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Out in the Open: U.S. GEOINT and OSINT in the Cold War 1946-1986

Cooper-Morgan Bryant

A Thesis in the Field of History

for the Degree of Master of Liberal Arts in Extension Studies

Harvard University

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Abstract

This thesis explores and describes the ways in which spaceborne and aerial reconnaissance platforms and open source intelligence together provided the U.S. with a distinct strategic advantage over the USSR in the Cold War. Comprising five chapters and three case studies, this thesis explores the multifaceted ways that geospatial and open source intelligence capabilities have shaped intelligence policy and supported the national interest. Beginning in the post-World War II era and concluding in 1986, geospatial power, the Foreign Broadcast Information Agency, the missile gap, the CORONA program, and the Strategic Defense Initiative comprise the bulk of this thesis' scholarship. In highlighting for the reader the extent to which issues related to the growth of GEOINT and OSINT can be viewed as solutions to some of the most pervasive issues facing the Intelligence Community today, this thesis promotes the idea that operational security, innovation, and collaboration across agencies led directly to a paradigmatic shift in intelligence collection and analysis.

This thesis delves into the evolution of geospatial power, revealing the particular ways in which the growth of such power contributed to policy and security. With case studies on the Sputnik moment, the conception and development of the U-2, and the Cuban Missile Crisis, this thesis provides robust evidence supporting the core argument. Furthermore, this thesis highlights how a historian of the era can address contemporary issues facing the USIC, such as machine learning, data analysis, and classification, thereby providing novel insight into how to deal with such issues today.

Dedication

To Hannah and Dad, with love

"For small creatures such as we, the vastness is bearable only through love." — Carl Sagan

"…that human achievement may be spared the ravages of time, and that everything great and astounding, and all the glory of those exploits which served to display Greeks and barbarians alike to such effect, be kept alive…" — Herodotus of Halicarnassus, The Histories.

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Terminology

AMT- Anti-Ballistic Missile Treaty

Apogee – The point in orbit when an object is farthest away from earth.

ARP – Aerial Reconnaissance Platform

ASAT – Anti-Satellite Technology

CIA – Central Intelligence Agency

COMINT – Communications Intelligence

CTBT – Comprehensive Test Ban Treaty, 1996

DARPA—Defense Advanced Research Projects Agency

DMSP (Defense Meteorology Satellite Program)

DSP – Defense Support Program

DMA – Defense Mapping Agency

DoD – Department of Defense

ELINT – Electronic Intelligence

EO – Executive Order

Escape Velocity – The minimum speed an object is required to achieve to escape earth's orbit

FBIS – Foreign Broadcast Information Service

FVEY – Five-Eyes Alliance

GEOINT – Geospatial Intelligence

GEO – Geosynchronous Orbit, 22,000 miles above Earth's surface

Geostationary Orbit – 26,200 miles above the Earth

HEO – Highly Elliptical Orbit, perigee of roughly 300 miles, apogee of 25,000 miles above the Earth's surface

HUMINT – Human Intelligence

ICBM – Intercontinental Ballistic Missile

IGY – International Geophysical Year, July 1957-December 1958

IMINT – Imagery Intelligence

IRBM – Intermediate Range Ballistic Missile

LEO – Low Earth Orbit, roughly 200 miles to 1,000 miles above Earth's surface.

Keyhole – The successor to the CORONA program, post 1963.

LTBT – Limited Test Ban Treaty, 1963

MEO – Medium Earth Orbit, range between LEO and GEO

MIRV – Multiple Independent Reentry Vehicles

MORL (Manned Orbital Research Laboratory)

NAMA – National Imagery and Mapping Agency

NATO – North Atlanta Treaty Organization

NIE – National Intelligence Estimate

NIMA (National Imagery and Mapping Agency)

NSA – National Security Agency

NSC – National Security Council

NTM – National Technical Means of Verification

NRO – National Reconnaissance Office

NPT – Non-Proliferation Treaty

OSS – Office of Special Services

OSINT – Open Source Intelligence: Intelligence produced from publicly available information that is collected, exploited, and disseminated in a timely manner to an appropriate audience for the purpose of addressing a specific intelligence requirement.

Perigee – The point in an orbit where an object is closest to the Earth.

PDB – The President's Daily Brief

SALT/SALT II – Strategic Arms Limitation Treaty

SARP – Space and Aerial Reconnaissance Platform

SDI – The Strategic Defense Initiative, also known as 'Star Wars.'

SRP – Spaceborne Reconnaissance Platforms

SRV – Satellite Reentry Vehicle

SRBM – Short Range Ballistic Missile

START – Strategic Arms Reduction Talks

WMD – Weapon of Mass Destruction

Chapter I.

Geospatial Power: Its Post-WWII Development and the New Look Defense Policy

I know, too, of cases that have occurred in the past when people sometimes as the result of slanderous information and sometimes merely on the strength of suspicion, have become frightened of each other and then, in their anxiety to strike first before anything is done to them have done irreparable harm to those who neither intended nor even wanted to do them any harm at all. I have come then in the conviction that misunderstandings of this sort can best be ended by personal contact, as I want to make it clear to you that you have no reason to distrust us."

— Xenophon of Athens, circa 400 B.C, moments before the Achaemenids used the quoted meeting to slaughter the Greek leadership.

Does knowing the relative strength of one's adversary matter? Is suspicion a good motivator for politics, strategy, or tactics? Is trust a suitable replacement for suspicion in a diplomatic context?

Had the Greek leadership asked questions such as these, perhaps the Greek Army of Cyrus the Younger, escorted out of Persia by the victorious army of Cyrus' brother, the Achaemenid King Artaxerxes II, may not have lost their heads. As Thomas Schelling wrote in his analysis of the slaughter in *Arms and Influence, "*The mistake was apparently in thinking that the only way to take the danger out of distrust is to replace it with trust."[1]

Fast forwarding to the past century, a major area of state investment in power is in the geospatial domain. Geospatial power refers to the facilitation and utilization of

[1] Thomas C. Schelling, *Arms and Influence*, Veritas paperback edition, 2020 (New Haven, CT: Yale University Press, 1966), 261–62.

advanced reconnaissance platforms such as spy satellites to satisfy a variety of intelligence, strategic, and tactical requirements. A key motivator of the rise of geospatial power has been distrust: distrust of the Soviets by the Americans and vice-versa. Distrust of leadership, of capability, of technology, and of the general unknown had served to ignite in the imaginations of leaders and policymakers' monsters – machinations as evil and blunt as their purported intentions held. In the new nuclear age – an age in which destruction and warfare was thought of no longer in terms of trenches, or tanks – in which the levels of violence now dealt with obliteration of cities, governments, and systems – warfare changed, and the warmakers were compelled to change with it. This chapter holds firm to the argument that geospatial power was the hinge upon which the door of technological advancement, economic prosperity, cultural influence, and the ultimate winning of the Cold War, swayed. The fervor and dedication with which American policymakers and leaders facilitated the development, deployment, and eventual exploitation of geospatial intelligence provides enough evidence to support this claim, as will be demonstrated below.

Distrust and suspicion were not the only drivers of the growth of geospatial power. Logistics, international legality, reliance on perhaps outdated or misinformed intelligence, the need to create and implement reconnaissance operations with limited or non-existent human handling, and a wide swath of questions relating to the overall technological feasibility of space and aerial reconnaissance platforms (SARPs) served not only to spur the growth of American geospatial power, but also to solidify its importance in the U.S.A.'s security network across the Western Hemisphere. However, before

SARPs themselves will be written about later in this thesis, some groundwork must be laid – a stage must be set.

The threat of the U.S.S.R., having grown significantly from the end of World War Two, reached a crescendo on August 29, 1949, with the successful detonation of a nuclear weapon, RDS-1, at Semipalatinsk Test Site in modern-day Kazakhstan. The Central Intelligence Agency would inform President Truman less than two weeks later, on September 9, 1949, of "abnormal radio-active contamination" registered in the Pacific Northwest, revealing to the only man in history to have authorized nuclear weapons for a military purpose that the U.S.S.R. had technical parity with the U.S.A.[2]

However, one important aspect in the minds of President Truman and Eisenhower, their advisors, and those to come was that the Soviets had no confirmed way of reaching the U.S. with a nuclear bomb by plane, providing some comfort to policymakers in Washington, while surely of less comfort to allies in London, Paris, and Berlin, among others. The Soviet's contemporary inability to create and deploy what would later be termed an Intercontinental Ballistic Missile (ICBM), allowed the Truman, and subsequently Eisenhower, administrations to take stock of how the U.S. would respond technologically.

[2] "Detection of the First Soviet Nuclear Test, September 1949 | National Security Archive | Burr, September 9, 2019

The Beacon Hill Report

A key response to the RDS-1 detonation was the Beacon Hill Report, commissioned by President Eisenhower and published via classified channels on June 15, 1952.[3] The Beacon Hill Report Commission consisted of a group of civilian scientists and consultants across various fields and relationships to the Massachusetts Institute of Technology (MIT) which hosted the commission. Chaired by Dr. Carl F. J. Overhage, Director of MIT's Lincoln Laboratory, the report surveyed "the current Air Force program in intelligence and reconnaissance," and suggested "directions for future technical effort." Essentially, the Beacon Hill Report outlined for President Eisenhower, an early-adopter and firm believer in the necessity of intelligence, espionage, and reconnaissance, problems, requirements, and possible solutions to issues surrounding the facilitation and deployment of SARPs. The Beacon Hill Report outlined several important comparative questions at its outset – having acknowledged the reality of the largeness and apparent similarity of the Soviet and U.S. militaries in terms of manpower and force – "Which is smarter? Which can learn more about the vulnerability of the other, and adapt its force most shrewdly and precisely to exploit the other's weakness? … We are smarter only if we <u>know</u> more – about the enemy's strength, his weaknesses his plans."[4] Several members of the Beacon Hill Report Committee, such as Edwin Land, and Alan Donovan, will be mentioned throughout this thesis across both the GEOINT and OSINT-focused portions.

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[3] F.W. Loomis, "Beacon Hill Report: Problems of Air Force Intelligence and Reconnaissance, Project Lincoln, Massachusetts Institute of Technology (MIT), 1952," *Confidential*, June 15, 1952.
[4] Beacon Hill Report, 14.

The Beacon Hill Report continued to ask questions, some of which will have been unanswered for over a decade after the completion of the report, highlighting the scarcity of actionable intelligence relating to Soviet weaponry, combat forces, and readiness. Unmentioned in the report but which remained vital in the minds of American policymakers was the scarcity of knowledge of the Soviet interior – a subject reliant on the closed nature of Soviet society which could only be solved at the time through atlases outdated maps, and scare open source intelligence, which will be the subject of a subsequent chapter.

Subjects of note in the Beacon Hill Report for which the authors highlighted robust intelligence requirements are: the necessity of developing stronger electromagnetic intercept technology, photoelectric aids, word-of-mouth sources (OSINT), and most notably for this thesis, photographic reconnaissance. The development of photographic reconnaissance outlined in the report, though not explicit in its space-borne capability, (the idea of a high-utility, high-precision ICBM still being two years off) gave policymakers and committee members a rough outline of expectations and requirements for photographic reconnaissance. Such expectations and technological requirements included that any future aerial photo reconnaissance system would have to fly at 70,000 feet and be equipped with a "small, fast-cycling, wide-angle 70mm camera with shutter speeds up to 1/2000-second and with image-motion composition" with "No lenses of focal length greater than 36 inches."[5]

The Beacon Hill Report provided the foundation for nearly all subsequent technical intelligence requirements and outlined for policymakers the issues which

[5] Beacon Hill Report, 18.

needed resolution in that space. Future developments, such as those of Weapon System 117L (WS-117L), the U-2, the SR-71, the SAMOS System, the DISCOVERER/CORONA/KEYHOLE system, the MIDAS system, the creation of the National Reconnaissance Office (NRO), and the MURAL system, all of which became significant aspects and stages of the evolution of the U.S.' National Technical Means of Verification (NTM) all stem from the Beacon Hill Report, and its influence on the minds of policymakers, tacticians, and engineers is difficult to overstate. At several moments across the creation of geospatial intelligence, engineers and policymakers would look back on the requirements of the Beacon Hill Report for guidance. An additional and subsequent committee, the Technological Capabilities Panel (TCP) would lead the next charge by addressing issues relating to industrial and precision technical capacity in 50's America and making recommendations that would shift the Cold War in the United States' favor.

The Technological Capabilities Panel

The Technological Capabilities Panel (TCP) was commissioned by President Eisenhower on July 26, 1954 with then-MIT President James R. Killian chairing. Killian, a tweedy, Kipling-esque, British-Intelligence inspired foreign policy expert, would later become the 1st Chair of the President's Foreign Intelligence Advisory Board, ostensibly due to his work with the TCP.[6] Under Killian were approximately 42 scientists, military advisors, engineers, technicians, industrialists, and specialists, some of whom have not

[6] "James Rhyne Killian, Carolyn Killian Staley and Dwight David Eisenhower at Swearing in Ceremony, circa 1956," MIT Museum; "Letter to Dr. James R. Killian, Jr., Appointing Him Chairman, Board of Consultants on Foreign Intelligence Activities. | The American Presidency Project,"

had their names officially declassified. The TCP was split into several working groups, committees, and subcommittees. As noted in the figure below, leadership and oversight of the TCP was divided into: The Technological Capabilities Panel of the Science Advisory Committee, the Executive Staff, and the Military Advisory Committee. Reporting to Killian were Project 1, Project 2, Project 3, and the Communications Working Group, studying the continental defense, striking power, and intelligence capabilities of the U.S., respectively.[7]

Project 3, led by Dr. Edwin H. Land, former CEO of the Polaroid Corporation, was by far the most pivotal group of the TCP as a whole when considering both the short and long-term implications constituting the rise of geospatial power. Land, who at the time of instigation of the TCP was on leave from his leadership position at Polaroid and was busy advising Alfred Hitchcock on modem three-dimensional filmmaking techniques, was asked for by name by Killian and immediately brought to Washington for the first meeting of the TCP on September 13, 1954. Land, who had hundreds film and lens technology patents to his name, served the TCP's Project 3 not only by bringing that expertise to bear on the TCP itself, but also out-of-the-box thinking which elevated Killian and Project 3 as a whole to nearly weekly briefings and progress update with President Eisenhower himself.[8] Land's theoretical approach to technological innovation was simple and refined, highlighting the need to define a requirement and explore the

[7] Gregory W. Pedlow and Donald E. Welzenbach, "The CIA and the U2 Program," History Staff *Center for the Study of Intelligence* Central Intelligence Agency (1998).
[8] William E. Burrows, *Deep Black: Space Espionage and National Security*, First (New York, New York: Random House, 1986), 62–64; Pedlow and Welzenbach, "The CIA and the U2 Program," 42.

shortest routes possible to that requirement's satisfaction, "he did not think there was a law of nature forbidding what you wanted to specified."[9]

The TCP consisted of some of the greatest technological and conceptual minds of the era – it was apparent to all involved that President Eisenhower was calling the nation's most faithful minds for a purpose greater than themselves. In addition to the demonstrated brilliance of Killian and Land, other notable members of the TCP included Dr. James Baker, Associate Director of the Harvard Optical Laboratory, Joseph Kennedy of Washington University in St. Louis, Allan Latham Jr., a friend of Land and a staff member at Polaroid, Nobel Laureate and Harvard professor Edward Purcell, and Dr. John W. Turkey of Princeton University and Bell Laboratories.[10]

The TCP's mandate was to "study the country's technological capabilities to meet some of its current problems" with the express intent of preventing an (ostensibly nuclear) surprise attack, with the memory of Pearl Harbor still fresh in the minds of all.[11] The TCP as a whole focused on 5 key goals: 1. Development of American capacity to gain intelligence regarding early warning; 2. Increasing retaliatory power to promote deterrence; 3. Strengthen defensive capabilities; 4. Assure secure and reliable communications; and 5. Understand the effect of technology on personnel requirements.[12]

The TCP was given absolutely unprecedented civilian access to national military and intelligence secrets, with one of the earliest sub-panel meetings occurring with Project 3 interviewing CIA, USAF, and various USIC officials across the Eisenhower

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[9] Robert M. Dienesch, *Eyeing The Red Storm: Eisenhower and the First Attempt to Build a Spy Satellite* (University of Nebraska, 2016), 62.
[10] Dienesch, 62–64.
[11] Pedlow and Welzenbach, "The CIA and the U2 Program," 38.
[12] Dienesch, *Eyeing The Red Storm: Eisenhower and the First Attempt to Build a Spy Satellite*, 61–62.

administration. The primary takeaway from these meetings was a sense that ineffectiveness, interagency rivalry, and unclear boundaries separating the spheres of influence within the USIC and the Armed Forces had become pervasive. In a Top Secret/Codeword interview, Land would recall, "We would go in and interview generals and admirals in charge of intelligence and come away worried. Here we were, five or six young men, asking questions that these high-ranking officers couldn't answer."[13]

Land's apparent exasperation with the USIC and the USAF in particular led him to find a compatriot in President Eisenhower, whose experience in both World War Two and the Oval Office provided him with unique insight into the innerworkings and machinations of the American military and intelligence apparatus. As Eisenhower's military budget was fraught with issues related to overspending, and a public unwilling to fund a global military force in peacetime, Land provided an alternative, less costly (and certainly less likely to result in massive death) way of 'doing' war, notably intelligence.

Land's Intelligence Panel, under the guidance of Killian, provided President Eisenhower with the means to commit more broadly to a new, more intelligence-focused force posture. The TCP supported ideas, notably the yet-unseen U-2 reconnaissance aircraft and the CORONA spaceborne reconnaissance platform, that could be done in peacetime and provide an advantage not only in the public space, but also an overall intelligence advantage over the U.S. adversaries.

As will be written on in significantly greater depth in the case study on the U-2 below, the TCP discovered, advocated for, and oversaw the implementation of SARPs, providing what Land called "hard facts" to support intelligence, all while cutting costs.

[13] Dienesch, 63.

The TCP's final report, delivered to President Eisenhower on Valentine's Day, 1955, noted that "We must face up to the reality of the actual situation: our estimates of the capabilities of the Soviets have, at their center, only a very limited core of hard facts, and we know even less about their intentions … We must find ways to increase the number of hard facts upon which out intelligence estimates are based, to provide a better strategic warning, to minimize surprise in the kind of attack and to reduce the danger of gross overestimation or gross underestimation of the threat. To this end, we recommend adoption of a vigorous program for the extensive use, in many intelligence procedures, of the most advanced knowledge in science and technology."[14]

Among the recommendations of Land's Intelligence Panel within the TCP, which highlighted requirements for what would later be referred to as spaceborne reconnaissance, was a little-known aerial project dubbed CL-282/Article 347, or as it was later and more famously called, the U-2. The U-2, whose project name within the CIA was Project AQUATONE, was intended to fill the urgent intelligence requirements laid out by the Beacon Hill Report and those of the TCP. In the years until ICBM launch capability, general rocket technology, and reconnaissance apparatuses, i.e., photoreconnaissance satellites, would be ready to deploy, the U-2 was given extreme precedence over many other projects within the USIC. Though the U-2 and its journey from imagination to deployment will be written about in much greater detail in a case study towards the end of this thesis, it is salient to note here how important the TCP, and

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[14] National Security Policy, Volume XIX - Office of the Historian," Comments on the report to the President by the Technological Capabilities Panel of the Science Advisory Committee, *WHO, ONASA, NSC* Series, Policy Papers Subseries, box 16, file NSC 5522 Technological Capabilities Panel, p. s21

Land's Intelligence Panel as a whole, was in the generation of one of the U.S.' longest-serving aircrafts.[15]

[15] "U-2S/TU-2S," https://www.af.mil/About-Us/Fact-Sheets/Display/Article/104560/u-2stu-2s/

Case Study #1: The Sputnik Moment and its Lasting Implications

On October 4, 1957, Senate Majority Leader Lyndon B. Johnson (D-TX) hosted a dinner party at his ranch with several friends, colleagues, and family members when the radio announced that the Soviets had successfully launched the first artificial satellite in history into low earth orbit (LEO), expressing for the first time a sense of Soviet technological superiority over the United States.16 What Johnson didn't know at the time was that the satellite Sputnik had completed two passes over the continental U.S. before its detection via radar on the evening of October 4. What Johnson, like many others in 1957, knew for certain was that the world had changed forever. If the Soviets could build a rocket big enough to launch Sputnik into orbit, they could certainly launch a nuclear warhead by similar means. The victory of that day belonged to the Soviets and the Soviets alone, for while Moscow celebrated, the West shuddered, impacting the minds and visions of the future of American policymakers, analysts, and executives.

One major aspect of how Sputnik impacted the minds of policymakers across the Federal government was the shock of it all. Sputnik was thought of by Burrows as a "technological Pearl Harbor" whose message warned the U.S. to drastically change its defense policies lest, in the words of Senator Stuart Symington (D-MO) "the Soviets move from superiority to supremacy."17 Confluent with the Soviet detonation of a nuclear bomb, a weapon thought to be exclusively in the hands of the Americans, in 1949, the sense that the Soviets were no longer playing catch-up, but were rather exceeding the U.S. in terms of military technology, began to make itself known across the USIC, Congress, and the American public as a whole.

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[16] Dienesch, *Eyeing The Red Storm: Eisenhower and the First Attempt to Build a Spy Satellite*, xii.
[17] Burrows, *Deep Black: Space Espionage and National Security*, 92.

Another example of how the Sputnik launch affected U.S. policymakers comes from two U.S. Secretaries of Defense, Charles Wilson and Neil McElroy. Secretary Wilson called Sputnik a "nice, technical trick" attempting to downplay the event despite blatant evidence of its importance to senses of American technological supremacy.[18] Wilson, whose tenure as Secretary of Defense lasted four days into the Sputnik era due to his desire to retire after President Eisenhower won his second term, was followed by Secretary McElroy, whose response to Sputnik was to order investigation into and creation of systems intentionally built to shoot down incoming missiles, behaving as a predecessor of the Strategic Defense Initiative (SDI) under President Ronald Reagan.[19]

However, it is worth noting briefly that the shocking aspect of Sputnik was not Sputnik at all, but rather its delivery system, the R-7 Semyorka ICBM, referred to by NATO as the SS-6 Sapwood.[20] The R-7 had, at the time of the Sputnik launch, a total lift-off thrust of approximately 4,537N (1,019,960 lb) of thrust, compared to the contemporary U.S. Atlas ICBM with approximately 1,468N (330,000 lb) of thrust, showing that the Soviets were in possession of and had utilized a rocket over three times more powerful than anything the U.S. had.[21] The Semyorka was able to place an object of roughly 500kg into LEO, while the Atlas was thought capable of placing a 9kg object in orbit – the Soviet missile program had proven itself far superior to that of the U.S. and other allied forces.

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[18] Thomas Jr. Graham and Keith Hansen, *Spy Satellites and Other Intelligence Technologies That Changed History*, Illustrated edition (Seattle: University of Washington Press, 2007), 37.
[19] Scott Armstrong and Peter Grier, *Strategic Defense Initiative: Splendid Defense or Pipe Dream?*, Headline Series 275 (Foregin Policy Association, 1986), 5.
[20] M C Wonus, "The Case of the SS-6: Growing Pains in Astronautics Intelligence," *CIA Historical Review Program*, July 2, 1996.
[21] Davis Baker, *US Spy Satellites: 1959 Onwards (All Missions, All Models) Owners Workshop Manual* (Somerset, UK.: Haynes Publishing, 2016), 37.

The R-7 Semyorka which launched the Sputnik satellite into orbit was designed in an exceedingly Soviet-style way. The rockets creator, Segei Korolev, had been imprisoned by Joseph Stalin in the early 1950s for “wasting government resources on studying rockets for space travel” and had been released and allowed to continue his work under the leadership of Nikita Khrushchev.22 Korolev had personally lobbied Khrushchev to utilize the novel R-7 rocket system to place a satellite in orbit, highlighting a satellite’s ability to “galvanize the public into recognizing the USSR as a world leader in advanced technology.”23

Korolev had relied on the work of Konstantin Tsiolkovsky, whose early work on rocket propulsion was considered a paradigm shift in astronautics and who serves as one of the grand pioneers of spaceflight technology.24 Tsiolkovsky’s Equation, or the Ideal Rocket Equation, as it is commonly referred to, relied on the principle of the conservation of momentum, proving mathematically that with enough force, an object could be launched and placed in a specific place within or outside of Earth’s orbit. Korolev had taken Tsiolkovsky’s work and applied it to more modern rocket frames and fuel stacks, eventually successfully presenting to the Soviet high command the R-7 Semyorka rocket, which consisted of a total of twenty motors to reach contemporarily maximum payload-to-orbit capability.25

The Sputnik launch both caused and solved a wide variety of problems for President Eisenhower while in office, having led to several executive orders, policy

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[22] Baker, 37.
[23] Baker, 38.
[24] Jennifer Wall: NETS, “Konstantin E. Tsiolkovsky,” NASA (Brian Dunbar, June 5, 2013), http://www.nasa.gov/audience/foreducators/rocketry/home/konstantin-tsiolkovsky.html.
[25] Baker, *US Spy Satellites: 1959 Onwards (All Missions, All Models) Owners Workshop Manual*, 38.

documents, National Intelligence Estimates (NIEs) and a marked increase in national defense spending. General Curtis LeMay, whose leadership of the Strategic Air Command (SAC) during and after WWII allotted him near-complete command of the USAF, used the Sputnik moment to receive an additional $23.8 billion from Eisenhower in FY 1958, predicting that the U.S. was so far behind the Soviets technologically and militarily that a single surprise attack could eliminate the United States as a whole, assessing that the comparative bomber forces of the USSR and U.S. was 2:1.26

A key aspect of the Sputnik moment and its immediate aftermath was the fresh opportunity for hawks like LeMay to acquire additional funding, which in the eyes of President Eisenhower was an extraordinarily dangerous precedent to set. Fearful of runaway spending in the aftermath of Sputnik, President Eisenhower went out of his way repeatedly to convince legislators, the American public, and the Joint Chiefs of Staff (JCS) to accept his views on balanced defense spending. In a letter to Swede Hazlett, Eisenhower's childhood and lifelong friend, Eisenhower wrote of the JCS, "What I need to make the Chiefs realize is that they are men of sufficient stature, training and intelligence to think of this balance – the balance between minimum requirements in the costly implements of war and the health of our economy."27

In terms of documentary evidence for shifts in policy stemming from the Sputnik, the ordering and completion of NSC 5814/1, subtitled "Preliminary U.S. Policy in Outer Space," by President Eisenhower in the summer of 1958 has proven to be one of the most seminal reports in the history of U.S. reconnaissance and space policy.28 NSC 5814/1

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[26] Dienesch, *Eyeing The Red Storm: Eisenhower and the First Attempt to Build a Spy Satellite*, 54.
[27] Ambrose, *Eisenhower The President* (New York,NY: Simon & Schuster, 1984), 225.
[28] Burrows, *Deep Black: Space Espionage and National Security*, 104.

made several points salient to this thesis, the greatest of which was the necessity of separation between civilian and military space programs, as lessons learned from studying the Semyorka rocket, which was quite useful in launching a satellite into orbit but which had little to no utility as an attack vehicle given the length of time required for the boosters to warm up. NSC 5814/1 pointed out that "Reconnaissance satellites are of critical importance to U.S. national security," and urged their development "at the earliest technologically practicable date" in an attempt to "enhance to the maximum extent the U.S. intelligence effort."29 Over two years after Edwin Land's TCP provided its final report to President Eisenhower urging him to undertake a stronger, more faithful SRP program, Sputnik occurred, and a little less than one year later after that, the NSC agreed.

Paired with a robust denied targets program, the Soviets with their short-term technological superiority seemed to be an impenetrable box, and solutions had to be made. Despite the willingness on President Eisenhower's part to take on the monumental project of developing the first space reconnaissance platforms, several issues remained. The first was a deep distrust and misunderstanding of the Soviet economy – policymakers were consistently confounded by the idea that a market economy could fall behind a command economy technologically. At the time, the U.S. was not aware of the particular scale of the espionage, deception, and theft of intellectual property which propped up the Soviet technology sector for decades. After all, capitalism had until the successful launch of Sputnik proven to be the more efficient model in terms of innovation and growth which promoted the overall vitality of Western market-based economies. The second

[29] Foreign Relations of the United States, 1958–1960, United Nations and General International Matters, Volume II - Office of the Historian, "National Security Council Report 5814/1," August 18, 1958, https://history.state.gov/historicaldocuments/frus1958-60v02/d442.

issue was that SRPs would take a long time to develop, as nascent technology does not appear out of thin air. The third issue was that neither side understood the other's response expectations, with a lack of communication leading to imaginative fears on both sides, primarily on whether or not one side would launch a preemptive strike, what their second strike capability would be, and the time it would take for one side to know that the other had launched a nuclear weapon. The fourth issue was that the U.S. was unsure of how the Soviets would respond to something like an SRP flying above Soviet territory – asking the question of how far up precisely Westphalian ideas of sovereignty would go. In a sense, the launch of Sputnik solved the fourth issue – if the Soviets could fly a satellite over the continental U.S., then the idea of sovereign space need not exist, thus allowing for the commencement of work on SRPs. To solve issue two, the U-2 would be built, which will be written on in greater detail in Case Study #2. Solving issues one and three, however, would take an old, but certainly ramped-up approach to understanding one's adversaries better: Open Source Intelligence.

Chapter II.

First Generation Open Source Intelligence: The FBIS, The Yale Report, and the Beginning of the Classification Crisis

On July 14, 2016, Cameron Colquhoun wrote a piece for Bellingcat, a reputable not-for-profit open source intelligence (OSINT) investigation organization focused on solving global crimes and supporting journalists worldwide.30 In the piece titled "A Brief History of Open Source Intelligence," Colquhoun wrote that, after WWII, "the world of open source (in a Government analysis context) went into a deep sleep, undisturbed by the Cold War or even 9/11."31 However understanding one must be of the reliance on the word "brief" in the article's title, it is the goal of this chapter to dispel any notion that OSINT simply "went into a deep sleep," or that the INT itself was "undisturbed by the Cold War." OSINT has existed across the modern era, but to Colquhoun's sentiment, has risen in prominence and utility in the post 9/11 era, parallel with the rise of the internet, social media, and other various technological improvements which allow us to see each other a bit more clearly.

OSINT played a crucial role in understanding several major geopolitical events across the Cold War, notably communist buildups in the Indo-Pacific in 1950, the Hungarian Uprising of 1956, the Cuban Missile Crisis in 1962 (the focus of a subsequent case study), the Prague Spring and the Tet Offensive of 1968, the 1978 peace agreement

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[30] "We Are Bellingcat," Bellingcat, Eliot Higgins https://www.bellingcat.com/book/.
[31] Cameron Colquhoun, "A Brief History of Open Source Intelligence," Bellingcat, July 14, 2016, https://www.bellingcat.com/resources/articles/2016/07/14/a-brief-history-of-open-source-intelligence/.

between Israel in Egypt, the 1979 Soviet invasion of Afghanistan, and others.32 While OSINT may not be as flashy as HUMINT, its utility was valued across the USIC and Presidents alike. Through the collection, exploitation, analysis, and assimilation into intelligence briefings, OSINT played a historically outsized role in maintaining national defense when considering its small funding relative to other aspects of the U.S. defense apparatus, which will be written on below. By looking at financial documents indicating growth in funding, archival research into the growth of OSINT as a legitimate "INT," and comparative parallels not only between Soviet and U.S. OSINT operations but also OSINT agency parallels across the globe; this chapter serves to demonstrate to the reader the utility of OSINT in the Cold War. Later, an analysis will showcase how the U.S. and the USSR utilized OSINT to satisfy various intelligence requirements.

This argument will be showcased through various sources and occasions in which Open Source Intelligence proved valuable, if not decisive, in impacting the overall geopolitical landscape. This chapter will highlight, to multiple extents, the ways in which OSINT solved intelligence problems, as well as the role that roadblocks to genuine OSINT prevented the USIC from fulfilling said intelligence requirements, primarily through the shifted-wartime Foreign Broadcast Information Service (FBIS) which dealt strictly with unallocated open source materials, and which utilized several novel analytic methodologies, collection platforms, and interagency resources to satisfy primary

[32] William O. Studeman, "Remarks by Admiral William O. Studeman, Deputy Director of Central Intelligence at the Symposium on 'National Security and National Competitiveness: Open Source Solutions,'" *Teaching the Giant to Dance: Contradictions and Opportunities in Open Source Within the Intelligence Community*, December 1, 1992, https://www.proquest.com/dnsa/docview/1679159975/abstract/1725BE1C8484D8FPQ/10.

intelligence requirements laid out by the President and his National Security Council, among other aspects of the USIC.

The most salient role OSINT played in the Cold War was solving problems one and three from the previous chapter: misunderstanding of the Soviet economy and unclear expectations of possible Soviet responses to perceived American aggression , OSINT provided insight into the workings of the closed Soviet society, using newspapers, academic articles, parades, broadcasts, and refugee interviews. OSINT also played a broader international role, with intelligence collected from Chinese, Baltic, and central European sources. As will be highlighted and substantiated below, information warfare, not only as a concept but as a discipline, was developed, practiced, and exploited during the Cold War, beginning as early as 1955.33 However, it was only in the postwar era that OSINT took on its modern form of monitoring a wide swath of publicly available sources, which eventually burgeoned into the internet era that is outside of the scope of this thesis, having focused nearly exclusively on the narrow framework of newspapers, magazines, broadcasts, and academic articles.

Additionally, an OSINT project during the Cold War, generated by Sherman Kent and called the "Yale Report," provides evidence to support one of this chapter's central claims – that the exploitative nature of open source materials in a democratic and open society provided so much U.S. military information that Presidents Eisenhower, Kennedy, and Johnson spurred novel advancements in classification, resulting not only in a more secure USIC and military apparatus but also what has come to be known as the "classification crisis." The classification crisis, a term inspired by Dr. Matthew

[33] Office of Current Intelligence, "April 12 1955 Current Intelligence Weekly Summary" (Central Intelligence Agency).

Connelly's book The Declassification Engine: What History Reveals About America's Top Secrets, is the "relatively recent anomaly" of mass classification to the effect of inevitable leaks, instability, and gross misuse of funds.34 This chapter showcases how OSINT was used to satisfy intelligence requirements and create a culture of classification, clearances, interagency rivalry, and an expansion of the USIC as a whole. However, one must begin somewhere, and as with much of the Cold War's technological and analytic improvements, the story begins with World War II.

The Foreign Broadcast Information Service

President Roosevelt instigated the formation of the Foreign Broadcast Intelligence Agency to satiate intelligence requirements during WWII to monitor broadcasts from Japan and Europe to intercept, interpret, analyze, and exploit foreign broadcasts to satisfy various wartime intelligence requirements. The Foreign Broadcast Intelligence Agency, as a wartime agency under the Federal Communications Commission, established its first non-D.C. listening post in Portland, Oregon intending to intercept and analyze Imperial Japanese broadcasts.35 Technically part of the Office of Special Services, which is considered to be the predecessor of the Central Intelligence Agency, the Foreign Broadcast Intelligence Service was placed under the command of the Department of the Army shortly after WWII and later transferred to the novel Directorate of Central

[34] Matthew Connelly, *The Declassification Engine: What History Reveals About America's Top Secrets* (New York: Pantheon, 2023); Patrick Radden Keefe, "The Cult of Secrecy," *Foreign Affairs*, February 13, 2023, https://www.foreignaffairs.com/reviews/patrick-radden-keefe-cult-of-secrecy-america-classification-crisis.

[35] Stephen C Mercado, "FBIS Against the Axis, 1941-1945," *Studies in Intelligence* Fall-Winter, no. 6 (n.d.): Central Intelligence Agency Directorate of Science and Technology.

Intelligence, and subsequently the Central Intelligence Agency after that agency's formation in 1947.

Post-World War II, the Foreign Broadcast Intelligence Agency was renamed the Foreign Broadcast Information Service (FBIS) within the novel Central Intelligence Agency (CIA), joining as a founding aspect as outlined in both President Truman's establishment of the Central Intelligence Group in 1946 and the subsequent National Security Act of 1947, which established the CIA as an independent agency, and which was comprised partly of the FBIS.36 The FBIS's mandate was to provide "as a service of common concern on behalf of the Intelligence Community, the monitoring, processing, and analysis of information from foreign public information media."37 The CIA defined "Foreign Public Information Media" as "foreign public radio and television broadcasts, foreign press services, and foreign publications" with the key intent being a greater and better developed understanding of nations, sovereignties, leaders, governments, militaries, and academies.38 In other words, the FBIS looked at a wide swath of sources, ranging from the seemingly benign newspaper of a small town to the hurried speeches of political and military leaders across the globe. All aspects in between, so long as the information itself was not classified, secured, or encrypted, it was considered fair game by the FBIS.

Translation, as the primary tool of the FBIS, allowed the service to publish roughly 80 periodicals, a five-times-weekly intelligence update, and a variety of

[36] Harry S. Truman, "Presidential Directive on Coordination of Foreign Intelligence Activities," January 22, 1946, https://history.state.gov/historicaldocuments/frus1945-50Intel/d71; "National Security Act of 1947," July 26, 1947, https://www.dni.gov/index.php/ic-legal-reference-book/national-security-act-of-1947.
[37] Director of Central Intelligence, "Director of Central Intelligence Directive 2/3: Foreign Broadcast Information Service" (July 30, 1982: Central Intelligence Agency, n.d.).
[38] Director of Central Intelligence.

specialized reports on specific countries, issues, leaders, and reports.39 By and large published by the Joint Publications Research Service (JPRS), at the time a joint CIA and DoD enterprise under the cover of the U.S. Department of Commerce, the FBIS' reports were disseminated across the USIC, often under the umbrella of the Current Intelligence Weekly Summary (CIWS) under the Office of Current Intelligence (OCI), a subset of the FBIS. FBIS officers and translators were capable of indigenous quality translation of 17 languages by 1957, with officers and translators placed in approximately 80 countries around the globe. The scale of the FBIS as a genuinely global intelligence agency relying on the infrastructure provided by the CIA showcases how OSINT proved valuable and actionable intelligence to policymakers across the spectrum of the USIC.

From a historical point of view, the FBIS' most salient role within the CIA, the USIC at large, and the executive branch was to provide members of the USIC, policymakers, and the President with a more strict understanding of Soviet society, its economy, and its academies, as the source material utilized by FBIS was rarely intended for anyone other than the members of the Soviet society, economy, and academies. This unique perspective allowed the FBIS to analyze information intended for the public, allowing the USIC insight into the inner workings of the Soviet machine and ample opportunity to exploit said information. As noted in the Sputnik case study, one of the primary challenges, albeit failures, of the USIC in the early days of the Cold War was a fundamental misunderstanding of the Soviet society and economy and its components. Primarily, policymakers (typically coming from more conservative voices such as

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[39] "A Suggestion about the Information Explosion: The Exploitation of Foreign Open Sources," n.d., Author Redacted https://www.proquest.com/dnsa/docview/1679043301/abstract/8B01415E8BA844D3PQ/2.

Senator Symington (D-MO), and which was noted in the Sputnik case study) were baffled by the idea that a command economy such as that of the USSR could so rapidly and decisively surpass that of a market economy in terms of missile technology, despite both being intensely industrial powers. Without a deep and faithful understanding of how precisely the Soviet economy worked, there was little understanding of how its military, industrial, foreign investment and labor force could have worked to surpass the U.S. Without adequate understanding, it was nearly impossible to find qualities within Soviet society which could be exploited from an intelligence perspective, leaving HUMINT and SIGINT operations without a helping hand.

As will be noted in a subsequent chapter on what had been termed the "Missile Gap," misunderstandings regarding the Soviet economy of force, Clausewitz's definition being the way in which a state employs force and maintains readiness, deeply impacted the minds of policymakers across the United States Government (USG), and its USIC – leading policymakers and military leaders towards gross overestimations of Soviet capability – thereby allowing the FBIS to fill an urgent intelligence requirement and repeatedly offer policymakers a better understanding of their adversary.40

However, one major challenge prevented clear access to information regarding the Soviet society and economy – the inherent insularity of the USSR. Referred to as a closed society, the USSR exhibited several salient symptoms of insularity, primarily through its attitudes towards academics and foreigners and the psyche of the Soviet public. A closed society, defined by Anthony Parel in his 1982 article Values of Closed Society, as a society that "through political organization, … survival, acquisitiveness, and

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[40] Sun-Tzu and Karl von Clausewitz, *The Book of War: The Art of Warfare & On War*, 2000 Modern Library Paperback Edition (Random House, n.d.), 437.

domination are effectively sought. … Hierarchy, authority, and immobility are their essential characteristics," additionally hinders academic progress, but, paradoxically, not technological progress.41 A closed society, particularly the modern Soviet society, was "ruled by superstitions and taboos that leave no place for anyone's critical opinion; no civil rights are guaranteed, and most decisions are taken behind closed doors."42 The impact of the closed Soviet society on OSINT collection and analysis within the FBIS took the form of analysts knowing that any material collected would have had to have gone through extensive copyediting by soviet personnel, which in a sense enabled FBIS analysts to better understand what the Soviets wanted and did not want published through academic and newspaper articles.

The USIC, primarily the CIA and the FBIS, had difficulty penetrating Soviet society. Between minders – Soviet employees trained in counterintelligence tasked with following American and other Western operatives and reporting their findings up their heavily centralized chain of command, and the overall hostility towards foreigners that the Soviet public displayed, collection of open sources was typically left to diplomatic attachés who were by and large prominent CIA officers and collections operatives. However, a significant quantity of embassies and foreign offices are comprised partly of FBIS officers tasked with collecting, translating, and disseminating open source material.43 This was primed by a demand to fulfill intelligence requirements with regard

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[41] Anthony Parel, "Values of Closed Society," *International Political Science Review* 3, no. 2 (April 1982): 230–37, https://doi.org/10.1177/019251218200300210.
[42] Nadezhda K. Radina and Mariia V. Koskina, "Power, Attraction, and Reference in Macrolevel Social Relations: An Analysis of Closed Groups and Closed Societies Based on the Psychology of the 'Soviet Person,'" *Psychology in Russia: State of the Art* 10, no. 1 (2017): 117–29, https://doi.org/10.11621/pir.2017.0109.
[43] "FBIS HISTORY | CIA FOIA (Foia.Cia.Gov)," 179, https://www.cia.gov/readingroom/document/cia-rdp84-00022r000300010005-6.

to better understanding Soviet intentions, effectiveness, and economy of force, set by the U.S. administration. However, as the core of this thesis argues, open sources were difficult to obtain and translate, exploit, and assimilate into the overall intelligence reports viewed by the President and other policymakers.

Additionally, particularly within the Soviet sphere, sources of varying quality and quantity challenged the FBIS. As a closed society with robust restrictions on speech and expression, specific sources were considered less exploitable than others, such as Soviet radio broadcasts. However, this was only sometimes the case. A CIWS report from April 1955 provided one of the earliest declassified reports of Soviet research on an artificial satellite.44 Radio broadcasts announced the names of 16 members of a commission developed to study the possibility of scientific satellites placed in orbit long before appearing in other intelligence reports. May Day parades also provided the USIC with an opportunity to exploit open sources, with CIA and FBIS officers watching military parades, ostensibly counting aircraft, taking covert photos of novel weapons, and providing updates on the apparent health and status of the Soviet leadership of Soviet research on an artificial satellite.45

Academic articles and newspapers comprised most of the material collected and analyzed by the FBIS. Academic articles provided additional levels of exploitable open source intelligence. Despite being sanitized, relative to those in the West, by the Soviet information apparatus, academic articles collected by the FBIS offered unique insight not only into the inner workings and advancements of Soviet technology and theory but also into Soviet estimations of U.S. power, intentions, capability, and economy of force.

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[44] Office of Current Intelligence, “April 12 1955 Current Intelligence Weekly Summary.”
[45] “FBIS HISTORY | CIA FOIA (Foia.Cia.Gov).”

Newspaper articles provided a vast swath of material primed for exploitation across the USSR, often including stories or photos that slipped through the cracks of Soviet information sanitization. A 1963 CIA periodical by Davis Moore Jr. on the exploitation of open Soviet sources details a moment when "dignitaries attending the November 7 anniversary parade … the Byelorussian paper carried a good full-face photo of the reviewing stand which revealed the whole order of protocol."46 Numerous instances of the exploitation of Soviet sources allowed for what Moore Jr. to call an "abundant resource."

Tremendous intelligence value was provided by Soviet open sources, despite their inherent difficulty in being obtained. Specific Soviet open sources typically used for FBIS and CIA exploitation were numerous. Mainly Soviet Military Regulations Manuals, which, when updated, were analyzed to showcase a shift in Soviet military thinking, as well as a journal entitled Vocnnaya Strategiya (Military Strategy) edited and partially authored by First Deputy Minister of Defense Vasily Sokolvsky, which Moore Jr. considered to be "the closest the Soviets have come to publishing a complete and up-to-date analysis of strategic and tactical concepts applied in the practices of their own and the U.S. armed forces." Although the FBIS was not the only agency tasked with the collection and exploitation of open source material, as the DoD and the U.S. Department of State (DoS) had their research bureaus which relied partly on the translation quality of the FBIS, the FBIS provided the bulk of political and military analysis of open sources in the USSR, furnishing "the more significant part of all information uses in the production

[46] Davis W. Moore Jr., "Open Sources on Soviet Military Affairs," c 1963, https://www.proquest.com/dnsa/docview/1679165487/abstract/546B5DC44A0F46C5PQ/1.

of military intelligence on the Soviet Union.”47 With the FBIS translating and analyzing up to 45,500 words/day by 1951, the abundance of information began to be provided as a challenge to the operational efficiency of the FBIS and CIA as a whole, which caused the FBIS to initiate partnerships with temporally equivalent services from allied nations.48

Notably, the U.S. was certainly neither the first nor the only power to see the value in OSINT, with analogous agencies and services spanning the globe. Other temporally relevant equivalents to the FBIS were the British Digest of Foreign Broadcasts (later entitled the Summary of World Broadcasts and known as the BBC Monitoring Service today) and the East German Ministry for State Security’s Information Bureau (colloquially known as the Stasi, and which analyzed over 1,000 Western magazines and books per month, along with approximately 100 newspapers and 12 hours of Western radio and TV broadcasts per day.)49 However, despite not having a siloed or otherwise delineated OSINT service, the Soviets used open sources across the West. They were indeed not limited by the OSINT program of the Stasi.

Soviet utilization of OSINT took various forms. As Moore Jr. notes, Soviet OSINT operations took several notable forms, such as attendance at technical and industrial conventions, correspondence with chambers of commerce, subscriptions to American journals and technical publications, direct purchases of documents from the USG, the purchasing of patent details for use in reproduction and analysis, and

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[47] Moore Jr., 2.

[48] Foreign Broadcast Information Service Central Intelligence Agency, “F.B.I.S. MONITORING AND COMMUNICATIONS TIME LAGS” (Kyrenia, Cyprus, Date Redacted, Estimated as 1952), https://www.cia.gov/readingroom/document/cia-rdp80-00765a000100010011-1.

[49] Central Intelligence Agency; Director, FBIS, “Future Relations between FBIS and BBC Monitoring Service Memo to Col Edwin K. Wright” (Foreign Broadcast Intelligence Service, September 13, 1946); Kalev Leetaru, “The Scope of FBIS and BBC Open-Source Media Coverage, 1979–2008 (U)” 54, no. 1 (2010).

reconnaissance trips throughout the U.S. itself, taking advantage of freedom of mobility.50 What is genuinely notable here is the last form of open source collection. As will be noted in a subsequent chapter, one of the primary differences between U.S. and Soviet OSINT and covert intelligence collection is that the Soviets had no real need to be so covert with their exploitation, as the U.S.' open society provided more than enough space and political leeway towards foreign persons to the point that, unlike in Moscow, if a Soviet operative wished to photograph government buildings, they certainly could and be well within their rights as visitors to the U.S. A following chapter will elaborate on the impact of this difference, particularly in terms of attitudes towards GEOINT.

From the U.S. perspective, an additional and arguably primary driver of OSINT is its cost-effectiveness. In 1997, during an era of budget cuts to the CIA in which the FBIS was considered for the chopping block, the Federation of American Scientists and other academics called for the preservation of the FBIS, calling it the "biggest bang for the buck in the American intelligence community."51 When considering basic operational expenses such as labor and transportation, along with the inherent cost of purchasing Soviet academic journals, newspapers, and atlases, the FBIS' budget had consistently been among the lowest – not due to perceived disuse of OSINT among the HUMINT-hungry USIC, but because the FBIS could not justify an exorbitant budget due to the inherent low-cost intelligence at the core of the FBIS a the USIC's more extensive OSINT apparatus.52 Compared to HUMINT, with its risk of human life, or GEOINT and

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[50] Moore Jr., "Open Sources on Soviet Military Affairs."
[51] Heather J. Williams and Ilana Blum, "Defining Second Generation Open Source Intelligence (OSINT) for the Defense Enterprise" (RAND Corporation, May 17, 2018), https://www.rand.org/pubs/research_reports/RR1964.html.
[52] Williams and Blum, 9.

SIGINT, with the inundation and rising cost of technology, OSINT provided intelligence of the highest caliber for the least amount of money possible – a core reason for the continued use of OSINT in the pre-internet (third generation OSINT) era.

The FBIS had several notable successes across its history, showcasing the effectiveness and utility of OSINT throughout the Cold War. As mentioned above, the rise in salience of the Indo-Pacific in 1950, the Hungarian Uprising against Soviet control in 1956, the Cuban Missile Crisis of 1962, which is the subject of the following case study, the Tet Offensive of 1968, the 1978 peace agreement between Israel and Egypt, and the 1979 Soviet invasion of Afghanistan, all provide salient and emphatic examples. The FBIS' successes were, by and large, drowned out among other, arguably more flashy successes across the Cold War involving HUMINT, causing a significant gap in the overall scholarship of Intelligence History. To showcase this, the FBIS does not appear in Tim Weiner's Legacy of Ashes: The History of the CIA, despite the work being considered by some to be a comprehensive and definitive compendium of CIA history.53

Before this thesis begins providing substantive claims to the effect of the role of the FBIS in the overall intelligence picture, it must set the stage by assessing shifting geopolitical tensions and relationships across the globe – notably, the thawing in tensions and restoration of sincere diplomatic relations with the People's Republic of China (PRC) and its leading Chinese Communist Party (CCP) beginning in earnest in 1972 when President Nixon signed the Shanghai Communique along with then-premier Zhou Enlai.54

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[53] Evan Thomas, "Counter Intelligence," *The New York Times*, July 22, 2007, sec. Books, https://www.nytimes.com/2007/07/22/books/review/Thomas-t.html.
[54] "Joint Communique of the United States of America and the People's Republic of China (Shanghai Communique)," http://www.china.org.cn/english/china-us/26012.htm.

After the 1972 thaw in relations with China, which had since split in relations from the USSR, the U.S. maintained a robust OSINT collection program despite translation and exploitation issues.55 Opportunities for OSINT collection came primarily in the form of robust but challenging translation, given the speed with which the USIC had to begin focusing on China, academic, and military publications. Barriers to OSINT collection in China depended not only on the closed society aspect similar to that of the USSR, but also on Chinese political culture. Notably, difficulty in telling the chairman, from Mao to Enlai and later through Xiaoping and into the modern era, there has existed significant difficulty stemming from the imperial era with not being able to tell the premier the truth across airwaves, in reports, or in person. As Crawley stated, analysts focused on Chinese open sources should remember that "History shows that in China, the bearer of bad tidings to the emperor traditionally was rewarded with death. This means that analysts should not be surprised that Chinese language sources contain no bad news," continuing that "This disposition towards no bad news manifests itself in open source documents in two primary forms, blatant hyperbole, and cautious conservatism, and the analyst must supply his own objectivity to the overstatements and understatements which he will often encounter."56

The FBIS did not limit its scope exclusively to the USSR and China. For instance, the rise in the salience of the Indo-Pacific was closely monitored by FBIS officers and translators, with some of the earliest reports of communist buildup in Indonesia coming

[55] Lorenz M. Luthi, *The Sino-Soviet Split: Cold War in the Communist World* (Princeton University Press, c2008), https://hdl.handle.net/2027/heb32514.0001.001.
[56] Carl B. Crawley, "On the Intelligence Exploitation of Open Source Chinese Documents," *NIQ* II, no. IV (Date Redacted [Post 1979), https://www.proquest.com/dnsa/docview/1679043193/abstract/AAF1012BB51F4378PQ/1.

in the form of a translated FBIS text, which ostensibly contributed to the support of CIA intervention in Indonesia.57 The global aspect of the FBIS, following that of the CIA itself, involved operations in most capitals of power across the world, including southeast Asia, South America, Africa, and Europe, providing the USIC and other customers with often vital insight into the inner workings of global thought in the pre-internet era. This insight provided customers with additional context in an often intelligence-starved Intelligence Community, thereby allowing policymakers to generate more faithful pictures and further intelligence requirements in their minds.

The FBIS also had several notable declassified successes regarding actionable intelligence throughout the Cold War. With limited HUMINT or GEOINT resources during the Hungarian Uprising of 1956, the FBIS played a crucial role in informing policymakers of developments in the stifled revolution, being the only agency with robust sources available during the tumult. Another example is the 1968 invasion of Czechoslovakia by the Warsaw Pact, which eliminated the rise of the Prague Spring. During those two events, "radio broadcasts provided intelligence analysts with a highly relevant, timely understanding of what was happening in the streets of Budapest and Prague."58

According to Adm. William O. Studeman, then Deputy Director of Central Intelligence, the FBIS collected and analyzed roughly 790 hours of television per week, had access to over 8,000 commercial databases, and was the prime witness to the rise of television media as an exploitable medium along with the rise in numbers of publications,

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[57] Bandoeng, "Indonesia Communists Meet at Cheribon" (Foreign Broadcast Information Service, January 25, 1946),
[58] Studeman, "Remarks by Admiral William O. Studeman, Deputy Director of Central Intelligence at the Symposium on "National Security and National Competitiveness."

highlighting that between 1970 and 1972 alone, more than 1700 novel periodicals were published that did not exist before 1970.

Later, additional successes for the FBIS came in the form of the 1979 invasions of Vietnam and Afghanistan by the Chinese in February and by the Soviets in December, respectively. The FBIS was able to exploit Chinese radio broadcasts aimed at the Vietnamese public and urged policymakers that an invasion was imminent. The FBIS convinced policymakers that the impending Chinese invasion of Vietnam was real by relying not only on the quality of translation but also by understanding different styles of Chinese speech and writing, as well as a, unique to the FBIS and perhaps the U.S. Diplomatic Corp, faithful and parsimonious understanding of Chinese cadence and subtext. As DDCI Studeman explained in 1992, “FBIS analysts anticipated the February 1979 Chinese invasion of Vietnam by demonstrating that, with rare exceptions, the wording of authoritative Chinese warnings to Vietnam had only been used in instanced in which Beijing actually applied military force.”59 In terms of the December 1979 invasion of Afghanistan by the USSR, open sources contributed significantly to policymakers’ understanding of the impetus and later results of the invasion itself. However, it was not until 1989, when the USSR pulled out of its decade-long and costly war in the Middle East and North Africa (MENA) region, that the FBIS’ utility came into the light. DDCI Studeman, who would undoubtedly be in an appropriate position to know, highlights that the FBIS began to anticipate the Soviet military withdrawal as early as May 1985.60 In addition to the above, one non-military example could be considered particularly striking in terms of the success of the FBIS – the monitoring and anticipation

[59] Studeman, 9.
[60] Studeman, 4.

of the collapse of the Soviet Union in 1991, with analysts estimating that at least 80% of their information came from open sources and the FBIS.

In facilitating the development of a greater understanding of Soviet intentions towards the U.S., an intelligence requirement set by all presidents from Truman to Clinton, the FBIS was critical. The importance of the FBIS for better understanding Soviet intentions, a requirement which will be touched on at greater length in the sections and chapters on the Yale Report and the Missile Gap, was evidenced primarily in its powers of translation. After Gary Powers' U-2 had been shot down by contemporarily novel anti-aircraft weaponry over Soviet territory on May 1, 1960, the FBIS provided an uneasy President Eisenhower with translations of Khrushchev's reaction via radio address to the Soviet people, to what he considered to be a direct and blatant violation of sovereignty by the U.S.[61]

The overall development of OSINT throughout the Cold War was affected by several factors: shifting geopolitical tensions, improvements and progression in technological ability, and a shifting media landscape. As Western Liberalism came to dominate the bulk of the Western Hemisphere (some outliers such as Cuba, Argentina, and Venezuela, among others notwithstanding), the USIC adapted to a marked increase in exploitable open source material from around the globe. As nations worldwide began to ease restrictions on speech, thought, and research, so did the quantity of materials that required analysis. Improvements and progression provided the most significant change to OSINT throughout the Cold War. The Cold War comprised some of the most notable technological shifts humanity had ever seen, such as the advent of television, mass book

[61] "Avalon Project - The U-2 Incident 1960," https://avalon.law.yale.edu/20th_century/u2.asp.

production, improvements in camera quality, and eventually, on the edge of this paper's scope, the internet itself as is thought of today. Particularly, television, camera quality, and the internet have proven to be the most salient identifiers of change when considering the state of OSINT throughout the USIC. Along with the dramatic increase in the quantity of exploitable open source material stemming from the advent of personal cameras, television, mass distribution of reading materials, and the internet, there occurred a dynamic and agile shift in how open sources were exploited and analyzed, as evidenced by Studeman saying, "Foreign TV Programs … give analysts a multidimensional feel for a country or material that other open source media cannot provide. Many analysts prefer to see the way a particular country chooses to portray events visually, rather than relying on the news network 'filter.' … It allows us to monitor crises as well as to broaden our knowledge of more restrictive societies. For example, the revolutions in Eastern Europe were covered extensively on those countries' domestic television."62 The shifting media landscape has provided an additional, at times stifling but valuable, room for OSINT to grow and for the FBIS to lead that charge. With the grand popularization of network news agencies and newspapers, those organizations saw an opportunity to cater to certain political sensibilities, allowing analysts to include an awareness of bias in their analysis. With the popularization of politically aligned news agencies whose viewer base depends on the fervor of the journalists' political doublespeak, analysts were, therefore able to create more faithful pictures regarding the intentions of foreign powers. This primarily introduced many analysts to the nascent ability to recognize and exploit political fervor.

[62] Studeman, "Remarks by Admiral William O. Studeman, Deputy Director of Central Intelligence at the Symposium on "National Security and National Competitiveness," 14.

The modern era, defined here as the post-Vietnam War Era (after 1975), in which technology began to develop at a rapid pace, driven by a healthy U.S. economy in the 1980s and the effects of late 20th-century globalization, was characterized not only by economic growth and stabilization but also by the advent of, as touched on above, what has come to be called Video Intelligence, or VIDINT. VIDINT, defined in 1988 by Brewer and Weltmer, is the "intelligence information derived from television broadcasts as well as on the scene handheld video collection."63 Brewer and Weltmer explain that "Video Intelligence can provide information that may not be available through other intelligence sources, as well as confirm analysis of material from those sources. Broadcasts can provide information on the development of new weapons systems, the deployment and modifications of existing systems, military operations, and daily life in the armed forces of foreign countries."

As the agency primarily responsible for the collection, exploitation, and dissemination of open source materials, the novel VIDINT would eventually fall nearly entirely under the purview of the FBIS.64 The outgrowth of VIDINT and its compartments was a losing battle against the contemporarily burgeoning National Security Agency (NSA) with its directive of signals intelligence. Perhaps there was at one time an argument on whether the FBIS should have been absorbed by the Federal Bureau of Investigation (FBI) instead of the CIA. However, its foreign focus likely prevented that from occurring, with the NSA being able to perform operations both domestically

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[63] Linda Brewer and Capt. Noyes Weltmer, "Video Intelligence (VIDINT)," *United State Air Force Intelligence Agency: Directorate of Research and Soviet Studies, Military Research Division*, October 1988, https://www.proquest.com/dnsa/docview/1679060842/abstract/1725BE1C8484D8FPQ/3.
[64] Studeman Admiral William O., "Scooping the Soviet Press," *National Security and National Competitiveness*, December 1, 1992, https://www.proquest.com/dnsa/docview/1679158556/abstract/1725BE1C8484D8FPQ/5.

and internationally. In contrast, the FBIS was focused, like the CIA, on purely foreign broadcasts.65 However, Soviet television broadcasts were traditionally poorly exploitable sources, save May Day and other military parades in which the Soviets debuted new weapons systems with the express intent and knowledge of the West, particularly the CIA, watching. However, with the shoring up of Soviet realism in the 1980s, broadcasts, including television and other video media, of that era became much more open, providing the USIC with an additional look into Soviet life, resulting in the increased exploitation of VIDINT.66

Further development of OSINT and the FBIS in the modern era came under the presidency of Ronald Reagan, who supported the exploitation of open source material as his "first resort."67 What has been considered the "most detailed inventory and assessment of Soviet weaponry … is a lavishly illustrated, richly detailed manual called Soviet Military Power." The Soviet Military Power compendium, though relaying partly on classified sources, is in and of itself an open source material and, therefore, is appropriately considered to be within the scope of this thesis. The compendium, the first edition publicly published in 1981, "coincided with the Regan administrations call to arms," and has "fattened over the years from 99 pages to 143 by 1985." The compendium consists of information collected not only by open sources collected through VIDINT and other methods listed above but also through GEOINT, showcasing a clear crossing of INTs to satisfy various intelligence requirements.

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[65] "National Security Agency/Central Security Service > Culture > Operating Authorities," https://www.nsa.gov/Culture/Operating-Authorities/.
[66] Brewer and Weltmer, "Video Intelligence (VIDINT)," 1.
[67] Burrows, *Deep Black: Space Espionage and National Security*, 332.

Outside of the scope of this thesis, but which still merits noting, is the later development of OSINT into the 21st century, in which the FBIS became absorbed into the novel CIA Open Source Center (OSC) in November 2005 and later into the Open Source Enterprise (OSE) in 2015, following the recommendations of the 2004 9/11 Report.68 The primary factor that contributed to this change, other than the dramatic reshaping of the USIC as a whole in the wake of the September 11, 2001 attacks, was the precipitous growth of the internet, social media, and the increase in both supply and demand for internet-enabled mobile phones as everyday tools across the globe. As the FBIS was disbanded and became what would by 2015 be called the OSE, the former agency, being absorbed into the CIA Directorate of Digital Innovation, was tasked with "collecting, analyzing, and disseminating publicly available information of intelligence value."69 This new directive, which notably does not mention foreign broadcasts directly, has expanded the role and utility of OSINT across the USIC, having its leadership in the form of the Assistant Deputy Director of National Intelligence for Open Source (ADDNI/OS) reporting directly to the Director of National Intelligence (DNI.) The foundational quality of the FBIS contributes significantly to the perception of the utility of OSINT across the USIC and beyond, showcasing to policymakers and the public its modern utility and its past successes.

Additionally, despite the successes of the FBIS in the Cold War, which certainly have salience regarding modern issues facing the USIC, such as data management, the spurring along, handling, and exploitation of emerging technologies, and difficulties with

[68] Thomas H. Kean (Chair), "National Commission on Terrorist Attacks Upon the United States," August 21, 2004, https://govinfo.library.unt.edu/911/report/index.htm.
[69] "Open Source Center (OSC) Becomes Open Source Enterprise (OSE)," *Federation of American Scientists* (blog), https://fas.org/publication/osc-ose/.

the adaptation of novel geopolitical threats and the rise of the non-state actor, one significant issue facing the USIC today, what some analysts call over-classification or the "classification crisis," has its beginnings in the field of OSINT.[70] The Yale Report, which is the subject of the following subsection, will be proven to have had long-lasting impacts on how the USIC, in particular, began to deal with the threat of exploitable open sources in the U.S. in the 1950s, evidencing a clear shift in policy and priority when it came to the advent of mass classification.

The Yale Report, Executive Order 10290, and the Classification Crisis

The Estimates of Capabilities of the United States Combat Force In-Being [as of] 1 September 1951, perhaps better known as the Yale Report, is one of the foundational texts supporting the advent of the modern U.S. classification system. Written across ten weeks in the summer and autumn of 1951 and provided to President Truman shortly after completion, the Yale Report, authored by Yale University professor and "intellectual founder of the U.S. Intelligence Community," Sherman Kent, utilized open sources collected across the U.S. to elicit a comprehensive update on precisely how much information regarding the state of U.S. combat readiness was publicly available given Western democratic protections of free speech.[71] With a team of 17 graduate research assistants, 11 of whom had fought in WWII and whose specializations included History, Classics, Biology, and Physics, Kent prepared a monolithic report of 627 pages detailing

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[70] Keefe, "The Cult of Secrecy"; Connelly, *The Declassification Engine*.
[71] Mark M. Lowenthal, *Intelligence; From Secrets to Policy*, 7th Edition (Los Angeles, California: CQ Press, 2016), 213.

the state of combat readiness using exclusively declassified and other open sources.72 Kent, who also created and despised the idea of the National Intelligence Estimate (NIE), evidenced by saying that creating a program for the collection, analysis, and dissemination of intelligence collected from across the USG was an "impossible task," followed by the exclamation that "estimating is what you do when you do not know."73 The primary goal of the Yale Report, as outlined in the later published Miscellaneous Studies: Military Secrets in an Open Society, was to come up with an imagined estimate of U.S. Military capabilities as they stood from the point of view of the Soviets – the Yale Report was, at its heart, the first open-source analytical operation from a grand strategic point of view in American History.

What drove President Truman, Kent, and other policymakers across the USIC and DoD was the same sense that promoted the development of geospatial intelligence (GEOINT) collection platforms and the FBIS, as noted in the previous section – to elicit and exploit the intentions of the adversary. One key element and analytical technique geared towards a better understanding of the intentions of the adversary, which in this era meant almost exclusively the USSR, was to apply their point of view in eliciting the intentions of the U.S., primarily by taking a closer look at precisely how much information could be gleaned without robust espionage.

The intellectual and scholarly conception of the Yale Report depended on one central assumption, which proved correct, "that there was in the public domain enough

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[72] Sherman Kent, "Miscellaneous Studies: Military Secrets in an Open Society--The Yale Report [Attached to Forwarding Memorandum Dated August 23, 1984]," *Central Intelligence Agency*, April 1973, 1, https://www.proquest.com/dnsa/docview/2057017340/abstract/CBA4512D550F4FA1PQ/20; Sherman Kent, "Estimates of Capabilities of the United States Combat Force In-Being [as of] 1 September 1951" (Central Intelligence Agency, September 1, 1951), 2, https://www.cia.gov/readingroom/document/cia-rdp79r00971a000300020002-0.

[73] Tim Weiner, *Legacy of Ashes: The History of the CIA*, First (New York, New York, 2008), 56.

information to piece together an all-but-complete gross order of battle of U.S. forces in being."74 Some of the first National Intelligence Estimates (NIEs) were published on that same topic, showcasing a dramatic increase in published desire to understand the Soviets better. Notably, NIE 3, published November 15, 1950, is titled Soviet Capabilities and Intentions -- the inclusion of the word "intentions" in the title reflects the analytic progression of DCI General Walter Bedell Smith, whose insistence upon considering intentions in NIEs led directly to the curation of the Yale Report by holding firm to the stance that "an NIE on the military stance of the USSR would not be complete until we had given the reader our best thoughts on how it was likely to use its vast military apparatus," with Kent continuing by writing that "the appearance of that word [Intentions] in the title was in itself no small tribute to General Smith's powers of persuasion."75

The curation and progress of the Yale Report derived directly from the CIA's focus on gaining a better understanding of Soviet intentions and impulses. They were frighteningly correct in their assessment of the collection of open source material. The Yale Report nearly correctly ascertained the extent to which the U.S. stockpile of chemical, biological, and nuclear weapons related to the overall force composure of the U.S. combat forces. Regarding chemical warfare (CW) weaponry specifically, Kent continued in his 1973 follow-up report on his Yale Report, saying, "One cannot escape a feeling that the U.S. had developed considerable capability in this field. … Soviet leaders had very precise notions as to the inventory of U.S. forces in being at the end of 1951 and were in a position to make confident estimates as to the capabilities of those forces in any

[74] Kent, "Miscellaneous Studies," 18.
[75] Kent, 6.

of several possible war situations. How the Soviet leaders estimated U.S. intentions – which was part two of the project – became a doubly stillborn exercise."76 With additional regard to biological warfare (BW), the Yale Report identified and listed seven laboratories and production facilities engaged in biological warfare research and provided a list three pages long identifying the particular viruses and pathogens under research at BW-focused facilities – a potentially grave aspect of having loose in the public sphere. In addition to the precision of the CW and BW subsections, the Yale Report included relatively precise estimations of the force composure and readiness of the U.S. Army, Navy, and Air Force, with the Air Force alone taking up 222 pages in the Yale Report, with DCI Smith remarking that what the Yale group had written was "probably about 95 percent correct."77 For a small, 18-total person study over 10 weeks relying on open source information which excluded from its analysis local newspapers of cities with Navy ports or Air Force installations, the Yale Report was an extraordinarily consequential document, showcasing not only to President Truman but also policymakers across the burgeoning USIC not only the utility of OSINT but also the risk, borderline threat, of America's reliance on Western Liberalisms' protections of free speech, particularly freedom of the press. Any nation-state with a dedicated OSINT program would undoubtedly be a significant counterespionage risk to the U.S.

Within three weeks of the Yale Report's delivery on the Resolute Desk, President Truman issued Executive Order 10290, Prescribing Regulations Establishing Minimum Standards for the Classification, Transmission, and Handling, by Departments and Agencies of the Executive Branch, of Official Information Which Requires Safeguarding

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[76] Kent, 16–18.
[77] Kent, 18.

in the Interest of the Security of the United States on September 24, 1951, which set a "new pattern for safeguarding these materials," creating "a class of stuff which was to be known as 'security information.."78 EO 10290 was a drastic step in classifying information related to the nation's security. It was a direct result of Kent's Yale Report, with President Truman saying in a press conference, "I didn't sign the order until I got it." President Truman went on in the same press conference to say, "Central Intelligence and Yale University made a survey, and that survey found -- and they had no connection with the Government -- that 95 percent of all of our information was public property. … remember that 95 percent of our secret information has been revealed by newspapers and slick magazines, and that is what I am trying to stop."79

President Truman's October 4, 1951 press conference on the novel EO 10290 indicated a series of issues unique to Western Liberal and enlightenment values regarding freedom of speech and press, with many questions regarding possible constitutional infringement being asked to President Truman and his Press Secretary Joseph Short directly. Before President Truman spoke to the press, Short clarified several aspects of the novel and contentions EO 10290, saying, "The president as directed me to clarify his views on security information as follows: Every citizen -- including officials and publishers -- has a duty to protect our country; Citizens who receive military information for publication from responsible officials qualified to judge the relationship of such information to the national security may rightfully assume that it is safe to publish the information; Citizens who receive this sort of information from improperly qualified

[78] Kent, 19; "EXECUTIVE ORDER 10290 | Harry S. Truman," https://www.trumanlibrary.gov/library/executive-orders/10290/executive-order-10290.
[79] "The President's News Conference | Harry S. Truman October 4, 1951," n.d., https://www.trumanlibrary.gov/library/public-papers/247/presidents-news-conference.

sources should be most guarded in passing it along.; The recent executive order does not alter the right of any citizen to publish anything."80 EO 10290, which established the classification categories of Confidential, Secret, and Top Secret, was criticized at the outset for infringing upon rights guaranteed by the First Amendment (1A), with those criticisms failing to disrupt the progress of the novel National Security apparatus.81

Squaring the two key objectives of the Truman administration concerning EO 10290, namely the objective of promoting national security while also protecting constitutionally guaranteed rigs to free speech, press, affiliation, and assembly, was a signal effort of Truman and his administration in the creation of EO 10290. Unlike the USSR or the PRC, with their closed societies and Marxian understandings of human liberties, the U.S., with its enlightenment and liberalist value systems, was a massive barrier to completing a robust national intelligence and classification apparatus. Evidenced by President Truman's insistence that, in the face of an American press corps borderline belligerent to any perceived infringement of 1A protections, EO 10290 would not impact the ability of the press to publish anything, President Truman's willingness to acknowledge the fears of the public and press corps as a whole has strongly influenced the legacy of Truman and classification as a tool of the U.S. national security apparatus. While the issue of whether or not one can rationalize the tug-of-war between the desire to protect national security and the inviolable rights of those in the U.S. is certainly not limited to the Truman Era, understanding that this issue has at its foundation the

[80] Kent, "Miscellaneous Studies," 23–24.
[81] Sam Lebovic, "The Surprisingly Short History of American Secrecy | Perspectives on History | AHA," *Perspectives on History*, July 5, 2016, https://www.historians.org/research-and-publications/perspectives-on-history/summer-2016/the-surprisingly-short-history-of-american-secrecy.

parsimonious and unambivalent analysis of open source material is vital to unlocking a more faithful understanding of the current classification crisis.82

The Yale Report's burdensome scope and ultimate result called into effect a drastic reshaping of the U.S. National Security Apparatus, on par with events and documents such as the Church Committee and the 9/11 Commission Report, thoroughly reflecting the shifts in force perception across the USIC. As is typical with impetuses for change, Kent's Yale Report spurred robust discussion surrounding the push and pull of security versus freedom, an unfair characterization to be sure, but one nonetheless indicative not only of the contemporary political zeitgeist but also of the perceived danger of an executive branch growing in power.

By early October 1951, President Truman had set up an internal executive committee to study the extent to which orders from EO 10209 were applied across the USG. This subcommittee, the Interdepartmental Committee on Internal Security Subcommittee on Protection of Classified Government Data, or ICIS Subcommittee for short in this thesis, had as its core function the "policing" of the implementation of EO 10209.83 The recommendations that the ICIS subcommittee provided to applicable agencies were varied, but by and large, they had to do with issues of staffing, the ability for agencies to self-audit their classified libraries and collections, and the establishment of declassification staff as well as an all-agency board tasked with the handling of appeals related to classification and declassification, particularly from the press.84

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[82] Keefe, "The Cult of Secrecy."
[83] Sheffield Edwards, Colonel GSC, "Implementation of Executive Order Re Minimum Standards by ICIS and This Agency" (ICIS, October 12, 1951).
[84] Leonard P Bienvenu, "ICIS Suggestions Regarding Implementation of President's Directive Regarding Executive Order 10290," Memorandum For: ICIS Subcommittee on Protection of Classified Government Data; Captain J.A. Waters, AEC Ad Hoc Representative; Mr. William W. Harrison, Treasury Department

Despite the level of oversight provided to the USIC regarding the novel classification levels outlined in EO 10209 as spurred by the Yale Report, certain aspects of novel classification began to be denigrated by the press, public, and lawmakers in particular, who were by and large worried about the growth in power of the Executive Office in peacetime. One particularly salient example of this worry directly impacting the political reality of the Office of the Director of Central Intelligence came in 1952 when, dismayed by DCI Smith's refusal to provide Congress with information under the auspices of and under EOs 9835 and 10290, the former of which authorizes the DCI and CIA to withhold information from Congress on the grounds of national security.85 The information being withheld by DCI Smith and President Truman primarily had to do with reports of Communists within the Central Intelligence Agency as reported to the House Committee on Un-American Activities (HCUA), which DCI Smith ostensibly had persuaded President Truman not to respond to, provoking the ire of lawmakers who accused DCI Smith of not understanding the aforementioned Executive Orders.

Although the relationship between Congress and the USIC is significantly less tumultuous today than in the era of lawmakers asking DCIs to identify, fire, and expose to Congress USIC employees accused of "Un-American Activities," the push and pull between security and freedom is still remarkably salient today. With considerations regarding NSA domestic espionage operations, §702 of the Foreign Intelligence

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Ad Hoc Representative; Col. Sheffield Edwards, CIA Ad Hoc Representative (Department of Justice, Washington D.C.: Interdepartmental Committee on Internal Security, October 12, 1951).

[85] "EXECUTIVE ORDER 9835 | Harry S. Truman," https://www.trumanlibrary.gov/library/executive-orders/9835/executive-order-9835; Lawrence R. Houston, General Counsel, "Refusal by Executive to Provide Information to Congress," Memorandum For: The Director of Central Intelligence (Washington, D.C: United States Congress, October 8, 1952); Executive Office of the President: National Security Council, "Safeguarding Official Information in the Interests of the Defense of the United States," Memorandum For: The National Security Council, Referenced: A. Executive Order 10501 B. NSC Action No. 948 (Washington, D.C, December 21, 1956).

Surveillance Act, and the dramatic growth of the surveillance capabilities of local and state police forces, the issue of classification and its logical endpoint in a democratic state, the impulse to hide information thought to be well-worth hiding, is still at the forefront of many political discussions today. However, this issue began in earnest with the dissemination of the Yale Report, which correctly and with high confidence assessed the state of roughly 95% of the U.S. Combat Forces and their readiness in 1951 using exclusively open source material. The foundational quality of the Yale Report in our modern understanding of espionage, classification, and liberal ideas of what a populace ought and ought not to have access to is difficult to overstate. In terms of the effect on the security and espionage of the nation, the Yale Report is undoubtedly in the same league as SRPs, the 9/11 Commission Report, which established the Directorate of National Intelligence (DNI), and perhaps even the U-2 spy plane, the subject of Case Study #2 below.

Case Study #2: The Conception, Development, and Legacy of the U-2 Spy Plane

As one of the most iconic pieces of military and intelligence technology in the Cold War, the Lockheed U-2 Spy Plane referred to in this case study simply as the U-2, merits extensive consideration when considering the rise and maintenance of geospatial power. Initially developed as a stopgap for the USIC to fulfill intelligence requirements while spaceborne reconnaissance platforms (SRP) were being conceptualized, built, tested, and utilized, the U-2 proved to be one of the most useful and most frequently utilized pieces of human-operated reconnaissance technology during the Cold War and into the post-Cold War era. Notable for its innovative design, non-weaponized quality (compared to the camera-equipped B-52 bombers used in World War II), and fulfillment of intelligence requirements outlined in the Beacon Hill Report, the U-2 sent shockwaves across the globe, impacting nearly every level of the USIC as well as geopolitics as a whole, as it set a new precedent in terms of the acceptability and reliability of reconnaissance imagery.

The history of the U-2, from sketchpads at the Lockheed Corporation to its contemporary service in Iraq and Afghanistan, is extensive. This case study will focus on the original conception of the U-2 in the early 1950s, its subsequent development under the CIA, several use cases of note, and the inclusion of a large portion on the technical and engineering aspects that made the U-2 a genuinely innovative and technically impressive feat. This case study will focus on several individuals in the administration of President Dwight Eisenhower, whose intrepid determination to satisfy geospatial intelligence requirements relating to the Soviet Union and beyond directly facilitated the development of the U-2, and which consequentially shifted the arc of history towards the rise of geospatial power.

The U-2 coming into being required several preconditions. First, the USIC must have defined the Aerial Reconnaissance Platform (ARP)'s technical and other intelligence-related requirements. The Beacon Hill Report and Land's Project 3 panel within the TCP had sufficiently defined the requirements for an ARP. Second, political will and budgetary considerations must be met before developing the proposed ARP. The CIA's Special Reserve Fund and the Contingency Reserve Fund allowed for quick and quiet access to funds without having to report to Congress by utilizing language in Public Law 110, approved by the 81st Congress on June 20, 1949.86 Third, there would have to be a significant legal cover for U-2 operations, which were heavily classified through the Espionage Act of 1917 and the National Security Act of 1947 and notably through President Truman's EO 10290. The legal cover was provided unsuccessfully through President Eisenhower's Open Skies Proposal, which would have allowed for Soviet and American reconnaissance overflights over each other's territory.87 Despite the lack of fulfillment of the third precondition relating to international legality, the Eisenhower administration forged ahead and supported the idea of the U-2. However, the lack of genuine legal cover lasted only a short time, with the October 1957 launch of Sputnik effectively proving that sovereignty only extended so high. Once two of the

[86] Burrows, *Deep Black: Space Espionage and National Security*, 77.
[87] Andrew Glass, "Ike Offers 'Open Skies' Plan at Geneva Summit, July 21, 1955," POLITICO, July 21, 2010, https://www.politico.com/story/2010/07/ike-offers-open-skies-plan-at-geneva-summit-july-21-1955-039988; "The Open Skies Treaty at a Glance | Arms Control Association," https://www.armscontrol.org/factsheets/openskies.

preconditions for ARP conception were met, with defined requirements and funding, the story of the U-2 Spy Plane could begin in earnest.

The U-2 began as an idea in the mind of Clarence "Kelly" Johnson. Johnson, who by 1938 was the Chief Research Engineer for the Lockheed Corporation and whose later achievements included the SR-71 Blackbird, another ARP well outside of the scope of this thesis, is by far the most salient individual in the conception and development of the U-2. Johnson had heard through undisclosed channels that the USG, pursuant to the recommendations of the Beacon Hill Report and Killian's TCP, had been accepting proposals for reconnaissance aircraft. Unsolicited, Johnson and his partner at Lockheed, John H. "Jack" Carter, sent the initial proposal to Washington for what they called CL-282.[88] Carter had initially pitched CL-282 to the USAF Strategic Air Command (SAC) under the leadership of WWII veteran and known Hawk Curtis LeMay. The branch was thought by Johnson and Carter to be the most natural fit for a reconnaissance aircraft. However, it was quickly denied by LeMay because CL-282 did conform to the SAC's ideal of what an aircraft was meant to be, look like, or consist of, with LeMay remarking before standing up and leaving the meeting, "If I wanted high-altitude photographs, I would put cameras in my B-36 bombers. I'm not interested in a plane that has no wheels or guns."[89] CL-282/U-2's break from conventional design was a critical aspect of its success within the CIA and will be touched on in later paragraphs in this case study.

Despite being rejected by the USAF SAC, the proposal caught the eye of Edwin Land of the TCP's Project 3, as well as Allan Donovan of the Cornell Intelligence System Panel, who had previously discovered that the idea of simply placing a camera on the

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[88] Pedlow and Welzenbach, "The CIA and the U2 Program."
[89] Pedlow and Welzenbach, 24.

bottom of a B-36 or B-57 would not satisfy the problems outlined in the Beacon Hill Report, stipulating that the ideal American reconnaissance craft would have to fly at or above 70,000 feet – an elevation which no aircraft in the world at the time could have reached. Donovan, whose previous work on the Manhattan Project designing the release mechanism for the nuclear weapons used in Nagasaki and Hiroshima had elevated him to prominence within academia, the Intelligence Community, and among aeronautical engineers as a whole.90

Donovan continued to urge the USAF to accept Johnson's CL-282 proposal, believing firmly in its ability to equal out the aeronautical equations of balance, thrust, lift, and weight due to Johnson's complicated and innovative design, highlighting that the aircraft would not need to have guns or be able to drop bombs as it would be able to fly above radar, anti-aircraft defenses, and Soviet fighters themselves, at least at the time. An additional reason why the USAF did not accept the CL-282 proposal was that they had already accepted the proposal for and begun work on their short-lived reconnaissance platform components, the Martin RB-57 and the Bell X-16, both of which missed the 70,000ft minimum requirement by 2700ft and 500ft, respectively.91

Donovan eventually reached out to Edwin Land, whom he knew professionally and through the TCP, and who strongly encouraged the development of CL-282. Land, having been convinced immediately of the utility and meeting of requirements which CL-282 envisioned meeting, evidenced by his telling a colleague, "I think I have the plane you're after," soon got in touch with Richard M. Bissell, whose status as the CIA's

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[90] Alexander Flax and Ivan Getting, "Alan F. Donovan 1914-1995 | Memorial Tributes: Volume 8 | The National Academies Press," 73, https://nap.nationalacademies.org/download/5427.
[91] Pedlow and Welzenbach, "The CIA and the U2 Program," 9.

Special Assistant for Planning and Coordination, former Deputy Director of the Marshall Plan, and member of the Georgetown Set, give him close personal and professional proximity to DCI Allan Dulles, which made him the near-perfect person to lobby for the development of CL-282.92 However, despite Bissell's connection, DCI Dulles did not immediately accept the CL-282 proposal. In a rare breach of interagency protocol, and ostensibly due to Land and Bissell's faith in the CL-282 proposal, Donovan and Land went over the DCI's head and made their case directly to President Eisenhower in November 1954, who approved of the plan but stipulated that the program, for reasons regarding interagency rivalries described in Chapter I, would have to be "handled in an unconventional way so that it would not become entangled in the bureaucracy of the Defense Department or troubled by rivalries among the services."93 In short, as Eisenhower was keenly aware of the various interests at play among various services and agencies within the DoD and the USG as a whole, the project of the development of CL-282 into the U-2 Spy Plane would be given directly to a civilian agency outside of the DoD, namely the CIA.

On the morning of November 26, 1954, DCI Dulles informed Bissell of his new charge as director of a "very secret program," which Dulles could not tell Bissell more about without violating classification procedures.94 Within a week, Bissell, who had already been relatively familiar with the idea of the U.S.' creation of a reconnaissance plane before his being read into the program but who had been unaware that the program

[92] Pedlow and Welzenbach, 27, 42; Greg Rosalsky, "The Most Dangerous Economist," *NPR*, February 20, 2020, sec. Newsletter, https://www.npr.org/sections/money/2020/02/20/807790520/the-most-dangerous-economist.
[93] Pedlow and Welzenbach, "The CIA and the U2 Program," 45.
[94] Pedlow and Welzenbach, 51.

would require overflights of Soviet territory, reported to the Pentagon with Herman Miller, then the chief of the Office of Scientific Intelligence's Nuclear Energy Division and who would later become the Executive Officer of the U-2 Overflight Program. Upon meeting with USAF officials on December 3, 1954, including Trevor Gardner and Lt. Gen. Donald Putt, whose lack of interest in the weaponless CL-282 program was made apparent, Bissell and Miller began putting a staff together for what was referred to as Project AQUATONE, known in later context as the U-2 Overflight Program. While the USAF stated requirements, which would later contribute to interagency animosity, for the inclusion of J57 engines, which were being produced for B-52s, KC-135s, F-100s, and RB-57s, Bissell and Miller's new staff in Washington D.C. and their partners at Lockheed began the design, testing, and implementation work for the novel spy plane, largely without consequential support or input from USAF officials.95

The U-2 would eventually become one of the first resorts for reconnaissance and geospatial espionage in the arsenal of successive administrations. With the assurance that Johnson and Lockheed could provide a testable prototype by August 1955, a mere eight months after construction had commenced, the U-2 would be one of the quickest-developed and most utilized articles within the U.S. reconnaissance arsenal. The relatively pressured and short timeframe of the development and construction of the U-2 would lead to innovations regarding aerial technology and capabilities, management, and comprehensive industrialization, as substantiated in the sections below.

The innovativeness and ingenuity of the U-2 cannot be overstated. It is incumbent upon any historian of the subject to provide in detail how the U-2 came to be designed

[95] Pedlow and Welzenbach, 52.

and in which ways the design was counter to the culture of modern military aircraft as well as its robust fulfillment and exceeding of individual intelligence requirements. In terms of requirements, which were not only set by the Beacon Hill Report but also by the Executive office and the U.S. Military brass, primarily the USAF, the U-2 would have to, for a time at the very least, exceed by leaps and bounds the technological, military, and reconnaissance capabilities of the USSR. Principally, the U-2, as a weaponless aircraft, would have to coherently evade the most advanced Soviet interceptor, the Mikoyan-Gurevich-17 (MiG-17). The Soviet MiG-17 could theoretically reach 45,000 feet in elevation, but the U.S. was also aware of Soviet aerial radar technology, notably the Soviet P-20 Radar Array, which topped out at around 60,000 feet.96

In order to exceed anti-aircraft defenses, radar, and Soviet interceptors, as well as be able to make a return journey, the U-2 would have to have a maximum sensor capacity of 500lb, reach or exceed 70,000 feet in elevation, and have a 2,000-mile range of service before refueling. In addition to these requirements, the U-2 was designed to decrease political vulnerability in the event of a Soviet capture or downed U-2 craft. To this effect, the U-2 was explicitly designed to appear non-threatening, with no detectable weaponry, a single engine, and limited U.S. military markings, the former two of which also enabled the U-2 to keep its weight low, a critical component of any aeronautical thrust equation.

The engine itself was an additional and fascinating aspect of the development of the U-2. Proposed as a single engine craft, an aspect which raised concerns for utility among the USAF read into Project AQUATONE, the engine itself needed to be made of exact engine components. The sheer number of available American-made engines that

[96] Author Redacted, "Early Warning Radar Stations/Soviet P-3, P-8, and P-20 Radar" (Central Intelligence Agency, January 1, 1957), https://www.cia.gov/readingroom/document/cia-rdp80t00246a000700680001-9.

outpaced those of the USSR speaks volumes regarding American technological superiority in the pre-Sputnik era. Kelly Johnson, whose work at the Lockheed Corporation's Burbank, CA design facility, commonly called Skunk Works, found great utility in the General Electric (G.E.) J73/GE-3 non-afterburning turbojet engine.

The GE J73, Johnson's engine choice for the U-2, had roughly 9300lb of thrust, enabling the U-2 to reach 70,000 feet given its final weight of roughly 7 tons. Although the GE J73 was Johnson's pick, the USAF recommended including the Pratt & Whitney J53 engine, which was argued to have a better thrust ratio and the all-around contemporary premier engine. Other engine designs considered real players for the trophy of the U-2 came from the Bell, Fairchild, and Lockheed Corporations. The battle over which engine would be used eventually came down in favor of the USAF, who had run several independent tests on the various engines through Wright Air Development Command, whose Maj. John Seaberg recalled, "I stated that, in my opinion, the J72 [General Electric engine] would not be good enough to do the job in Johnson's airplane. And further, I overlaid a curve showing that with the J57 [Pratt & Whitney engine] installed, it would be competitive with the Bell and Fairchild designs."97

However, Johnson's acquiescence to the recommendations of the USAF was not solely due to the quality of respective engine technologies but also his keen awareness of USAF culture and standards, particularly relating to multiengine aircraft. The USAF, particularly the SAC under the direction of Gen. LeMay, wholeheartedly supported the inclusion of twin engines in the novel U-2 craft. The USAF's primary reason for pushing the idea of multiple engines on the U-2 was the USAF's lack of foresight into how

[97] Pedlow and Welzenbach, "The CIA and the U2 Program," 47.

camera technology would develop during Project AQUATONE. Primarily, the USAF fallaciously considered focal length, the aspect of a camera lens that determines how much of a particular scene appears in a photograph, to be directly correspondent with the size of the lens itself, an axiom that was upended through the work of Edwin Land across the development of the U-2, an issue which will be brought up in a later section of this case study in greater detail, touched on here chiefly to explain Johnson's decision to submit to the USAF and allow the inclusion of the J57 engine into the U-2. Although Johnson acquiesced to the USAF's engine choice, the U-2 would remain a single-engine aircraft, citing weight requirements and the likelihood of more advanced engines soon.

The frame of the U-2 presented an additional design challenge to Johnson and those who worked on Project AQUATONE (referred to as Project OARFISH and nicknamed 'Angel' within Lockheed) more broadly. Johnson's design for the frame itself relied extensively upon ideation stemming from buoyant seaplanes common in coastal areas and WWI. The all-aluminum seaplane design, which was effectively a glider, enabled the U-2 to reach the stratospheric heights demanded by the USIC and the Executive office. The sailplane design initially allowed Johnson to build the U-2 without wheels, but at least two under each wing were added before the prototype was first tested in August of 1955.98 However, the aluminum frame had one significant downside – it was noticeably flimsy and seemingly eager to break. This challenge within the design and testing phase of AQUATONE/OARFISH has never indeed been solved, with the U-2 itself undergoing stress tests of 2.5Gs as opposed to the USAF-mandated requirement of 5.33Gs, showcasing a worrisome buckling under pressure which would never have

[98] Pedlow and Welzenbach, 59.

passed muster had the U-2 been strictly a USAF project. The U-2's stress tests led directly to Johnson's decision to implement two separate wing panels bound with tension bolts, a common aspect of sailplane and glider design. However, Johnson warned Bissell and those in the U.S. military who had been read into AQUATONE that it would be essential for test and active military pilots to avoid, under all circumstances, strong gusts of wind. He remarked on its inability to take coherent evasive maneuvers. In effect, the lightweight quality and shape of the U-2 meant that if it were discovered or struck, the plane would be all but guaranteed to fall.

The aluminum frame was selected chiefly due to its lightweight qualities and enabled the U-2 to reach 70,000 feet in elevation. However, several issues relating to the stratosphere had to be dealt with before a prototype launch. As is common scientific knowledge, the density of breathable air gets lower as one rises higher in elevation – mainly when dealing with near-space heights – which is also true of aircraft engines. Designed with an unpressurized cockpit, which required pilots to wear early configurations of pressurized spacesuits, as blood in the human body would begin to boil at around 65,000 feet, the conditions (notably the speed and cold of the stratosphere) outside the cockpit mattered greatly. Notably, the power curve of the G57 engine at stratospheric conditions would decrease to roughly 6% of its sea-level power.99 This meant that the U-2, once it had reached its maximum elevation, would have significantly decreased maneuverability in the event of detection or attack – another reason why the requirement of being able to fly above Soviet interceptors, surface-to-air missiles

[99] Pedlow and Welzenbach, 37.

(SAMs), and radar was imperative. Once a U-2 pilot had entered adversarial airspace, they were alone with little to no recourse for evasion.

Additional factors of the U-2 design implementation consisted of standard sailplane design features. The U-2 had horizontal stabilizers to keep the plane in a nose-up attitude, which helped immensely with dealing with high wind conditions within entry into the stratosphere. The U-2 wings were also novel innovations within military aircraft design, with two separate panels attached to the fuselage, which allowed for a maximum of 500lb camera and sensory equipment to be placed directly behind the pilot and ahead of the engine, with the wings as is classic within modern airplane design referred to as the Wet Wing Design Model, carrying the bulk of the fuel – an additional reason why Bissell and Johnson thought that one blow to the U-2's airframe would spell disaster for the craft, pilot, and imagery collected, but which significantly improved the craft's center of gravity.

An additional 100 gallons of reserve fuel was held in the nose of the plane itself, again helping with the center of gravity issue. The wings of the U-2 were also inspired by sailplane design, which improved the aspect ratio with a low-induced drag wing. In effect, Johnson "had designed a jet-propelled glider."100 The tail, whose jutting view was attached to the main body with three tension bolts, a common occurrence in sailplane design, also held additional and reserve fuel with a direct line to the fuselage and engine. The U-2 would eventually weigh approximately 7 tons with a single 208lb solid-mount oleo strut with two wheels under the tail for takeoff and landing. The U-2's innovative

[100] Jay Miller, *Lockheed U-2 - Aerograph 3* (Aerofax Inc., 1983), 12.

shape and fuel capacity would allow for flights of 2,600 miles by the time of the prototype's delivery to the CIA.

While development was underway for a U-2 prototype, promised by Johnson to be delivered to the CIA within the year, work on the camera technology, which provided the primary function of the U-2, began in earnest. However, the story of how the U-2's camera technology came to be began in the mid-1940s with James Baker of the Harvard University Optical Laboratory (HUOL) and Richard S. Perkin of the Perkin-Elmer company developing a 48-inch focal length scanning camera that would come to be modified for fitting for the B-36 bomber.

The 46-inch camera, while a definite improvement on camera technology of the day, was too heavy for the 450lb maximum payload of the U-2, with the sensor payload being decreased from 500lb in conception to allow for structural changes to the plane itself. Relying on their technological improvements to camera technology, Baker and Perkin began adapting the USAF K-38 camera. It turned it into a 24-inch aerial framing device manufactured by the Hycon Corporation, but the K-38 failed in the depressurized and cold environment of the stratosphere. Baker and Perkin eventually found and adapted the 73B Series Hycon camera, with significant work on the camera itself coming from research performed by Baker and Land of the TCP. An additional and consequential issue for the field of Intelligence History regarding the development of the 73B Series Hycon camera was that the development of the camera system was intentionally left out in the open. As Pedlow and Welzenbach note, "By not calling attention to the effort through special security measures, the project could be completed faster and still not be compromised. This ‘hiding the in open’ strategy proved very successful.”101 This event provides one of the most salient and recognizable examples of strategic openness within the USIC, which speaks not only to the ingenuity of AQUATONE policymakers but also to the extent to which public-private partnerships were beginning to emerge across the technology sector. The U-2, at the urging of Johnson, Baker, and Miller, also carried a periscope whose mirrors enabled the pilot to recognize targets before taking pictures, enabling greater control of the pilot over reconnaissance decisions. The innovations of Baker and Perkin strategically enabled the U-2 to be the perfect reconnaissance aircraft despite its lack of mobility and increased fragility.

The actual development of the U-2 was rife with consequential decisions regarding its utility as an inherently reconnaissance-focused platform. In an era of robust American industrialization, progress on the U-2’s prototype development was as innovative as any other industrial process. Johnson required that his engineers be within 50 feet of the assembly line at all times. The advent of industrial management, which Johnson provided to his subordinates at Skunk Works, provided vital value to the CIA – the U-2 test prototype would eventually end up being delivered two months prior to the agreed-upon date, as well as being delivered roughly $3 million under budget. Not only would the U-2 become one of the most vital and most heavily utilized reconnaissance platforms within the U.S. arsenal, but it also provided a masterclass in organizational project management despite Johnson and his employees working 45-65 hours per week. The expediency and precision with which Johnson and a team of engineers whose total number has not yet been declassified, was not only due to Johnson’s managerial

[101] Pedlow and Welzenbach, “The CIA and the U2 Program,” 67.

efficiency but also the pressures put on the project by the Executive office. As noted above, the U-2 was initially conceived and designed to fulfill reconnaissance requirements while SRPs were being developed nationwide by Skunk Works. Through sheer force of will and organizational efficiency, Johnson and the Skunk Works team provided the CIA with its first test plane at an undisclosed lakebed on July 25, 1955.

The U-2 test plane, then called Article 341 within the CIA and Lockheed, was delivered and given its name, U-2, with the U standing in for ‘utility’ as the plane could not reasonably be classified as a bomber, fighter or transport plane. Article 341 ended up having slightly different specifications than the original conception. Article 341’s power came from the Pratt & Whitney J57/P-37 engine, which could develop at sea level roughly 10,200lb of thrust, showcasing to Johnson not only his fallibility – had he chosen and designed the plane around his initial engine choice of the GE J73 the craft may not have performed as well or as long as it has – but also a key lesson in the idea that perhaps the USAF could be correct sometimes when it came to aircraft design. The P&W J57/P-37 engine would end up weighing 4,096lb on its own, providing a thrust-to-weight ratio of 2:7:1, but the 50 U-2’s, which would end up being built by Lockheed for the CIA, utilized the superior P&W J57/P-31 engine, which was roughly 20% more efficient due to more powerful thrust and lower weight, leading to a thrust-to-weight ratio of 3:4:1.[102]

The initial test of the U-2 was operated by Lockheed test pilot Tony LeVier and was initiated on July 27, 1955, two days after the delivery of CL-282 to the CIA. LeVier recalled later that on August 1, he accelerated the plane to 70 knots (80.5mph) and, upon engaging the ailerons, discovered that the U-2 could achieve flight, saying that the

[102] Pedlow and Welzenbach, 79–80; Miller, *Lockheed U-2 - Aerograph 3*.

incident "left me with utter amazement, as I had no intentions whatsoever of flying."103 The August 1 taxi test resulted in minor damage after the accidental flight. It bounced with blown tires, a leaking oleo strut, and damaged brakes, which LeVier believed were either faulty or unnecessarily soft on the wheels. In either case and with several fixable issues at play, the first taxi test of the U-2 was a success – the aluminum airframe enabled the aircraft to achieve lift at 70 knots, a remarkable achievement given that most military aircraft required nearly double the speed to achieve liftoff.

Later that week, on August 4, the U-2 was initiated for its first planned takeoff, flight, and landing, all under the control of LeVier. While takeoff and the flight, which operated at around 8,000 feet, went off without a hitch, LeVier and Johnson disagreed regarding the best way to land the novel aircraft. Johnson wanted LeVier to land with the front wheel and landing gear, much to LeVier's protests, given his experience earlier in the week with landing issues. LeVier attempted three additional landings at Johnson's recommendation, but all failed. Johnson eventually acquiesced to LeVier's advocation that a rear-wheel landing would work – and it did. The U-2, through ingenuity, teamwork, and technical partnerships between Johnson, Bissell, and LeVier, was ready for its first official full test flight on August 8, 1955. Once the landing had concluded, Johnson invited several others to witness the first full flight of the U-2 reconnaissance plane, including Richard Bissell, Col. Osmond Ritland of the USAF and future Deputy Director of the CORONA spy satellite program, and Garrison Norton, the former Assistant Secretary of State and then head of Research and Development for the Office of the Secretary of the Air Force to witness the U-2's takeoff, flight and holding of 32,000

[103] Pedlow and Welzenbach, "The CIA and the U2 Program," 81.

feet, and landing. The August 8 test flight, with representatives of the CIA and USAF present, Johnson provided the Eisenhower administration with the confidence to call the job of building the U.S.' first and most notable reconnaissance aircraft complete, with Bissell completing Project AQUATONE with two months to spare and $3 million under budget. However, it was not until one month later, on September 8, 1955, that the U-2 was proven effective at 65,000 feet. Ultimately, Project AQUATONE/OARFISH, CL-282, Article 347, and the U-2 project were a resounding success.

With the ability of the U-2 to fly and perform its duties, a production line for building the 50 (previously 20 craft pre-August 8 test flight) U-2's was set in motion at Lockheed's Bakersfield, CA plant. As mentioned above, Johnson required that his team of engineers and technicians stay within 50 feet of the factory floor to keep them around if something needed adjusting or fixing during assembly and validation. By May 1956, the manufacturing of U-2's required 220 employees and would rise to 450 within one year.104 Fabrication work for the components was still being completed at Skunk Works in Burbank. However, the final assembly occurred in a 200' x 400' manufacturing facility adjacent to the public Kern County Airport, commonly called the Lost Hills Airport, which closed in 2019. The public location of the U-2 assembly did not appear to be a significant worry for the CIA, whose critical function within Project AQUATONE was to manage the security for the whole project, with a Progress Report from May 1, 1956, stating that "all construction has been done with a view affording maximum security protection." Perhaps, as with the production of the U-2's 73B Series Hycon

[104] "Progress Report #1" (Central Intelligence Agency, May 1, 1956), 7.

reconnaissance lens, the CIA afforded more excellent value to the hiding-in-plain-sight method than is colloquially recognized.

The funding and negotiation of SP-1913, the contract between the CIA and the Lockheed Corporation for the building and delivery of a fleet of U-2's with various specifications, was a difficult and frustrating but amicably opaque process, considering the advancement of $1 million and aid in evading the California Sales tax as acts of good faith on the part of the CIA, consisting of a wide variety of personnel across the CIA and Lockheed itself.105 Evidence substantiates the argument that at least part of the initial contract negotiation took place between Johnson and Bissell personally, with the two of them repeatedly in contact with deal offers and adjustments being shared between the two of them by hand.106 On at least one occasion, Bissell had himself been sending checks directly to Johnson, with at least one check being sent to Johnson's home on February 21, 1955.107 Contract SP-1913 was signed on March 2, 1955, a little over five months before Article 347's successful takeoff, flight, and landing, and stipulated for CL-282 to be delivered in July 1955, with the last to be delivered in November 1956. Johnson's team at Lockheed, similar to the outcome of CL-282, had successfully provided the first round of 20 U-2's to the CIA on time and under budget.

While Lockheed was producing the aircraft, work simultaneously began formatting and fitting the 73B Series Hycon camera initially used in the previous

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[105] Author Redacted, "Contract No. SP-1913, Invoice No. 2-2," Memorandum for: Project Comptroller (Central Intelligence Agency, February 21, 1958); Author Redacted, "INVOICE NO. 2-1," Personal Commentary and Invoice (Central Intelligence Agency, February 21, 1955), https://www.cia.gov/readingroom/document/cia-rdp89b00709r000300640091-6.
[106] Richard M. Bissell Jr., "Contract SP-1913," Memorandum for: Contracting Officer, November 4, 1955.
[107] As Cited in Pedlow and Welzenbach, "The CIA and the U2 Program," 56., "John S. Warner, Office of the General Counsel, Interview by Donald E. Welzenbach, Washington D.C. Tape Recording 5 Aug 1983 (S): OSA History, Chap 5, Pp 1-2 and Annex 43 (TS Codeword); Johnson, 'Log for Project X,' 21 February 1955,".

generation's U-2—reconnaissance cameras, which were chiefly utilized in Maj. Gen. LeMay's SAC runs on Japan and Germany in WWII, regarded as the most profoundly advanced camera systems utilized by any military at the time, could achieve resolutions of 20-25 feet per side at an altitude of 33,000 feet – a resolution wholly unfit for reconnaissance imagery taken over twice that altitude. Effectively, any camera used at altitudes exceeding 68,000 feet, a regular elevation for U-2 flights, would have to be at least 400% more precise than anything within the USG at the time of the U-2's conception.108

As written above, Baker and Perkin's modified K-38 lens from Hycon was chosen by Johnson and Bissell. An additional feat of ingenuity and salient shift relating to the difference in utilization between reconnaissance cameras and those used for bomb targeting was that the U-2's camera system called the A-1, consisted of two lenses pointing a different degree to maximize coverage. The A-1 included a rocking mount for the second lens so that the camera would alternate photograph the left and right obliques onto separate rolls of film. The film would later be pieced together and analyzed at the National Photographic Interpretation Center (NPIC), written in detail in the following chapter.

By December 1954, Baker had already developed the third iteration of the U-2's camera platform. This C model indeed interrupted Johnson's production, given that the C model would require six more inches of payload space, to which Johnson replied, "Six more inches? I'd sell my grandmother for six more inches!"109 As Johnson could not reasonably accommodate the additional payload space specified by Baker for the C

[108] Pedlow and Welzenbach, "The CIA and the U2 Program," 63.
[109] Baker Interview (S), Pedlow and Welzenbach, 66.

Model, Baker returned to Series B, the functionality of which had already been proven. This time, Baker came back with a B series fitting but with the novel inclusion of a lightweight foamed silica mirror system, which not only decreased the weight but the size as well, with the mirror scale being 13in x 13in, and due to the new material's functionality, the process to create the mirrors themselves took only 16 days by using a ray-tracing computer whose technology would go on to impact significantly the fabrication of semiconductors and Central Processing Units.

After the camera system's fabrication had been sorted, it was understood from the onset of Project AQUATONE that an interagency committee or organization would be required to set intelligence requirements for the U-2.110 On December 1, 1955, at the recommendation of both Land and Secretary of Defense (SecDef) Donald Quarles, Bissell established the Ad Hoc Requirements Committee (ARC) with James Q. Reber as Chairman. Reber, who had previously served as the head of the Directorate of Intelligence (DI) Office of Intelligence Coordination, was a natural fit for the position given his experience working with and maintaining interagency cooperation.111 The chief task of ARC was to “draw up lists of collection requirements, primarily for the U-2, but also for other means of collection.”112 ARC was tasked with finding ways to satisfy intelligence requirements relating to Soviet long-range bombers, guided missiles, and nuclear energy stations while balancing the parallel interests of the USIC, which prioritized strategic intelligence such as that related to factories, waterways, roads,

[110] Edwin H. Land, “Letter from Edwin H. Land, Chairman of the Technological Capabilities Panel of the Science Advisory Committee, Office of Defense Mobilization, to Director of Central Intelligence Dulles” (Washington, D.C, November 5, 1954), https://history.state.gov/historicaldocuments/frus1950-55Intel/d194.
[111] “Ad Hoc Requirements Committee on Project AQUATONE (ARC),” Minutes of Meeting Held in Room 328, Administration Building, Central Intelligence Agency at 10:00 AM, May 27, 1957.
[112] Pedlow and Welzenbach, “The CIA and the U2 Program,” 93.

bridges, as well as nuclear and non-nuclear power generating stations, with those of the U.S. military who places significant emphasis on order-of-battle intelligence. The primary contribution of the ARC regarding Project AQUATONE was the identification of locations of signal interest of the UISC and military. Several declassified but heavily sanitized reports in the CIA's archive contribute to the argument that the U-2 would be engaging missions dedicated to photographic bomber units, particularly the Bison bomber fleet. The ARC steadily expanded its membership to include not only various representatives from the military but also from the rapidly growing intelligence community, with members coming from the Office of Current Intelligence (then the parent organization overseeing the FBIS) and the relative newcomer of the National Security Agency, which had been established nearly five years prior.113 With the U-2's built, their cameras perfected as much as possible, as well as the setting of intelligence requirements and targets, the first detachment of U-2's was set to begin their mission, with the fine-tuning of the U-2 elevating its capabilities to being able to fly for 2,950 miles at 72,000 feet of elevation, far beyond the reaches of even the most advances Soviet missile defenses, aircraft, or radar, surpassing even Johnson's preliminary predictions regarding the capabilities of the U-2.

Detachment A, the first CIA U-2 detachment comprising a classified number of aircraft, was publicly known as the 1st Weather Reconnaissance Squadron, Provisional. The weather-based story under the cover of the National Advisory Committee on Aeronautics satisfied Bissell and Dulles, who capitalized on scientific excitement around the International Geophysical Year, which provided much of the cover for early

[113] Harry S. Truman, "Communications Intelligence Activities," Memorandum For: The Secretary of State, The Secretary of Defense (The White House, October 24, 1952).

CORONA and Sputnik launches. Detachment A, by way of England, eventually found their first home at the Wiesbaden Airfield in West Germany, where they were outfitted with the back-ordered J57/P-31 engines, and with the new engines, the U-2's were given a new designator – U-2B. Despite operational readiness and urging from DCI Dulles, Bissell, and Air Force Chief of Staff Nathan Twining, President Eisenhower had not yet entirely decided on whether or not to authorize U-2B flights over the Soviet Union until his post-surgery recovery at Walter Reed Hospital in late June 1956.114

President Eisenhower, having authorized and been directly involved with every step in the development and deployment of the U-2, was keenly aware of the negative possibilities regarding U-2 overflights. Chief among President Eisenhower's concerns was the possibility of loss of American life. Knowing full well the fragility of the U-2 as described by Johnson and Bissell, and with a notable ambivalence towards promoting U.S. national security and protecting American servicemen's lives, President Eisenhower thought of the U-2 as a last resort, urging the Soviets and Khrushchev in particular to accept his 1955 Open Skies proposal, and at one point remarking that, "I'll give it one shot. Then, if they don't accept it, we'll fly the U-2."115

However, Bissell, leaning on prior Presidential approval, had ordered U-2 flights over Soviet satellite-state territories, particularly Poland and East Germany, beginning on June 20, 1956. One day later, on June 21, 1956, President Eisenhower authorized ten days of overflights in early July 1956, one of the most momentous decisions of the 20th Century.

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[114] "President Eisenhower's Big Day June 29, 1956 - Interstate System - Highway History - Federal Highway Administration," https://www.fhwa.dot.gov/infrastructure/bigday.cfm.
[115] Michael R. Beschloss, *Mayday: Eisenhower, Khrushchev, and the U-2 Affair,* Reprint edition (New York: Harper and Row, 1986), 105.

However, U-2 overflights into Soviet territory could not begin immediately, as President Eisenhower had decided to, on the recommendation of the CIA and State Department, inform West German Chancellor Konrad Adenauer of the U.S. decision to overfly the Soviet Union from bases in Germany, notably Wiesbaden.116 Another reason for the delay, other than weather conditions expected to be favorable to reconnaissance overflight, was the June 23, 1956, Moscow Air Show, to which Khrushchev had invited a delegation of USAF officials, including Gen. Twining, who had requested Eisenhower that no overflights would be taken while the USAF delegation was in Moscow.117

On Wednesday, July 4, 1956, the original U-2, Article 347, was the first reconnaissance craft to fly directly over Soviet airspace. The U-2, fitted with a J57/P31 engine and an A-2 camera frame, was approved for takeoff by President Eisenhower, Bissell, and those on the ground at approximately 6:00 AM in Wiesbaden, West Germany. The target of this mission, dubbed Mission 2013, was to photograph naval shipyards in Leningrad (modern St. Petersburg), which was thought by the CIA to be the center of the USSR's submarine construction program. Mission 2013 also was ordered to photograph along its route "a number of major military airfields to make an inventory of the new bison jet-engine heavy bomber."118 The Article 347 U-2B successfully executed its mission, with no indication that the USSR had tracked or even noticed the plane, despite past sporadic tracking of U-2's over Poland. Pedlow and Welzenbach highlight an essential feature of the USSR radar and missile defense systems, stating that "Interestingly, the Soviet radar coverage was weakest around the most important targets,

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[116] Pedlow and Welzenbach, "The CIA and the U2 Program," 111.
[117] Pedlow and Welzenbach, 101.
[118] Pedlow and Welzenbach, 115.

Moscow and Leningrad, and the Soviets did not realize that U-2's had overflown these two cities."119

The photos taken by U-2B overflights in the authorized 10-day period were immediately rushed to Washington, D.C., for analysis and exploitation. Despite expectations to the contrary, the photos confirmed that the U-2 flights were indeed being tracked, evidenced by several MiG-15s and MiG-17s flying below the U-2 in pursuit but failing at all attempts to achieve a coherent attack vector, proving that while the aircraft had been detected, the USSR had no aircraft in its arsenal with the ability to engage the U-2 at its operational elevation. An additional issue arose when the first photographs returned to D.C. – some of the photographs were relatively blurry. The blurriness was attributed to water on the runway in Wiesbaden striking the A-2 camera lens package during takeoff. This issue was quickly solved with Johnson implementing a jettisonable cover for the camera to be removed in mid-air and attached to wheels so it could be recovered and reused. Soviet diplomatic cables addressed to Secretary of State Dulles, DCI Dulles, and President Eisenhower alerted the administration to Soviet knowledge of an overflight program.

However, the Soviets described the incident as a military and twin-engine bomber over Soviet territory, which enabled President Eisenhower to truthfully deny the claim that any military or bomber craft had flown into Soviet airspace.120 To mitigate or possibly solve the problem of Soviet detection of the U-2, Bissell and Land engaged a team of MIT scientists from the Lincoln Project to design and implement a series of

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[119] Pedlow and Welzenbach, 116.

[120] "United States Reply to Soviet Note of July 10 Alleging Violations of Soviet Territory by United States Aircraft," Press Release for 7:00 PM, EDT, Thursday, July 19, 1956 (U.S. Department of State, July 19, 1956).

radar-absorbing materials proposed by Edward M. Purcell, the laureate of the Nobel Prize in Physics in 1952 for his work on Nuclear Magnetic Resonance (NMR) which made Purcell the primary candidate for the research into novel material applications for use in evading radar detection. The program, known as Project RAINBOW, resulted in various solutions to the issue of decreasing the U-2’s radar cross-section but was ultimately a failure not due to a lack of ingenuity on the part of Purcell and the MIT Lincoln Lab team, which had been working with Lockheed for these improvements to the U-2, but due instead to Soviet perseverance and growth of radar technology. The U-2 would continue to be able to be tracked by the Soviets and others even into the modern day, increasing the danger that remained ever-present in the mind of President Eisenhower.

Despite fears of loss of life and due to the slow pace of the development of the unmanned CORONA program, which was intended to replace the U-2 as the USIC primary SARP, the U-2 continued to fly across the planet, collecting intelligence not only on the Soviet Union, but on the People’s Republic of China, Cyprus, Egypt, Israel, and various Eastern European nations. The dam had broken, and the U-2 soon became one of the first resorts for collecting GEOINT across the USIC.

Utilized by Detachment B and C, the U-2 began to undergo many more changes and upgrades, including novel camera technologies and better anti-radar technology supported by Purcell and the MIT Lincoln Lab as part of Project Rainbow and notably, including the J75 engine, an engine with cavernous capabilities differences between it and the J57 engine provided the U-2 with its third iteration, the U-2C in July 1959.

On May 1, 1960, A U-2C flown by Captain Gary Powers, the most experienced U-2 pilot in the USIC, who had flown 27 operational missions in the U-2 over the USSR and China, took off from its base in Peshawar, Pakistan, as part of Operation GRAND SLAM, also known as Mission 4154, the 24th deep-penetration overflight of the Soviet Union.121 At 66,000 feet above Afghanistan, known as penetration altitude, he proceeded to disable all radio signals coming from his plane, referred to as Article 360, as the SOP for deep-penetration overflights required radio silence. According to Pedlow and Welzenbach, the Soviets had halted civilian air traffic due to May Day and were able to begin tracking the U-2 roughly 15 miles south of the Soviet/Afghan border. With at least 13 MiG interceptor aircraft in pursuit of the U-2, an SA-2 surface-to-air missile then detonated near Powers' U-2 roughly 70,500 feet above Sverdlovsk after the successful capture of photographs of the infamous Missile Test Range at Tyuratam, modern-day Töretam, Kazakhstan. Captain Powers then ejected and landed, with the aid of an automatic parachute in a nearby field, where local Soviet soldiers and civilians were waiting.

The SA-2 SAM array, which knocked Powers' U-2 out of the sky, had been unknown to the CIA in their flight plans, which were specifically designed to avoid SAM sites. The SA-2 SAM array's volley of three missiles, one which missed the target, one which caused Powers' U-2 downing, and the other which "scored a direct hit on a Soviet fighter aircraft sent aloft to intercept the U-2," was by and large a stroke of luck favoring the Soviets, given the disparity between the elevation of the U-2 and the maximum distance the SA-2 could reach.122 In an additional stroke of Soviet luck, the U-2 itself was not significantly damaged, with the lightweight qualities of the airframe playing a significant role in the aircraft's survival. Powers had not been able to self-destruct the U-

[121] Pedlow and Welzenbach, "The CIA and the U2 Program," 182.
[122] Pedlow and Welzenbach, 185.

2, which would have destroyed the Series B camera platform in the event of a landing in adversarial territory. The status of Captain Powers was unknown until May 7, when Khrushchev informed the Supreme Soviet that the pilot, who had confessed to spying on the Soviet Union, was alive and, contrary to the U.S.' official cover story that a weather pilot had blacked out and let his plane fly into Soviet territory, showed no signs of oxygen deprivation.123

As President Eisenhower's U-2 cover story had been blown, he had no recourse but to acknowledge to the American people that his administration had been flying deep-penetration overflights into adversarial airspace for nearly four years. However, even at Khrushchev's demand, Eisenhower refused to formally apologize for the American breach of Soviet sovereignty, instead opting to suspend U-2 overflights and guarantee their suspension for as long as he would be in office. While the story of the U-2 certainly does not stop with the downing of Powers' aircraft, there is one final moment in the narrative of Powers and Eisenhower that underscores the rising importance of GEOINT

On Saturday, August 20, 1960, the New York Times on Saturday ran a split front page with the right-oblique headline stating, "Powers Gets a 10-Year Sentence: Soviet Asserts Penalty is Mild, but Eisenhower Find its Severe," on one side, and the headline on the left stating, "Space Capsule is Caught in Mid-Air by U.S. Plane on Re-Entry from Orbit." 124 The juxtaposition of these two headlines speaks to a paradigm shift in geopolitics – as the U-2 program would soon enter a period od decreased use now that the

[123] "Milestones: 1953–1960 - Office of the Historian," https://history.state.gov/milestones/1953-1960/u2-incident.

[124] by the Associated Press, "SPACE CAPSULE IS CAUGHT IN MID-AIR BY U.S. PLANE ON RE-ENTRY FROM ORBIT," *The New York Times*, August 20, 1960, VOL. CIX, No. 37,464 edition, sec. Front Page; Osgood Caruthers, "POWES GETS A 10-YEAR SENTENCE; SOVIET ASSERTS PENALTY IS MILED, BUT EISENHOWER FINDS IT SEVERE," *The New York Times*, August 20, 1960, VOL. CIX No. 37,464 edition, sec. Front Page.

rise of unmanned SRP's had begun – the world would change irrevocably from that day, with the new and old eras delineated side by side in the New York Times.

Chapter III.

The Missile Gap and the Progression of Space Reconnaissance

In November 1959, during a reception following the All-Union Congress of Soviet Journalists, Soviet Premier Nikita Khrushchev exclaimed to all present, "I want to be understood correctly: we do not want to frighten anyone, but we can tell the truth. Now we have such a stock of rockets, such an amount of atomic and hydrogen weapons, that if they attack us, we could wipe our potential enemies off the face of the earth. … By the way, I shall reveal – and let the people know about it; I am making no secret of this – that in one year, 250 rockets with hydrogen warheads came off the assembly line in the factory we visited. This represents millions of tons in terms of conventional explosives. You can well imagine that if this lethal weapon is exploded over some country, there will be nothing left there at all."[125]

Had Khrushchev been telling the truth, this would have been quite the destabilizing situation. However, the fact is that Khrushchev was lying and had suspected for some time that the Americans knew he was lying. Three years of nearly two deeply penetrative overflights into Soviet territory by U-2 aircraft had begun to prove to American policymakers that the missile gap – the idea that the USSR was leagues ahead of the U.S. in terms of both the quality and quantity of missile and bomber technology – was a fallacy. The key aspects of this chapter are the fallacious missile gap and its political context, salience, and legacy. This chapter will highlight how strategy, technology, and geopolitics created the conditions that would spur the rise of GEOINT

[125] Philip Klass, *Secret Sentries in Space* (New York: Random House, 1971), 43–44, https://archive.org/details/secretsentriesin0000klas.

and OSINT and the creation of the National Reconnaissance Office (NRO) before the following chapter on the CORONA SRP program.

The conditions for the missile gap phenomenon began as soon as American policymakers shifted their post-WWII focus to the rising tide of communism and the technological, intelligence, and ideological rivalry with the USSR. The first factor in how this phenomenon came about is the requirement laid out by Presidents Truman and Eisenhower and the heads of the burgeoning USIC to understand better Soviet intentions, their society, their economy, and their military. As discussed in previous chapters on the FBIS and the U-2, OSINT and GEOINT provided the most extensive levels of insight into those respective aspects, with both OSINT and early-GEOINT platforms in development and exploitation within a decade of the end of WWII. The second factor is interagency and interbranch rivalry.

The nearly exponential growth of the American military and economy in the post-war era provided a rising tide of newly available resources to the U.S. military and USIC, with a wide variety of camps and interests vying for increases in budget and stature, which inevitably led to overspending and mismanagement of funds based on the missile gap fallacy. The third factor at play is the respective attitudes toward reconnaissance and spying between Presidents Truman and Eisenhower, throughout whose administrations the missile gap would be proven as a false assumption. These three factors will be shown to have a monumental impact on how the U.S. perceived its Soviet adversary on a grand strategic level, highlighting both the material and, more ethereal, emotional conditions spurred by events such as the first U-2 overflights and the launch of *Sputnik.*

The first condition, concerning the stated desire for intelligence on Soviet intentions, economy, and military, has been written on at length in previous chapters, but what stands salient here is what that lack of understanding led to. The grand intelligence requirement of better understanding Soviet intentions through the use of OSINT and, eventually, GEOINT factored into every verifiable level of policymakers' minds – as noted in Chapter I, this lack of understanding was a primary driver of the growth of open source and geospatial intelligence, and which would by the end of the Cold War have proven invaluable in providing context to intelligence customers through which their decisions were informed. NSC 20/1, a Top Secret document published to the National Security Council in August 1948, highlights as one of its primary objectives "to bring about a basic change in the theory and practice of international relations observed by the government in power in Russia."[126]

NSC 20/1 highlights an essential consequence of not knowing one's adversary well – the boogey-man-ification of the other. In a perhaps understandable, albeit prosaic, paragraph in the context of the 1948 National Security Council, Stalin, the loss of China to communist rule, and the impending Korean War, NSC 20/1 goes on to say, "There is no reasonable prospect that we will ever be able to alter the basic political psychology of the men now in power in the Soviet Union. The malevolent character of their outlook on the outside world, their repudiation of the possibility of permanent peaceful collaboration, their belief in the inevitability of the eventual destruction of the one world by the other; these things must remain, if only for the simple reason that the Soviet leaders are convinced that their own system will not stand comparison with the

[126] National Security Council, *NSC 20/1 - US Objectives with Respect to Russia*, 1948, http://archive.org/details/NSC201-USObjectivesWithRespectToRussia.

civilization of the west and that it will never be secure until the example of a preposterous and powerful western civilization has been physically obliterated and its memory discredited."[127] NSC 68, a reexamination of the priorities highlighted in NSC 20/1, published in April of 1950 and declassified in 1975, echoes the continuation of the above theory, stating, "The issues that face us are momentous, involving the fulfillment or destruction not only of this Republic but of civilization itself."[128] While the narrative of the Cold War being a life or death situation is certainly not limited to the era after the missile gap has been disproven, the all-or-nothing attitude that had been presented to the American public by policymakers throughout the Cold War did its part in energizing the nation to the support of democracy and western civilization.

The second condition, concerning interagency and interbranch rivalry, is not only a condition for the missile gap fallacy to emerge but is also a critical motivator in President Eisenhower's New Look defense policy, stemming from the perceived failures of President Truman's peacetime management of U.S. defense spending which has been characterized as "dizzying and oscillating" between 1945 and 1953 with the "government ordering expensive equipment one year and then delaying or canceling orders the next," which did "did more harm than good, preventing the military from modernizing and maintaining steady capability."[129] Interagency rivalry became so burdensome on President Eisenhower that by 1957 he estimated that over half his time as President was spent fighting pressure from competing agencies and branches.[130] Eisenhower's solution

[127] National Security Council 20/1, 25.
[128] "National Security Council Report, NSC 68, 'United States Objectives and Programs for National Security' | Wilson Center Digital Archive," 3, https://digitalarchive.wilsoncenter.org/document/national-security-council-report-nsc-68-united-states-objectives-and-programs-national.
[129] Dienesch, *Eyeing The Red Storm: Eisenhower and the First Attempt to Build a Spy Satellite*, 48–56.
[130] Dienesch, 48.

for this interagency conflict began even before he was President, establishing a majority-rules rule within the Joint Chiefs of Staff (JCS), which he led until his inauguration as President in 1953. By his inauguration in January 1953, the defense budget under President Truman had reached $85 billion, or roughly 20% of GNP, which in modern terms would be the equivalent of a $5 trillion defense budget.

With agencies and branches vying for funding and oftentimes using, taking a cynical view, surreptitious methods of increasing their funding, President Eisenhower instituted a rebuttal to President Truman's feast-to-famine pattern of defense spending by forcing budget cuts, particularly on the U.S. Army, whose force levels dropped by roughly 30% between December 1954 and June 1956.[131] President Eisenhower saw the most prominent rivalry between the USAF and every other branch. In 1953, as President Eisenhower was looking over the budget leftover from President Truman, the USAF claimed that it needed an additional 141 air groups in FY 1954, to which the President responded, "I'm damn tired of Air Force sales programs. In 1946 they argued that if we can have seventy groups, we'll guarantee security for ever and ever," regarding the USAF's demand for 141 groups as a "trick figure. … you have to abide by it or you're treasonous."[132] The USAF utilized the bomber gap fallacy to effectively blackmail the President into approving additional spending, with Maj. Gen Curtis LeMay leading that charge. LeMay predicted that if he did not receive an additional $23.8 billion (roughly $260 billion in 2023 dollars), the Soviet Union bomber forces would outpace the U.S. by 2:1 – it was apparent to President Eisenhower that significant changes would have to be made regarding defense spending lest the spending increase without justification and

[131] Dienesch, 51.
[132] Dienesch, 52.

severely impact the U.S. economy. After a series of failed appeals to his National Security Council, the U.S. Congress, and Alan Dulles' CIA, President Eisenhower turned directly towards spaceborne reconnaissance as an effective means of circumventing interagency rivalry while maintaining national security, by and large through the adaptation of reconnaissance agencies and platforms, such as the U-2 and the CORONA satellite program.

The third condition, respective views on reconnaissance and spying across the presidencies of Truman and Eisenhower, certainly spurred not only the missile gap fallacy and its solution but also the generation and advent of spaceborne reconnaissance platforms (SRPs) during the early Cold War. President Truman had been notable in his dispassionate view towards spying and reconnaissance. Despite facilitating the creation of the CIA, an agency he would later refer to as his "invention," President Truman's desire to have the CIA under military control spoke volumes regarding his views on intelligence.[133]

President Truman did, however, urge "Wild" William "Bill" Donovan, considered to be a founding father of the CIA, given his role in the WWII Office of Special Services, to make the public case for a novel espionage agency. Donovan would go on to publish his case in LIFE magazine at President Truman's request, highlighting that the American people's aversion to espionage must be overcome, promoting several arguments, among which are that "History is full of melancholy examples of the bankruptcy that eventually overtakes all clanking military empires. Intelligence supplies an alternative -- cheaper and

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[133] Thomas F. Troy, "Truman on CIA: Examining President Truman's Role in the Establishment of the Agency" (CIA Historical Review Program September 22, 1993, n.d), https://www.cia.gov/static/140d431d2c0e7dc2a891a4ed224c9991/Truman-on-CIA.pdf.

more congenial to our institutions" and it was "important to learn not merely the size of the forces that the enemy could put into the field but also the manpower available for the internal economy."[134] President Eisenhower's more direct approach to intelligence, particularly given that he had inherited the CIA and NSA, likewise provides additional context concerning policymakers' attitudes toward espionage and reconnaissance. President Eisenhower's attempt to balance the national defense and aversion to military disaster with the protection and benefit of Americans at home, President Eisenhower believed that "a strong economy was the cornerstone of security policy."[135]

President Eisenhower was also wary of creating a garrison state such as the USSR or DPRK and focused on the additional and more-difficult-than-not struggle of maintaining and promoting democracy in the U.S. – he believed that any guarantee of notional security would inevitably lead to the undermining of democracy – thus, President Eisenhower envisions a national security apparatus unlike anything anywhere else on the planet save perhaps Great Britain. President Eisenhower's increased reliance on and facilitation of intelligence agencies and apparatuses showcases a unique view of maintaining the best domestic political stability and global military and ideological prowess while keeping faith in democratic institutions. The burgeoning USIC provided some of the most rigorous qualities of oversight seen in any military or intelligence agency globally occurring within the USIC. President Eisenhower's views on war correlate to this effect, as evidenced in a letter to friend and co-head of the Simon & Schuster publishing house, Richard L. Simon, in 1965, saying, "War implies a contest;

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[134] William J. Donovan, "Intelligence.," *LIFE Magazine*, September 30, 1946, https://books.google.com/books?id=akkEAAAAMBAJ&pg=PA108&source=gbs_toc_r&cad=2#v=onepage&q&f=false.
[135] Dienesch, *Eyeing The Red Storm: Eisenhower and the First Attempt to Build a Spy Satellite*, 27.

when you get to the point that contest is no longer involved and the outlook comes close to destruction of the enemy and suicide for ourselves -- an outlook that neither side can ignore -- then arguments as to the exact amount of available strength as compared to somebody else's are no longer the vital issues."[136]

Returning to the original story from Xenophon in Chapter I, in which the Greeks ignorantly trusted the Achaemenids not to attack them on their monitored departure from Persian territory, President Eisenhower took the stage as a stand-in for the reader. Rather than blindly trusting Soviet assertions of peace, President Eisenhower opted for a strategy parroted later in the century by President Reagan – trust but verify. "We do not attempt to build up to a D-day because," Eisenhower wrote in his diary, "having no intentions of our own to attack, we must devise and follow a system that can carry us as long as there appears to be a threat in the world capable of endangering our national safety."[137] President Eisenhower's idea, which would come to be called indefinite defense, based on the core idea of verification, provided the impetus for the creation of SARPs. Centered on the limitation that there was no feasible way to achieve maximum defense in peacetime without sacrificing the economic and personal liberties guaranteed by Western democratic nations, the rule of indefinite defense would instead rely on nuclear deterrence.

Among the key indicators of President Eisenhower's willingness to upend Truman-era defense policy to shore up national defense, protect democratic institutions,

[136] Dienesch, 34; Dwight D. Eisenhower, "Letter from Eisenhower to Richard L. Simon," April 4, 1956, box 14, file April 1956 Miscellaneous (5), DDE Diary Series.
[137] "DDE Personal Diary, January 22, 1952, Box 1, File [January 1-February 28, 1952], 3. See Also, 'Letter to Charles E. Wilson from President Eisenhower, Jan 5, 1955,' AWF, DDE Diary Series, Box 9, File DDE Diary January 1955 (2).," n.d.

and foster a thriving capitalist economy is the creation and legacy of Project SOLARIUM. SOLARIUM outlined for all members of the NSC, JCS, and USIC the national security priorities of the Eisenhower Administration. SOLARIUM led directly to the creation of a policy paper entitled NSC 162/2, which conclusively outlined the role of the political elite in generating a successful national security policy in the Cold War. SOLARIUM also provided a solution to the nascent issue of precisely how to deal with nuclear deterrence.

President Truman's experience dealing with nuclear deterrence was limited, given that the U.S. had been the world's only nuclear power for most of his administration. However, President Eisenhower inherited the problem of a nuclear-capable USSR. President Eisenhower's belief that the only thing worse than losing a nuclear war would be winning one formed the foundation of nuclear deterrence theory at an Executive level. As President Eisenhower wrote in his diary to this effect, "Here would be a great area from the Elbe to Vladivostok and down through Southeast Asia torn up and destroyed without government, without its communications, just an area of starvation and disaster. I ask you what would the civilized world do about it? I repeat there is no victory in any war except through our imaginations, through our dedication and through our work to avoid it."[138] President Eisenhower's ambivalence toward active war and his search for a legitimate substitute led him to the argument, which is still alive today, that the U.S. did not require a robust defense program with its contingent spending and interagency rivalry

[138] "Diary Entry, June 19, 1954, Hagerty Diary, Box 1A, File June 1954. See Also 'The Next Ten Years,' WHO, OSANA, NSC Series, Policy Papers Subseries, Box 2, File NSC 112/1 -- Disarmament (3).," n.d.

but that security could be maintained through the use of a long-term deterrent, which nuclear weapons would provide, as outlined in SOLARIUM and NSC 162/2.[139]

Notable not only for its scope of the issue, as the document itself is declassified at nearly 60 pages, NSC 296, provided to President Eisenhower on November 5, 1957, after the launch of *Sputnik* but which was written prior to the launch, provides one of the most germane examples of USIC's over and underestimation of Soviet capabilities and intent concerning their missile stockpile and technological advance. In an instance of correct estimation verging on underestimation, despite the lack of declassified knowledge regarding the *Sputnik* launch just one month prior, NSC 296 analyzes that, "We believe that the USSR has the capability of orbiting, in 1957, a satellite vehicle which could acquire scientific information and data of limited military value. A satellite vehicle possessing substantial reconnaissance capabilities of military value could probably be orbited in the period 1963-1965."[140]

An example of overestimation of Soviet military capability by the CIA is provided in a 1956 NIE on Soviet capabilities in which the CIA assessed that the USSR had 1,300 long-range aircraft, including 35 BISON bombers, 30 BEAR, 475 BADGER, and 760 BULL bombers.[141] The 1956 NIE also assessed that the USSR had the industrial

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[139] "NSC 162/2 Report to the National Security Council by the Executive Secretary (Lay)," NSC, Foreign Relations of the United States, 1952-1954, National Security Affairs, Volume II, Part I (Washington, D.C: National Security Council, October 30, 1953), https://history.state.gov/historicaldocuments/frus1952-54v02p1/d101; "Memorandum for the Record by the Special Assistant to the President for National Security Affairs (Cutler)" (National Security Council, May 9, 1953), https://history.state.gov/historicaldocuments/frus1952-54v02p1/d63; Dienesch, *Eyeing The Red Storm: Eisenhower and the First Attempt to Build a Spy Satellite*, 37.

[140] Director of Central Intelligence and Intelligence Advisory Committee, "NIE No. 296 Soviet Capabilities and Probable Programs in the Guided Missile Field" (Washington, D.C, March 12, 1957), 8, 25–26.

[141] Director of Central Intelligence and Intelligence Advisory Committee, "Soviet Capabilities and Probable Courses of Action Through 1961," National Intelligence Estimate (Washington, D.C, August 2, 1956), CIA FOIA Reading Room.

strength to produce an additional 800 long-range bombers by 1961, an assertion wholly disproven by U-2 overflights which generated additional intelligence regarding Soviet economic woes, proving that the Soviets, by 1960, had a total of 116 BISON bombers and 85 BEARS.[142] A following NIE in 1957 assessed that by 1962, the Soviets could have over 500 ICBMs and over 700 ICBMs by 1963, inadvertently delineating between the bomber and missile gap periods and brightly showcasing the rising need for more precise and faithful intelligence collection platforms such as the U-2 and SRPs.[143] It has been noted, now that the dust of the Cold War has been relatively settled, that at the time of publication and scope of the relevant NIEs, the USSR had ICBMs in the low double digits, but this was not entirely understood by policymakers at the time and would continue to fuel the conditions upon which the bomber and missile gaps relied.[144]

The missile gap itself proved to be a fallacy by 1961 with the advent of GEOINT platforms such as the U-2 and the CORONA satellite system in particular, which will be the topic of the following chapter. However, as noted above, it was not merely the lack of concrete intelligence on the USSR that allowed the bomber and missile gap to grow into a phenomenon that would impact nearly every level of the U.S. Military and Intelligence apparatus. Interagency rivalry, particularly between the nascent CIA and USAF, impacted spending, peace of mind, diplomatic conditions, and economic policy on a grand scale, as evidenced by LeMay's requested increase in USAF spending and the sense that as a civilian agency, the CIA was not up to the task of running reconnaissance

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[142] Huw Dylan, David V. Gioe, and Michael S. Goodman, *The CIA and the Pursuit of Security* (Edinburgh University Press, 2020), 103.
[143] Director of Central Intelligence and Intelligence Advisory Committee, "Main Trends in Soviet Capabilities and Policies 1957-1962," National Intelligence Estimate 11-4-57, November 12, 1957, CIA FOIA Reading Room.
[144] Dylan, Gioe, and Goodman, *The CIA and the Pursuit of Security*, 104.

missions into adversarial territory. President Eisenhower's strategy of indefinite defense and the New Look Defense Policy throughout the 50s and early 60s enabled him to become one of the most consequential Presidents in terms of the effectiveness and organization of the USIC, parallel perhaps with President Truman and the organizational reforms of President George W. Bush in the wake of the 9/11 terrorist attacks.

President Eisenhower's role in the formation and reorganization of the USIC can be described as bridging the gap between the first and second generations of the USIC. The first generation (1GUSIC) of the USIC in the post-war era comprised solely the CIA and NSA, with fundamental but contingent support from the DoD. In contrast, the second generation would be formed across the Presidencies of Eisenhower and Kennedy. It would constitute the creation and facilitation of organizations such as the Defense Intelligence Agency (DIA), the National Photographic Interpretation Center (NPIC), and the National Reconnaissance Office (NRO). President Eisenhower's dissatisfaction with the quality of intelligence provided to him by the CIA, NSA, and DoD in the early years of the Cold War had been primarily driven by his distaste for interagency rivalry and the stature of the old WWII guard. Therefore, enabled by an ushering-in of executive power over the JCS, and with fewer than nine months left in his second term, President Eisenhower was able to coherently begin the administration of the 2GUSIC, through which the thesis will use the establishment of the NRO as a case in point.

In March 1960, Secretary of Defense Thomas Gates suggested that the President take a comprehensive look at the efficiency of the burgeoning defense intelligence apparatus, which at that time had a budget of roughly $2 billion and had failed to accurately assess Soviet intentions and military buildup, despite the enormous contributions of the U-2. Across the summer and fall of 1960, the waning days of the Eisenhower presidency, a group consisting of the Bureau of the Budget, the President's Board of Consultants on Foreign Intelligence Activities, the CIA, and the Secretaries of State and Defense formed the Joint Study Group (JSG). Chaired by the Inspector General of the CIA, Lyman B. Kirkpatrick, the JSG provided a series of recommendations to the Executive Office, which provided a series of bureaucratic reorganizations of the USIC, among which would lead to the development of the DIA, NRO, and NPIC.

The JSG convened ninety times across the Eisenhower presidency, interviewed 320 individuals across 51 organizations relating to intelligence, and conclusively determined that military intelligence apparatuses had been playing too large a part within the USIC, and therefore recommended the establishment of novel agencies and groups within the USIC.[145] Thus, with the recommendations of the JSG, the shift from 1GUSIC, which had relied on military intelligence, to 2GUSIC, which included more centralized agencies such as the DIA, came forth within the U.S. political and intelligence domain, with interagency rivalry and lack of actionable intelligence relating to the capabilities of the USSR acting as reagents for the shift toward 2GUSIC.[146]

The JSG's final recommendations were provided to President Eisenhower on December 15, 1960, and were approved across the final days of the Eisenhower administration. However, despite the best efforts of the JSG and President Eisenhower, there would be no realistic way to implement the changes recommended in the December 15 report. Thus, however much of the ground had been laid by the Eisenhower

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[145] Burrows, *Deep Black: Space Espionage and National Security*, 135.
[146] Lyman B. Kirkpatrick et al., "The Joint Study Group Report on Foreign Intelligence Activities of the United States Government," December 15, 1960, Defense Intelligence Agency Media Archive.

administration already, the task of reorganization fell into the laps of those in the Kennedy Administration. President Eisenhower's thoughts on the subject, which would later inspire the title of Tim Weiner's National Book Award-winning compendium of CIA history, were that he felt he would "leave a legacy of ashes for his successor."[147] However, President Eisenhower's legacy would not come to be regarded as one of ashes, but would instead be carried on by successive administrations whose belief in the virtue of centrality of intelligence has only grown stronger well into the modern era.

The incoming Secretary of Defense in the Kennedy Administration, Robert McNamara, found the JSC report so compelling that within one year he and President Kennedy had successfully created and facilitated the DIA, NPIC, and NRO.[148] The JSG had been successful in persuading the Kennedy administration and McNamara in particular that the best solution to what President Eisenhower saw as reckless spending, pitiful interagency rivalry, and a tangled web of bureaucracy that hindered efficiency at all levels was to centralize further and make more independent the USIC. The establishment of the DIA, in particular, an agency that combines the respective intelligence services under the DoD, by and large, solved the problem of interagency rivalry and self-indulgence, or at least solved the problem at the Executive level. With the creation of the NPIC, the CIA had been given control of the technical aspect of geospatial analysis, mainly since, at the time of the center's creation, all SARPs worked on a film camera system that would require specialized analysis. However, the creation of the NRO holds the greatest salience for this thesis.

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[147] Marion W. Boggs, "Discussion at the 473rd Meeting of the National Security Council, Thursday, January 5, 1961," Memorandum (National Security Council), 4.
[148] Burrows, *Deep Black: Space Espionage and National Security*, 135.

The NRO was technically founded in August 1960 by the Eisenhower administration, but its actual development would begin under the Kennedy administration in early 1961. Though initially referred to as the USAF's Office of Space Systems due to the paramount secrecy of the subject, it was imperative to policymakers that the NRO not be solely under the command of the USAF, being instead made up of several overseers, including the DoD and CIA. Essentially, the NRO acted as a funneling point for all types of reconnaissance intelligence, dissolving any argument that one agency had a more substantial right to reconnaissance analysis than the other, the CORONA project included. This organizational miracle was achieved by having the head of the NRO always be the Under Secretary of the USAF, with their deputy being from the CIA, with both being civilian operators. The NRO's status as the bridge between respective reconnaissance projects and platforms enabled the NRO to have a significant amount of power in the analysis and dissemination of reconnaissance imagery and intelligence, giving the BYEMAN codenames, a style of security control developed for the NRO and used widely across the USIC, of CHESS for intelligence collected by the U-2 and RUFF for intelligence collected by SRPs.[149]

The NRO had been initially located in the 'guarded sanctum' of 4C-956 within the Pentagon and officially reported to the undersecretary of the Air Force. The cover story for the NRO had been met with some ambivalence by policymakers, but by and large, the true nature and purpose of the NRO were known to so few that it would never truly become a public issue. For such a secret organization, its budget was by 1985

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[149] Ken Renshaw, "The Retirement of BYEMAN: From the Front Office," Security Newsletter Issue 4, September 2004.

among the highest across the entire USIC at over $5 billion.[150] With President Kennedy's priorities regarding space technology, the civilian space agency, NASA, and the military/intelligence space agency, the NRO, quickly became among the most vital and most protected programs within the USG, to the point where the acronym 'NRO' was not even allowed to be said outside of secured areas, with the acronym itself being classified as Secret and the existence of the program as a whole as Top Secret.[151]

With the minimization of the USIC's rivalry and efficiency issues through the New Look Policy, it was not long until the fallacy of the missile gap was proven. With the parallel organization of the U-2 and CORONA SRP program under the NRO and utilizing the NPIC, particularly for imagery, the missile gap was no more. Technology alone can, therefore, be said not to be sufficient in inducing more actionable and parsimonious intelligence on its merit, but reimagining how tools and technologies are utilized is paramount to the success of any program. As would become standard practice across the USIC, each step toward better technology was eventually followed by a rigorous estimation of community-wide capabilities to a significantly positive effect. The core argument that management and organization both support and are supported by technological advancement has been substantiated throughout this chapter – proof among many in the managerial efficiency of the American capitalist system compared to the Soviet command economy. In short, the successes of the NRO and the U-2 in dispelling the fallacy of the bomber and missile gap showcase precisely how agility versus rigidity

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150 Burrows, *Deep Black: Space Espionage and National Security*, 199.

151 Jeffery T Richelson, *The Wizards of Langley: Inside the CIA's Directorate of Science and Technology* (Boulder: Westview Press, 2002), 247–49; "The Space Review: Red and Black: The Secretive National Reconnaissance Office Finally Faces the Budgeteers," accessed October 2, 2023, https://www.thespacereview.com/article/4366/1; Author Redacted, "National Reconnaissance Office Security Information," Memorandum For: Redacted (National Reconnaissance Office, June 14, 1963), National Security Archive - GWU.

plays out across time and administrations while also providing evidence to the critical argument of this thesis – that these technological and organizational improvements, parallel with the rise of open source intelligence, were vital in the American ability to understand Soviet capabilities and intentions better, thereby enabling the American side to act more rationally and keep the Cold War cold.

Chapter IV.

Corona/Keyhole 1958-1963

With the development of the U-2 completed the Eisenhower administration turned their eyes to what was, up to that point, one of the most innovative and consequential technologies in sovereign power of all time – the CORONA satellite system. CORONA's reconnaissance capability changed how reconnaissance, scientific measurement, and wars would be thought of well into the modern era, often to significant American geopolitical gain. Not solely dependent on the rocket boosters themselves, which are undoubtedly vital to the story of the rise of geospatial and reconnaissance power in the Cold War, the camera system and the theories supporting it offer a vast swath of material for historical analysis. The effect of the CORONA system, publicly referred to as the Discoverer program, in ending the missile gap fallacy enabled the U.S. and its allies to view the world through a different lens and provided the impetus for peace-building verification measures without putting American lives at risk. The effect of the CORONA system cannot be reasonably overstated. CORONA, in particular, as the forebear of a series of reconnaissance systems that made up the U.S.' National Technical Means of Verification (NTM), initiated a paradigm shift in geopolitics, grand strategy, and the pursuit of scientific intelligence as a whole.

With much of the context surrounding the intelligence requirements of understanding Soviet intentions and capabilities, as well as the shoring up and centralization of the USIC as a whole, having been provided in earlier chapters, this chapter will focus on the development and utilization of the CORONA satellite system across the Eisenhower administration in particular. It will seek to coherently prove the assertion that the CORONA system was a technology built with an inherent propensity toward peace, thereby facilitating an American strategic advantage over the Soviets, showcasing for the reader the impact of GEOINT and OSINT, and keeping the Cold War cold. Sources for this chapter come in the form of either primary or secondary to provide additional context and elevate the reader's knowledge of the subject. Additional consideration will be given to the rise of anti-satellite (ASAT) technology. In short, this chapter seeks to provide the reader with a greater understanding of the political, military, and theoretical conditions that enabled the U.S. to create such an innovative and consequential technology on par with the telegraph or computers.

Galactic Radiation and Background Satellites and the Introduction of Spaceborne Reconnaissance

As outlined in earlier sections on the Beacon Hill and TCP Reports, the requirement for the U.S. to develop and utilize spaceborne reconnaissance platforms (SRPs) had been a central focus of the Eisenhower administration, with particular focus on the development of the CORONA program, as evidenced by NSC Action 1814 in 1958 which placed the International Geophysical Year (IGY)and reconnaissance satellites at the top of the Eisenhower administration's R&D priorities.[152] However, the CORONA platform was not the first SRP of note in the Cold War and was instead the first camera-based SRP. Roughly one month after the downing of Captain Powers' U-2 over the USSR, the United

[152] Robert L. Perry, "A History of Satellite Reconnaissance" (Center for the Study of National Reconnaissance, December 2013), 28, HathiTrust, https://hdl.handle.net/2027/uc1.c112418611?urlappend=%3Bseq=6.

States Navy (USN) had launched the Galactic Radiation and Background (GRAB) electronic intelligence (ELINT) satellite atop a THOR-ABLE rocket. The USN's GRAB satellite program, Project Dyno, carried a Transit 2A navigation satellite, enabling the U.S. to map Soviet SAM sites and air defense radars, making it the first properly useful reconnaissance satellite.[153] The GRAB satellite, referred to as GRAB-1, orbited over the USSR and the PRC 22 times in total for 40 minutes each over three months and would have been competing, unknowingly, of course, given the secrecy around the CORONA program, with the CIA and USAF's joint SRP program – CORONA.

The effect of the GRAB-1 and GRAB-2 satellites, aligning with the standards set forth by the U.S.' participation in the IGY, proved to those involved that the U.S. was capable of exceeding *Sputnik* in the sense that a satellite could not only be launched but, unlike *Sputnik*, the satellite would be able to be launched across a precise orbital environment and return actionable intelligence. The clear U.S. technological superiority was not only due to the advent of the THOR, ABLE, and AGENA rockets upon which most satellites were launched but also spoke to the supremacy of the U.S. market economic system, which prized innovation in small quantity over something such as *Sputnik* which, while achieving LEO earlier than the U.S., had no accurate intelligence collection apparatus, despite Soviet satellites being easy to produce relative to those of the U.S. due the Soviet simplicity of design and less robust utility. This factor strikingly differentiates U.S. and Soviet GEOINT capabilities across the Cold War and will be written on in greater detail in Chapter V.

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[153] Baker, *US Spy Satellites: 1959 Onwards (All Missions, All Models) Owners Workshop Manual*, 75.

Spaceborne reconnaissance from the U.S. perspective was founded with the GRAB satellite, which was the first to ascertain the precise position of Soviet nuclear power plants, enabling the U.S. to ascertain with precision the location and status of the Soviet nuclear power program using GRAB-2, which utilized a Transit 4A radioisotope power array using U.S.-developed Systems for Nuclear Auxiliary Power (SNAP) isotopes, and which, had it not collided with space debris, would have orbited the earth and likely have remained operational for an additional 2000 years. GRAB-2's data, despite being cut in half by solar flares, provided enough data that an early automation system was able to predict the development and movement of Soviet SAM and radar systems.

Agena: The Workhorse of The Space Race

Although the story of the CORONA project is undoubtedly fixed on the camera system, the retrieval of film, and the analytic techniques involved in the production of SRP-based intelligence, the means of elevation – the rockets themselves – are crucial to understanding how the U.S. projected technological supremacy over the USSR. Regarding the CORONA program, the Agena rocket from the Lockheed Corporation, the Thor rocket from the Douglas Aircraft Company, and the Titan booster from the Martin Company formed the three-stack rocket array, which propelled the CORONA satellites into orbit. This chapter will focus primarily on the Agena and Thor rockers, as the overall performance of the Discoverer launches would be contingent upon the Agena, Thor, and their variants. Initially developed in response to the surprise *Sputnik* launch, all CORONA launches between February 1959 and April 1962 – the duration of the CORONA/Discoverer project until it was renamed KEYHOLE – utilized a Thor-Agena array, with the Thor booster acting as Stage 1 and the Agena acting as Stage Two.[154] Although Discoverers 1-3 did not carry a camera payload and are not typically classified as part of the CORONA program, their launches, and inevitable failures would provide a wealth of opportunities to elicit more information on the rockets' materials, fuel, and structure.

With a thrust of 69.40kN (15,600lb) and a specific impulse, defined as the amount of thrust delivered for one second by one kilogram of propellant, of 277 seconds, the first Agena variant to be used by the CIA and USAF, the Agena-A, is what would inevitably propel the first successful CORONA satellite, Discoverer 14 (CORONA 9009), into orbit over the USSR.[155] The Agena-A would be further developed in time for 9009 to utilize a novel invention in material science and chemical engineering, magnesium-thorium (magthorium), which was primarily adopted by the USAF and CIA for its lightweight and resistance to high temperatures, with creep resistance up to 662 degrees Fahrenheit.[156] While the advent of magthorium did not last very long, having been discarded due to fears of radiation from the thorium on the Gemini missions, an aluminum frame would be chosen by Lockheed for nearly all future frames.[157] The Thor Stage 1 booster, with roughly 667kN (150,000 of thrust) and a stage burn time of 163 seconds, enabled

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[154] "DISCOVERER PERFORMANCE" (National Reconnaissance Office, February 28, 1959), https://www.cia.gov/readingroom/document/cia-rdp79b00314a000500050001-1; "AIR FORCE LAUNCH OF SATELLITE ON 17 APRIL 1962," https://www.cia.gov/readingroom/document/cia-rdp85b00803r000100020013-8.

[155] S.C. De Brock, "Agena Propulsion System Flight Performance Prediction," *Journal of Spacecraft and Rockets* 7, no. 5 (May 1970): 529–32, https://doi.org/10.2514/3.29985.

[156] Paul Brown, Chairman, "Ninth Annual Report of the Activities of the Joint Committee on Defense Production With Material On Mobilization from Departments and Agencies," House Report No. 1193 (86th Congress, 2d Session, January 13, 1960).

[157] Baker, *US Spy Satellites: 1959 Onwards (All Missions, All Models) Owners Workshop Manual*, 55.

Discoverer 1 to achieve LEO in under 10 minutes, traveling roughly 8 kilometers per second.

In total, 39 Discoverer/CORONA/KEYHOLE attempts were made using the Thor-Agena boost stack between 1959 and 1963, culminating with 25 successful launches and orbits, evidencing an orbital success rate of 64% with a successful film capsule retrieval rate of 52%. Of the 39, only 34 carried CORONA imagery payloads. However, the Thor-Atlas stack had its challenges and failures. With little to no experience in developing and launching rockets of this size, the Thor-Agena stack acted as a trailblazer for future rocket technologies.

One challenge Lockheed faced in developing the Agena stage, as the second stage had to rely on more advanced propulsion technologies to place its payload in a specific LEO area, was providing Guidance and Navigation (G&N). G&N is the process by which a rocket can set and remain on course after launch, particularly in the second stage after the initial Thor booster has been discarded from the rocket itself. While several G&N technologies such as radio control and gimballed gyroscopes had been developed for use in airplanes and smaller rockets such as the V-2, Lockheed had gone the high-tech route – infrared (IR) horizon sensors. The sensors would be connected to the gimballed main engine and cold-gas altitude jets, providing greater flight guidance and altitude control than the classic gyroscopes.[158] The IR horizon sensors would go on to be maintained across the CORONA/Discoverer program and well into the modern era, showcasing not only the successive ingenuity of Lockheed engineers but the willingness of the CIA and

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[158] Baker, 58.

USAF under whose control the CORONA program was operated to accept and test novel technologies.

With a total length of 19.5 feet, a diameter of 5 feet, and a weight of roughly 8500lb, the Agena-A appeared small compared to the massive Korolev-designed Soviet R-7 *Semyorka*, which had launched the *Sputnik* satellite in 1957 and is generally considered to be the world's first ICBM. By contrast, the *Semyorka's* second stage was nearly five times longer and twice as wide as the Agena, resulting in nearly double the burn stage time.[159] However, as touched on in Chapter I and which will become more apparent as this chapter develops, bigger does not necessarily mean better when it came to rockets in the Cold War, with precision being favored to provide a more significant chance of success than not. Compared to the R-7's second stage, the Agena was more precise, highlighting not only American technological supremacy but also American managerial efficiency over the Soviets, evidenced by the American ICBM Atlas' accuracy of roughly 1,400 meters. At the same time, the R-7 had an accuracy of up to 10 kilometers.

The fuel utilized in each is an additional but no less critical difference between the Agena and the R-7. It had been understood by scientists on both sides that solid-state fuel was, by and large, a more efficient, robust, and stable way to propel rockets, as solid-state fuel required less managing and less demanding storage conditions. While the advent of solid-state fuel utilized in the Agena (and Thor) rockets was undoubtedly a technological advancement in and of itself, it also had the effect of helping to out-spend the Soviets in

[159] S. V. Reznik and P. V. Prosuntsov, "History and Experience of Overcoming Therman Barriers in Rocket and Space Technology: 1. Ballistic Missiles," *IOP Conference Series: Materials Science and Engineering* 971, no. 5 (November 2020): 052047, https://doi.org/10.1088/1757-899X/971/5/052047; "R-7 Family of Launchers and ICBMs," n.d., https://russianspaceweb.com/r7.html.

an attempt to force their space race into dangerous fiscal territory. Liquid-state fuel, also utilized by the Soviets in their SS-6 rockets, had the additional shortcoming of taking a long time to launch, making them impractical for use as an ICBM. However, Khrushchev, being aware of the difficulties in procuring and storing liquid-state fuel, decided to "defend his country with his mouth," making false claims such as the one at the beginning of the case study on the U-2, while secretly concentrating on "more dependable types that used storage liquid fuel and could be hidden in silos."[160] Solid-state fuel would form the basis of propulsion technology well into the 70s and 80s when both the primary and secondary source material begins to thin out, evidencing the phenomenal utility of the powder-based propulsion fuel.[161]

Discoverer 14/CORONA 9009 and its Successors: A Paradigm Shift in Intelligence Collection

With the Thor-Agena rocket stack having been sorted and beginning with the re-emergence of WS-117L into the minds of executive policymakers across the Truman and Eisenhower administrations, the CORONA SRP system would go on to solve a series of problems relating to grand strategy and geopolitical reality. The problems, notably the missile gap, and a profound misunderstanding of Soviet capabilities and intentions were put to rest with the advent of real-time intelligence, a term utilized across the USIC at this time despite the need for collection and photographic interpretation at the NPIC. In a pre-computer age, the idea that the CORONA satellite could provide intelligence within days of film retrieval provided a massive leap in technical capabilities for the U.S. compared

[160] Burrows, *Deep Black: Space Espionage and National Security*, 100.
[161] Burrows, 300.

to the USSR. However, these advancements and contributions to American technological supremacy would not truly begin until August of 1960, when Discoverer 14, known internally at the CIA, USAF, and NRO as CORONA 9009, launched from Vandenburg Air Force Base, successfully reached orbit, photographed the Soviet interior, and had its SRV successfully captured by the U.S. over Hawaii.

While the previous 13 Discoverer/CORONA flights had failed to either achieve orbit or release their SRVs in the desired timeframe and location, 9009 performed nearly flawlessly. Launch initiation and takeoff occurred at 12:57 local time on August 18, 1960, with the Thor-Agena booster stack achieving a standard orbit and an orbital period of 94.5 minutes. However, 9009 was found to be pointing in the exact opposite direction as required, with the KH-1C payload facing outwards towards space. This was soon remedied automatically by the Agena's I.R. horizon sensor and gyroscopic array, self-correcting back to its intended inclination of 79.65° toward the Soviet interior. Due to this break from expectations on the first orbit, 9009 would take its first pictures of the Soviet interior on its second and successive orbits, photographing roughly 4.3 million square kilometers on 3000 feet of film, covering a greater area in ten hours than the entire U-2 program had covered in the past five years. David Baker writes, "As the Earth rotated beneath the fixed orbit of Discoverer XIV, successive passes shifted farther west on each pass, and by the ninth orbit, it was passing across Eastern Europe. It worked perfectly."[162] For the first time in human history, not only had the Siberian interior been photographed and mapped by an adversarial power, but photos from space for use in intelligence collection had been successfully taken. A mere 110 days since Captain

[162] Baker, *US Spy Satellites: 1959 Onwards (All Missions, All Models) Owners Workshop Manual*, 81.

Powers' U-2 downing over Sverdlovsk, a new world had emerged with the U.S. as the unequivocal geospatial power.

However, the matter of jettisoning and collecting the film itself was still an uncertainty: the last challenge of solidifying the U.S.' geospatial supremacy. On its 17th orbit, with the entire length of the 3000 feet of film having been exposed over the USSR and Eastern Europe, the command to jettison the 9009's SRV containing the KH-1C payload was made via radio signal . The SRV itself, developed by General Electric (G.E.) to withstand reentry into Earth's atmosphere without damaging the film – a technological invention of some note in its own right and inspired by nuclear warhead design – would have to be collected in mid-air, as the materials which protected the film upon reentry were not buoyant. Despite the best efforts of engineers, physicists, and military analysts, the CIA could not articulate with any absolute precision where the SRV would land. However, they were able to approximate its eventual landing site. A team of Fairchild C-119s was ready to capture the SRV in mid-air using a technique that would come to be developed as the Sky Hook for officer extraction. As the SRV, which had a parachute to slow its reentry once the bucket (as it was colloquially referred to within the CIA, NRO, and USAF) safely entered the lower atmosphere, a C-119, piloted by Captain Harold E. Mitchell, whom President Eisenhower awarded with a Bronze Star for this feat, successfully captured the SRV in mid-air at roughly 8,000 feet.[163]

The material recovered from 9009's SRV proved not only that the U.S. was capable of generating geospatial intelligence of novel quality but also that there was a new field for the analysis of geospatial intelligence. As President Eisenhower's JSG came

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[163] CIA History Staff, "CORONA: America's First Satellite Program" (Center for the Study of Intelligence), 16, https://www.cia.gov/static/3d24f7019bf7e718fd1d2a5c57e6a646/corona.pdf.

to recommend establishing the NRO and NPIC, which roughly coincided with the return of 9009's film, a novel form of intelligence analysis began to emerge in earnest – GEOINT. The film returned by 9009, despite having streaks of light that would later be attributed to solar activity, energized CIA analysts who had the opportunity to provide their Executive with never-before-seen intelligence on the Soviet interior. The identification of military facilities and missile silos, notably a north-Siberian runway estimated to be used to launch long-range bombers toward the U.S. mainland and an ICBM launch facility and ballistic missile test site at Plesetsk, were photographed and analyzed for the first time from 9009's film. This was done using 9009's photography to identify precisely what Soviet ICBM silos looked like, using Plesetsk as a guiding example, and to eliminate other suspected missile silos across the Soviet interior.[164] Relying on the maxim that the Soviets, much like any modern military, built installations one way and rarely deviated from agreed-upon shapes, materials, or locations, the CIA was therefore enabled to make accurate estimations of the Soviet missile threat.

The recovery of 9009's film, with its solar activity noted, also allowed the Itek corporation to develop better camera technologies, with the KH-1 and 2 being single-panoramic cameras that produced images exclusively in two dimensions. The success of Mission 9009 provided the Eisenhower administration with signal confidence that the future of spaceborne reconnaissance, as a human-less reconnaissance system, would allow the U.S. to determine the capabilities, but not intentions, a job shared by OSINT, of the USSR by building better cameras, notably the KH-2, 4, 4A, 4B, and 5, which comprised the bulk of the Discoverer program's cameras. It would not be long until the

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[164] Burrows, *Deep Black: Space Espionage and National Security*, 111.

missile gap fallacy itself would be proven with the successful launch, orbiting, and recovery of Discoverer 18. Discoverers 15, 16, and 17 failed to achieve orbit, with 17 being the last to carry a KH-1 payload.

The KH-2 camera aboard Discoverer 18 (CORONA 9013) had finally, despite the best efforts of HUMINT, SIGINT, OSINT, and military reconnaissance to prove this on their own, dissolved the missile gap fallacy and instigated a new approach to reconnaissance as a whole. The December 7, 1960, launch of 9013 and its KH-2 payload marked improvement on the KH-1 in terms of the amount of film carried, resolution, and orbital time. The KH-2 would end up covering 9.842 million kilometers with a resolution of 65 lines per millimeter, compared to the 55 of the KH-1, meaning, in effect, the KH-2 would produce images 20% better than the KH-1, being able to differentiate objects of 25ft in width.

The KH-2 payload aboard 9013 proved that CIA estimations of Soviet missile buildup had been drastically overestimated. What had once been estimated to be 25 ICBM launchers in active deployment soon changed to twelve – what had been confirmed as 250-300 IRBMs with liquid-state fuel had been proven to pale in comparison to the U.S.' 78 ICBMs, 1500 long-range bombers, and over 7000 nuclear warheads. The effect of the missile gap on military and intelligence collection capability was becoming known. While the missile gap had been proven to be a fallacious assumption, the U.S. was then keenly aware of their missile and rocket-based technological superiority and, having no active desire outside of a few hawks in the USAF to launch a preemptive strike on the USSR, turned instead to cooling relations between the adversaries while still utilizing the novel and precious SRP program. Thus, Discoverer 19, launched on December 20, 1960 in the waning days of the Eisenhower presidency, carried a test payload geared towards missile detection and verification, the Missile Defense Alarm System, or MIDAS, a precursor to later and more advanced early warning and detection systems which would make up the bulk of the U.S.' National Technical Means of Verification (NTM) and form the basis for a series of treaties related to nuclear test bans, and thus moving into the administration of President John F. Kennedy.[165]

Further Development of SRPs

Several advancements in reconnaissance capability were pursued and achieved across the duration of the CORONA/Discoverer program and into the KEYHOLE program. Notably, the implementation of more advanced and stereoview camera systems such as the KH-5 ARGON, differentiated and specified technologies allowing for different types of SRP collection, as well as one of the earliest examples of artificial intelligence (AI), all extended the length of a particular satellite's lifespan, increased their efficiency, and enabled analysts at the CIA, NRO, and NPIC to generate more parsimonious intelligence for use in policy planning. These advancements were tested and implemented using Discoverer's 20-38 as platforms for scientific advancements and espionage activity between 1961 and 1962, with later CORONA platforms such as the CORONA-M and the available KEYHOLE playing a pivotal role in advancing American geospatial reconnaissance supremacy.

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[165] Baker, *US Spy Satellites: 1959 Onwards (All Missions, All Models) Owners Workshop Manual*, 83; Jeffery T Richelson, *America's Space Sentinels: DSP Satellites and National Security*, First (Ballinger Publication Co., n.d.), 18,

While all Discoverer/CORONA flights, including Discoverer 18, would carry a KH-2 payload, the Itek and Fairchild corporations had already developed and made plans for subsequent specialized generations of cameras, notably the KH-5 ARGON camera. The CIA had opted early in the CORONA program to skip over the KH-3 and KH-4 cameras, as theirs was only a marginal improvement on the KH-2. Thus, the ARGON camera would be launched ahead of the KH-3 and KH-4 initially aboard Discoverer 20 on February 17, 1961, which failed due to the ARGON capsule itself being unable to release from its AGENA booster.[166] Two other ARGON launches would also fail aboard Discoverers 24 and 27, with the first success of orbiting an ARGON payload coming on May 15, 1962, for Mission 9034A.

What is unique about the ARGON camera and 9034A as a whole, besides its success in achieving orbit and jettisoning its SRV for analysis, is the implementation of the stereoview camera system. Among the various issues faced by analysts at the NPIC, the inability to judge the height of structures in reconnaissance photography would only be solved with then-nascent three-dimensional photography, referred to here as stereo photography. By aligning two cameras with a ± 15° angular coverage of 5.25° and a third at ± 35°, thus allowing for a 10% overlap in photography, which could be controlled via radio frequency by the NRO, the ARGON camera enabled NPIC analysts to piece together various photographs to provide their superiors with three-dimensional imagery, similar to how a stereophonic system enables listeners to hear music from multiple angles. With its stereo quality, 35mm film, a focal length of 7.6cm, and wide-scale mapping capability with a ground coverage per shot of 556 square kilometers, the

[166] Baker, *US Spy Satellites: 1959 Onwards (All Missions, All Models) Owners Workshop Manual*, 84.

ARGON camera was ideal for large-scale mapping. Notably, a KH-5 satellite was cleared for use by a U.S. Army contractor to create a mosaic of the entire African continent, setting the stage for future commercial satellites and the National Geospatial-Intelligence Agency (NGA), which focuses on mapping.[167]

However, the ARGON system was but one of several camera-based reconnaissance technologies to be used across American SRP projects. While the ARGON was good at large-scale mapping, the KH-2 aboard Discoverer 25, with its more precise focal length and resolution, was used to map the entirety of the Trans-Siberian Railroad with its jutting lines connecting nearly all of the USSRs military instillations and silos in the deep Soviet interior. The KH-2 photographs from Discoverer 25 enabled the CIA to produce a Special NIE (SNIE), which updated prior estimations of Soviet missile capabilities assessing that "New information, providing a much firmer base for estimates on Soviet long range ballistic missiles, has caused a sharp downward revision in our estimate of present Soviet ICBM strength … We now estimate that the present Soviet ICBM strength is in the range of 10-25 launchers … this force level will not increase markedly during the months immediately ahead."[168] The different capabilities provided by the Fairchild and Itek corporations directly enabled the CIA and other agencies within the USIC and U.S. Military in general to generate intelligence of higher quality and faithfulness for use in policy planning – thereby promoting peace and the

[167] CIA History Staff, "CORONA: America's First Satellite Program"; Earth Resources Observation And Science (EROS) Center, "Declassified Satellite Imagery - 1," tiff (U.S. Geological Survey, 2017), https://doi.org/10.5066/F78P5XZM.
[168] Director of Central Intelligence, "Strength And Deployment of Soviet Long Range Ballistic Missile Forces," National Intelligence Estimate 11-8-61 (Central Intelligence Agency, September 21, 1961), CIA FOIA Reading Room; Director of Central Intelligence, "Strength And Deployment of Soviet Long Range Ballistic Missile Forces (Special Edition)," Special Edition and Update of NIE 11-8-61 (Central Intelligence Agency, August 4, 1961), CIA FOIA Reading Room.

opportunity to reach out diplomatically to the Soviets to urge the development of their own NTM system to parallel that of the U.S.

As the NPIC, under the leadership of Arthur Lundahl, became inundated with analysis requests for intelligence collected through the U-2 and CORONA/KH-1-5, novel solutions would have to be explored lest the work, which had already been greatly dependent on overtime by 1963, suffer under the weight of its amount. At a 1964 DIA's Intelligence School lecture, Lundahl would say that, "By 1958, our numbers had grown from around 60 to about 225, and the overtime was going out at a mad rate. I think we spent a total of 200,000 hours of overtime in the St[e]uart Building alone."[169] Rather than turn to additional manpower and considering the labor and quality implications of such overtime, Lundahl requested to the DDCI(I) a study into automatic solutions to the problem of manpower and quality, with the goals of determining "the feasibility of using optical-electronic instrumentation to distinguish objects on photography above and below the normal range of human vision … as a means of target recognition."[170] Lundahl called this possible electro-optical system "Automated" which stood for Automatic Man-Made Target Detection. Lundahl saw from the outset, having sent the memo less than two months after CORONA 9009 returned its imagery, that although technical capability had risen to relatively unthinkable extremes, the amount of work required to analyze and disseminate the respective intelligence would soon make the NPIC's efforts

[169] Arthur C. Lundahl, "The NPIC and Its Work," Unpublished manuscript for a proposed Studies in Intelligence Article, adapted from a lecture delivered at the DIA Intelligence School (Defense Intelligence Agency Intelligence School, 1964), 6, CIA FOIA Reading Room, https://www.cia.gov/readingroom/docs/CIA-RDP78B05167A000800060003-8.pdf.

[170] Arthur C. Lundahl, "Development of 'Automated,'" Memorandum For: Deputy Director (Intelligence) (Photographic Interpretation Center, October 5, 1960), CIA FOIA Reading Room, https://www.cia.gov/readingroom/docs/CIA-RDP78B05702A000100070054-3.pdf.

"operationally, mathematically, and humanly unsustainable."[171] Although Lundahl was, in the end, unable to achieve his dream of Automatic, primarily due to limitations in computation and chip size, the idea that automation, artificial intelligence, and machine learning would make an extraordinarily positive impact on the collection and analysis of intelligence would never truly leave the CIA, with much on the topic being written to this day.[172]

From Capability to Verification

With the dramatic increase in reconnaissance capabilities stemming from the ARGON system, the differentiating of other K.H. platforms, and the innate desire to automate functions related to GEOINT analysis, the U.S. was well positioned to utilize SRPs across the USIC, as well as focus on other matters of import. However, geopolitical reality came to impact the U.S. SRP program. With the intelligence-focused SRP program completed, the missile gap being proven as a fallacy, and the civilian space race to the moon beginning in earnest, President Kennedy focused on the USSR itself. As the only nuclear-capable non-NATO state at the time and knowing that the Americans knew of their absolute technological disadvantage, the USSR ramped up diplomatic tensions and nuclear testing. With the erection of the Berlin Wall in late 1961 and the successive 52-megaton *Tsar Bomba* (King of Bombs) thermonuclear test, the largest nuclear test ever performed, at Semipalatinsk on October 30, President Kennedy would have to shift

[171] Jack O'Connor, "Undercover Algorithm: A Secret Chapter in the Early History of Artificial Intelligence and Satellite Imagery," *International Journal of Intelligence and Counterintelligence* 36, no. 4 (June 21, 2022): 1337–51, https://www.tandfonline.com/doi/epdf/10.1080/08850607.2022.2073542?needAccess=true.
[172] Elizabeth Lawrence, "CIA Launching AI Tool for Intelligence Agencies," American Military News, September 26, 2023, https://americanmilitarynews.com/2023/09/cia-launching-ai-tool-for-intelligence-agencies/.

focus from reconnaissance related to capabilities analysis to nuclear verification.[173] Despite having no legitimate way of delivering the *Tsar Bomba* via ICBM in a way that would be able to evade U.S. missile defenses, the test, which was notable in part due to its indication of resumption of nuclear testing, the bomb worried the Kennedy Administration greatly, as indicated by a September 7, 1961, NIE on the matter.[174]

The shift in intelligence requirements from capabilities to verification was smooth. As the Kennedy Administration had been the first to truly recognize that the U.S. had technological, reconnaissance, and espionage supremacy over the USSR, SRPs were tasked more with maintaining the strategic balance between security and peacebuilding through the theory of verification. *Verification* in this context is defined as "the ability of one side to ensure unilaterally and reliably that the military activities of the other party are not inconsistent with agreed treaty obligations and cannot put its national security at risk through cheating."[175] Within the guidance provided by the 1925 Geneva Convention, which outlined the rules of war at the grand level, the Kennedy administration began drafting the 1963 Limited Test Ban Treaty (LTBT), of which the U.S., U.K., and USSR were the primary signatories. The LTBT acted as a safeguard against further nuclear tests and is a prime example of Kennedy's attempted disruption of the nuclear world. However, language in the LTBT did not ban underground nuclear tests, only above-ground and oceanic tests. As a matter of note, the number of U.S. underground nuclear tests tripled the year after the LTBT, an event mirrored by the USSR.[176] The necessity of

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[173] F. A. Khan, "On Tsar Bomba—The Most Powerful Nuclear Weapon Ever Tested," *Physics Education* 56, no. 1 (October 29, 2021): 013002, https://doi.org/10.1088/1361-6552/abbcbc.
[174] Director of Central Intelligence, "Implications of the Soviet Resumption of Nuclear Testing," Special National Intelligence Estimate 11-11-61 (Central Intelligence Agency, September 7, 1961), CIA FOIA Reading Room.
[175] Graham and Hansen, *Spy Satellites and Other Intelligence Technologies That Changed History*, 7.
[176] Graham and Hansen, 23.

verification was therefore applied to both adversaries, with the U.S. arguing for a more robust verification and detection system in the USSR, in the hope that both sides having a better understanding and viewing of their respective adversaries capabilities and intentions would keep the Cold War cold, following the spirit of President Eisenhower's Open Skies proposal in 1955.

Although President Kennedy would make great strides in evading military and diplomatic consequences relating to the erection of the Berlin Wall and the Semipalatinsk thermonuclear test, the world would soon change with the collection of intelligence relating to Soviet missile buildup in Cuba in 1962, providing Kennedy with the first and greatest geopolitical challenge of his administration. While reconnaissance on the September/October 1962 Cuban Missile Crisis relied almost exclusively on the U-2 as opposed to SRPs themselves, as they had been tasked with priority over the PRC and USSR, the crisis itself had dramatic implications and consequences for geopolitics, reconnaissance, and the state of the grand strategic threat. In the following case study on the Cuban Missile Crisis, evidence will be provided showcasing the extent to which OSINT and GEOINT would finally combine to enable Kennedy to weave through threats and avert nuclear war, despite the best efforts of the regime of Fidel Castro and Nikita Khrushchev.

Case Study #3: The Cuban Missile Crisis

In early August 1962, the Soviet freighter *Sovetskaya Gavan*, carrying four Komar-class missile boats, made landfall on the northern coast of Cuba, instigating unceremoniously and in earnest what would come to be called the Cuban Missile Crisis. Later that month, a HUMINT source, a Cuban refugee under CIA handling reported the development and deployment of several SA-2 SAM sites across western Cuba, all under the watchful eye of the U-2, which had been performing penetrative overflights into Cuba for at least six months,[177] By August 29, the CIA would confirm the development of at least eight SA-2, 4, and 5 sites developed for launching IRBMs, ostensibly toward the U.S. mainland a little over 100 miles away. However, no evidence had yet been provided, enabling the CIA to assess that the USSR had sent actual missiles to Cuba. The August 29 U-2 overflight also confirmed that the Soviets had brought multiple MiG fighter jets with them, thereby increasing the total Cuban fleet to 58.[178]

On October 22, President Kennedy acknowledged to the world what his CIA had known for months for the first time – that the USSR had been developing missile sites in Cuba to provide "nuclear strike capability against the Western Hemisphere."[179] The conflict reached its apex on October 27, which has come to be referred to as Black Saturday. Black Saturday was initiated with Castro's ordering of Cuban artillery forces to shoot down U.S. U-2s performing overflights into Cuban airspace, resulting in the downing and death of Major Rudolf Anderson's U-2. As a result of the Anderson event,

[177] Speech by (REDACTED), "Role of Intelligence During the Cuban Missile Crisis," September 19, 1966, https://www.cia.gov/readingroom/document/cia-rdp85g00105r000100040005-5.
[178] "8.29.62 President's Intelligence Checklist," PDB (Central Intelligence Agency, August 29, 1962), CIA FOIA Reading Room.
[179] President John F. Kennedy, "Address During the Cuban Missile Crisis" (The White House, October 22, 1962), https://www.jfklibrary.org/learn/about-jfk/historic-speeches/address-during-the-cuban-missile-crisis.

Castro's order of artillery fire, and the estimation by the CIA that the IRBM sites in Cuba were operational, President Kennedy ordered the JCS to elevate American defense readiness to DEFCON 2, one step shy of all-out nuclear war, with 173 nuclear-enabled ICBMs primed for launch into the USSR.[180] However, Black Saturday passed without a nuclear weapon being launched. Within weeks of Black Saturday, the USSR had recalled their forces, begun dismantling their SA-2 sites, and had begun to leave the island of Cuba under the watchful eye of the United Nations' (U.N.) famed (then Acting) Secretary General U Thant. The period of July-November 1962 had, therefore, become the most diplomatically unstable period to include a confrontation between nuclear-enabled states – a distinction it keeps to this day – a legacy that requires and has received dramatic and comprehensive study across the academic fields of political science, international relations, and intelligence history.

The focus of this case study is how nuclear confrontation between the U.S. and USSR was avoided by way of geospatial and open source intelligence, as well as intelligence-backed diplomacy and understanding of Soviet intentions. The Crisis showcases how those two INTs and diplomacy promoted security across times of peace and tangible tension between adversaries. This case study will focus on the role of the U-2, the CORONA program, and the FBIS in the Cuban Missile Crisis. Utilizing primary sources, the bulk of which come in the form of FBIS reports on global responses to the Crisis, as well as CIA records of the President's Intelligence Checklist (a precursor to the

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[180] General Power USAF Thomas S., "U.S. Strategic Air Command, History and Research Division, Historical Study No. 90, Vol. I, Strategic Air Command Operations during the Cuban Crisis of 1962" (Strategic Air Command, January 1, 1963), 74, National Security Archive - GWU, https://nsarchive.gwu.edu/document/20815-08-us-strategic-air-command-history-and-research-division-historical-study-no-90-vol.

President's Daily Brief (PDB)) and secondary sources which have analyzed both U.S. and Soviet sources to elicit novel insights into the Crisis, this case study will contribute novel insight into the role of GEOINT and OSINT.

Operation Anadyr: The Soviet POV

The Soviet mission to covertly develop and place IRBMs in Cuba was referred to internally as Operation Anadyr, named after the river of the same name, which flows into the Bering Sea. The naming of the operation itself is of note, as the Soviet affinity for Denial and Deception referred to in Soviet circles as *maskirovka*, was vital in establishing the cover story for the ships that would land in Cuba beginning in July and August 1962.[181] Operation Anadyr was operated under the direction of General Aleksei Dementyev and commander of the Soviet Missile Division Igor Statsenko. Dementyev and Statsenko, along with their colleague Sergei Biryuzov, commander of the Soviet Strategic Missile Force, had flown to Cuba on May 29 and met with the dictator Fidel Castro in July 1962 to propose a plan to place missiles within Cuba – with intelligence on the meeting landing on President Kennedy's desk the following morning.[182] Castro, who informed Dementyev, Statsenko, and Biryuzov that the island would be the perfect place for Soviet missiles, himself fearing an American invasion, told the Soviet entourage that given the robust foliage of western Cuba, there would be no way the Americans could

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[181] James H Hansen, "Soviet Deception in the Cuban Missile Crisis," *Studies in Intelligence* 46, no. 1 (2002): 2, https://www.cia.gov/static/205b8c27be0286b9a0d19fbf90d2382a/Soviet-Deception-Cuban-Missile.pdf.
[182] "5.30.62 President's Intelligence Checklist," PDB (Central Intelligence Agency) 4, CIA FOIA Reading Room.

see, even with their satellites and U-2s, the development of Soviet missile silos on Cuban soil, a "fateful delusion" according to Radchenko and Zubok.[183]

Operation Anadyr had several goals, none of which included the intentional use of nuclear weapons against the U.S., as evidenced by Khrushchev's refusal to launch a preemptive strike on America as requested by Fidel Castro, writing "If they initiate an attack on Cuba -- a barbaric, illegal, and amoral act-- then in those circumstances the moment would be right for considering the elimination of such a danger, claiming the lawful right to self-defense. However difficult and horrifying this decision may be, there is, I believe, no other recourse."[184] From the point of view of the USIC, the Soviet's goals had been to "improve the USSR's inferior strategic position, … push the West toward some concessions in negotiations, especially on recognition of East Germany and the status of Berlin, .. ensure control of Cuba and prevent the US invasion so feared by Castro; and it would demonstrate to the Communist world the strength of Soviet action as opposed to the weakness of Chinese words, fierce though they may be."[185] Taking the Soviet POV, which was similar to that of the USIC, instead of all-out nuclear war, the primary goal of the USSR was to deter the U.S. from invading Cuba and overthrowing their main ally in the Atlantic, Fidel Castro, thereby weakening his status as the global leader of Communism, a title for which he fought against Mao Zedong. Khrushchev's fear of embarrassment and of weakening his position within the Soviet politic would come to be a critical factor in the development of the Crisis. The secondary goal of

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[183] Sergey Radchenko and Vladislav Zubok, "Blundering on the Brink," *Foreign Affairs*, April 3, 2023, https://www.foreignaffairs.com/cuba/missile-crisis-secret-history-soviet-union-russia-ukraine-lessons.
[184] Fidel Castro, "Telegram from Fidel Castro to N. S. Khrushchev" (Wilson Center Digital Archive, October 26, 1962), https://digitalarchive.wilsoncenter.org/document/telegram-fidel-castro-n-s-khrushchev.
[185] Speech by (REDACTED), "Role of Intelligence During the Cuban Missile Crisis," 2.

Operation Anadyr was to gain leverage against the U.S. in an attempt to convince them to remove nuclear weapons from Italy and Turkey. Knowing that their ruse regarding the supposed missile gap had come to an end, the Soviets were hoping to convince the Americans to remove nuclear weapons from their backyard by placing their missiles in America's – a dangerous game with the possibility of civilization-ending consequences to be sure, but a game nonetheless. The tertiary goal, similar to the first, was to exploit the Cuban position to elicit an increase and shoring up of the particular brand of Communism belonging to the Soviets in competition with that of the PRC, who had also been vying for a stronger relationship with Cuba, as evidenced by the PRC-backed Liberation Front for South Vietnam opening their first permanent mission outside of Asia in Havana.[186]

Challenges to the success of Operation Anadyr relied significantly on issues related to the capability of the U.S.' GEOINT and OSINT operations. The primary challenge to the success of Operation Anadyr was the level of secrecy and D&D required to deliver, unload, and assemble the massive numbers of engineers, personnel, equipment, missiles, and missile sites without alerting the Americans. The Americans, whose geospatial and reconnaissance power was driven by the U-2 and the CORONA programs, had far exceeded that of the Soviets – a fact the Soviets had not fully understood at the time. Another challenge to the success of Anadyr was a precise understanding of Cuban geography and geology, notably the amount of tree cover intended to hide the development of the missile sites from the encroaching U-2s as well as the discovery that underground tunnels would not be able to be dug given the rockiness of Cuban soil. On the first trip to Cuba, the Soviet civilian attaché, not

[186] "8.29.62 President's Intelligence Checklist"; "10.9.62 President's Intelligence Checklist," PDB (Central Intelligence Agency), CIA FOIA Reading Room.

understanding precisely how much tree cover would be needed to conceal the development of the missile launchers, reported to Khrushchev that the cover would be enough to proceed with the operation.[187] An additional challenge was internal Soviet politics, which, as similarly noted in Chapter II regarding the difficulty in collecting OSINT in Communist China, did not reward the act of speaking truth to power. Dementyev, having been recalled to Moscow in June for an update on the status and progression of Operation Anadyr with the Soviet brass and Khrushchev himself, "began to say that it was impossible to hide the missiles from the American U-2s, [Minister of Defense] Malinovsky kicked his subordinate under the table to make him shut up. The operation had already been decided; it was too late to challenge it, much less to Khrushchev's face."[188] The final challenge to the success of Operation Anadyr, similar to any covert operation, was human and source security – which partially contributed to OSINT. With a local population of curious Cubans, reporters, and a steady stream of refugees fleeing the Castro regime who knew, if not that there were Soviets on the island building launchers with nuclear strike capability, that something strange was happening on the island, secrecy would be put into further peril. OSINT had made its way into the PDB well before and after but as evidence for the argument that the FBIS, the only organization capable of making sure that President Kennedy was made aware of this fact, wrote on September 1 that "the state of tension in the Cuban Armed Forces [redacted portion] … yesterday became viable to reporters for the US Press on the scene. Their

[187] Radchenko and Zubok, "Blundering on the Brink," para. 1.
[188] Radchenko and Zubok, para. 17.

dispatches from Havana reported that the city was astir with unexplained military activity and spoke of rumors that "something was going on" at the Eastern end of the island."[189]

The size alone of Operation Anadyr provided a monumental challenge for the Soviets, given the foundational quality of being covert. Regarding the Soviet 51st Missile Division, which was by far the most instrumental division sent to Cuba under the command of Statsenko, who provided a report to his superiors in Moscow in the aftermath of the Crisis, a total of 1404 officers, 6462 soldiers, and 90 civilians had been sent to Cuba to facilitate the development of the missile launchers. Additional metrics of the 51st include 42 missiles, 36 warheads, 1695 cars, 72 radios, 9425 tons of construction materials and equipment, and over 1000 tons of food, equipment, and clothing.[190] A total of 3,810 metric tons of weapons and ammunition, 8,000 trucks and cars, 500 trailers, 100 tractors, and 31,000 metric tons of fuel for cars, aircraft, ships, and missiles would end up being sent to Cuba for the expected duration of the Soviet presence in Cuba.[191] The military dispatched 24,500 metric tons of food. Statsenko's report, described by Radchenko and Zubok as "dripping with irritation," argued that Khrushchev had hastily planned a massive operation with little to no reconnaissance on either the geography of Cuba or the logistics involved in not only getting the materials and personnel to Cuba but also achieving that goal without alerting the CIA of their plans. By July the CIA had

[189] "9.1.62 President's Intelligence Checklist," PDB (Central Intelligence Agency), CIA FOIA Reading Room.
[190] Major-General Igor Demyanovich Statsenko, "Report of Major-General Igor Demyanovich Statsenko, Commander of the 51st Missile Division, about the Actions of the Division from 07.12.62 through 12.01.1962" (National Security Archive), https://nsarchive.gwu.edu/CMC-60/soviet-missile-commander-Statsenko-after-action-report-1962.
[191] Radchenko and Zubok, "Blundering on the Brink," para. 25.

already alerted President Kennedy of massive and concerning movements between the USSR and Cuba.[192]

When President Kennedy gave his speech on October 22 on the topic of the Soviet missile buildup in Cuba, he remarked that "Soviet Foreign Minister Gromyko told me in my office that he was instructed to make it clear once again, as he said his government had already done, that Soviet assistance to Cuba, and I quote, "pursued solely the purpose of contributing to the defense capabilities of Cuba," that, and I quote him, "training by Soviet specialists of Cuban nationals in handling defensive armaments was by no means offensive, and if it were otherwise," Mr. Gromyko went on, "the Soviet Government would never become involved in rendering such assistance." That statement was also false."[193] The Soviet and Cuban assertion that the missile buildup on the island nation had been purely defensive was not true, despite Soviet arguments to the contrary. Kennedy and his administration had regarded placing missiles within 100 miles of U.S. soil as untenable – a move that would jeopardize Western security lest active invasion or unassailable diplomacy were utilized to keep tensions below the level of active war. The story of precisely how to avoid active nuclear war depended on diplomacy, OSINT, and GEOINT, luck, and the spirit of individual soldiers.

Amidst the onslaught of Black Saturday on October 27, a Soviet B-59 nuclear-enabled submarine had been spotted by U.S. Naval (USN) forces aboard the USS Beale and USS Randolph between the coasts of Cuba and Florida. Requiring the discovered submarine to surface and present themselves to USN forces, a practice, and non-combative depth charge was launched to alert the Soviets of their discovery. The Soviets,

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[192] Radchenko and Zubok, para. 24.
[193] Kennedy, "Address During the Cuban Missile Crisis," para. 8.

misinterpreting the depth charge as a failed attack by the U.S., concluded that active war had begun and was under command to launch their T-5 10-kiloton nuclear warhead on the U.S. mainland. However, the Soviets had a three-person system for nuclear launches exclusively aboard B-59 submarines, which required the commanding officer and two subordinates to agree to a nuclear launch unanimously. Notably, all other Soviet vessels carrying nuclear warheads required the sole ordering of the commanding officer to launch a nuclear warhead. However, the B-59 was unique in that three individuals aboard would have to agree to a launch. Having been at a depth that prevented radio communication with Moscow, submarine captain Vasily Savitsky and political officer Ivan Maslennikov agreed to launch the nuclear missile. The lone dissent came from Vasily Arkhipov, who refused to be the lynchpin of nuclear war, thereby securing for at least one more day the survival of human civilization as a whole.[194] The incident would later be described by historian Arthur Schlesinger Jr. as not only "the most dangerous moment of the Cold War," but as "the most dangerous moment in human history."[195]

Several hours before the B-59 incident, Khrushchev sent a message to President Kennedy, essentially calling for a truce. The message, received, translated, and delivered to President Kennedy by a representative of the FBIS on October 26, stated one key demand for the removal of Soviet troops and missiles from Cuba – a guarantee that the U.S. would stand down and never invade Cuba. Khrushchev wrote, "I propose: We, for our part, will declare that our ships, bound for Cuba, will not carry any kind of

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[194] Svetlana V Savranskaya, "New Sources on the Role of Soviet Submarines in the Cuban Missile Crisis," *Journal of Strategic Studies* 28, no. 2 (April 2005): 233–59, https://doi.org/10.1080/01402390500088312.
[195] Marion Lloyd, "Soviets Close to Using A-Bomb in 1962 Crisis, Forum Is Told," *The Boston Globe*, October 13, 2002, https://web.archive.org/web/20210710213948/http://www.latinamericanstudies.org/cold-war/sovietsbomb.htm.

armaments. You would declare that the United States will not invade Cuba with its forces and will not support any sort of forces which might intend to carry out an invasion of Cuba. Then the necessity for the presence of our military specialists in Cuba would disappear."[196] President Kennedy's response, sent via telegram to Khrushchev the following morning, regarded the Soviet proposals as "generally acceptable," noting that "there is no reason why we should not be able to complete these arrangements and announce them to the world within a couple of days."[197]

Additional evidence for the swift resolution to the Crisis came in the form of an FBIS report coming from the Moscow Domestic Service, in which the news agency reported on October 27 that "the Soviet Union has been doing everything in its power to clear the atmosphere and lead mankind away from the verge of a nuclear war. With exceptional calm, wisdom, and self-control, the Soviet Government has instructed masters of Soviet ships … to keep away from the interception area."[198] Essentially, both sides had gotten what they wanted. The Soviets were guaranteed that the U.S. would not invade Cuba and disarm their missiles in Italy and Turkey. The Soviets would remove their missile bases and forces from Cuba, a process that would not be completed until early 1963. Despite the late completion of the Soviet withdrawal, by November 20, the CIA and President Kennedy were confident, relying on intelligence from the UN, that the

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[196] Nikita Khrushchev, "Khrushchev's Letter to Kennedy on Cuba," October 26, 1962.
[197] President John F. Kennedy, "Telegram of President Kennedy's Reply to Chairman Khrushchev's Letter of October 26, 1962" (John F. Kennedy Presidential Library & Museum, October 27, 1962), https://microsites.jfklibrary.org/cmc/oct26/doc6.html.
[198] Foreign Broadcast Information Service, "Shragin on Two-Way Missile Withdrawal," *Moscow Domestic Service*, October 27, 1962, https://docs.newsbank.com/openurl?ctx_ver=z39.88-2004&rft_id=info:sid/iw.newsbank.com:FBISX&rft_val_format=info:ofi/fmt:kev:mtx:ctx&rft_dat=12E3A9D632901780&svc_dat=HistArchive:fbisdoc&req_dat=B425E5B32E784515BC5AAA87BC16A340.

active threat posed by missiles had been dismantled, thus bringing to an official end the Cuban Missile Crisis.[199]

Geospatial and Open Source Power in the Cuban Missile Crisis

As the topic of this thesis is the rise and utilization of open source and geospatial power in the early years of the Cold War, no case provides more evidence to support the argument regarding the salience of those two INTs than the Cuban Missile Crisis. As already noted in the above sections, the U-2 and FBIS, in particular, had been instrumental in providing President Kennedy with intelligence on the growth of Operation Anadyr from the first meeting between Castro and Biryuzov in May 1962 to the conclusion of the Crisis in November. However, the particulars of how the U-2 and FBIS enabled the CIA to have insight into the goings-on in Cuba, which would have been unthinkable even a decade prior, have yet to be provided in this thesis. This section provides such insights from digitized primary sources from the CIA FOIA archive, the National Security Archive at George Washington University, and several secondary sources.

There is no more salient example in the story of how GEOINT was utilized during the Cuban Missile Crisis than the contribution of Juanita Moody, who at the time of the Crisis was the head of the Cuba desk at the National Security Agency (NSA). Moody, then 38 years old and a specialist in SIGINT, was a notable practitioner of and advocated for the inclusion of rapidly progressing computation for use in codebreaking. Moody had moved up in the male-dominated USIC, eventually becoming the chief of the G-Group,

[199] "Press Conference, 20 November 1962 | JFK Library," https://www.jfklibrary.org/asset-viewer/archives/JFKWHA/1962/JFKWHA-144/JFKWHA-144.

the NSA group tasked with intelligence on all countries other than the USSR and China – a monumental task.[200] With the failure of the 1961 Bay of Pigs invasion of Cuba and the successive reallocation of intelligence resources toward Cuba, which affected the entire USIC, Moody had been tasked to focus on Cuba specifically. Once the reallocation of resources had been completed and Moody's expertise on Cuba had been acknowledged, she published a still-classified report on her SIGINT findings on the military buildup of Cuba, which had been read by President Kennedy by May.

By August, Moody had been called into the NPIC to view the 928 images returned from a U-2 overflight into Cuban airspace and noticed something worth remembering – the trapezoidal patterns scattered across the island. These trapezoidal patterns indicated to Moody that the USSR had been building SAM sites in Cuba, having recognized the pattern and shape from previous experience looking at reconnaissance imagery in other locations where the Soviets had built SAM sites. As noted in Chapter III, relying on the assumption that militaries typically build things the same way regardless of location, if possible, had proven to work in the USIC's favor, thereby proving definitively that the Soviets had begun construction of defensive missile sites in Cuba. A Soviet colonel, a CIA HUMINT source, would confirm the assessment.[201] While Moody would go on to be celebrated as the first analyst to raise the alarm regarding Soviet military buildup in Cuba, contrary to the public story that NPIC boss Arthur

[200] David Seubert, "The Once-Classified Tale of Juanita Moody: The Woman Who Helped Avert a Nuclear War," *Smithsonian Magazine Special Edition*, March 2021, https://www.smithsonianmag.com/history/juanita-moody-woman-helped-avert-nuclear-war-180976993/.
[201] Seubert, para. 37.

Lundahl had discovered the missile sites first, Moody would have to wait nearly a decade for formal recognition of this effort.[202]

With 49 declassified U-2 overflights into Cuban airspace between May 1960, when Captain Powers' U-2 had been shot down by a Soviet SAM, and September 21, 1962, the GEOINT program on Cuba had grown in robustness. An additional 96 U-2 overflights were flown between August 29 and December 6, with 82 of those being between October 22 and December 6.[203] Concerns of advanced SAM sites being able to shoot the planes down was a motivating factor in the drop-off of U-2 flights over Cuba after the Crisis would come to a close, with a post-Crisis report highlighting a specific hesitancy mirrored in the past by President Eisenhower that "The vulnerability of the U-2 to Soviet SA-2 systems and the discovery of those systems in Cuba contributed further complicating factors in weighing risks against the need for hard intelligence. The situation as of September 1962 must be viewed against this background of universal repugnance, or, at the very least, extreme uneasiness regarding overflights."[204] GEOINT would go on to solve many of the intelligence requirements set by President Kennedy with regard to the Crisis but could only provide the President with a full view with the help of OSINT as run by the FBIS. The FBIS played an outsized role in providing intelligence to President Kennedy regarding the increase in Soviet military presence in Cuba, primarily by highlighting global reactions to the Crisis itself – the FBIS was instrumental in providing President Kennedy with the most valuable product they could

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[202] "1971 Federal Woman's Award" (U.S. Civil Service Commission, February 2, 1971), CIA FOIA Reading Room.

[203] Burrows, *Deep Black: Space Espionage and National Security*, 130.

[204] Director of Central Intelligence, "Summary of U-2 Operational Missions Flown since 1 May 1960" (Central Intelligence Agency, September 21, 1962), https://www.cia.gov/readingroom/docs/CIA-RDP33-02415A000100220009-6.pdf; Director of Central Intelligence, "U-2 Overflights of Cuba, 29 August through 14 October 1962" (Central Intelligence Agency, February 27, 1963), CIA FOIA Reading Room.

offer – context. Reports from across the globe – from North Korea (DPRK) to Albania to Ghana – provided President Kennedy and other policymakers with the necessary context, enabling them to make better-informed decisions relying on as few assumptions as possible.[205] As tensions in the Caribbean and across Europe rose, so too did the risk of alliances changing during a moment when alliances could not be easily sacrificed in the possibility of World War III. this context provided by the FBIS would become more and more important in the eyes of the CIA and President Kennedy himself, evidenced by the President's approval of a particular FBIS listening station in Key West, Florida, in February 1963.[206] The Key West listening post was unique within the sphere of the FBIS given that it was the first and only FBIS listening station dedicated to collecting intelligence on a single particular nation since the deployment of a Portland, OR, Japanese listening post in 1941. Along with the June 1962 increase in cleared personnel, Cuban broadcasts became more important to President Kennedy and his NSC, as evidenced by the additional funding for the FBIS, which was provided to enhance the number of personnel and quality of equipment.

The FBIS was also crucial in providing policymakers with a more well-rounded picture of Cuban and Soviet propaganda throughout the Crisis, enabling them to understand their adversary's intentions better. Primarily coming from but also beyond the Telegraph Agency of the Soviet Union (TASS), which was and remains Moscow's premier news agency and mouthpiece of power, and from the Havana-based CMQ radio

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[205] Accra Ghana Domestic Service, "U.S. Warned on Action Against Cuba" (Foreign Broadcast Information Service, October 16, 1962), Tirana Domestic Service, "Proposed Agreement on Cuba Reported" (Foreign Broadcast Information Service, October 28, 1962), https://infoweb-newsbank-com.ezp-p Pyongyung KCNA, "DPRK Statement Scores U.S. Cuba Action" (Foreign Broadcast Information Service, October 25, 1962), READEX FBIS Histories

[206] The Directorate of Intelligence Historical Series, "Foreign Broadcast Information Service History Part III: 1957-1967," (S) (Central Intelligence Agency, n.d.), 38, CIA FOIA Reading Room.

and television station through which the bulk of Castro's orders were shared, the FBIS had been able to provide critical context during the Crisis. In an October 23 interview with CMQ, Fidel Castro highlighted for the Americans who he was sure were listening, the grievances against the "imperialist … reactionary forces of America."[207] In an October 24 report from TASS titled "Stop and Think, America," the Soviet Union urged the American public to consider the idea that Cuba, "an island with a population less than that of New York City," could not possibly threaten America, and urged Americans to further consider the legacy of Thomas Jefferson concerning the idea that any nation ought to be able to govern itself "according to whatever form it pleases."[208]

The October 24 Appeal to Americans also offered the ludicrous assertion that there were no Soviet bases in Cuba or anywhere else in the world, calling assertions to the contrary lies, an assertion parroted by TASS two days later in a speech by Major General and Cosmonaut Alexi Leonov who called the idea that the USSR had missiles in Cuba "the big lie" and considered the U.S. blockade of Cuba akin to "pirates on the high seas."[209] The effect of the Appeal to Americans speech received and translated by the FBIS in real time was to showcase that the Soviets were not acting in good faith, providing the Kennedy administration with the necessary context to engage in negotiations with a moral high ground and knowledge of the Soviet missile ploy. Twelve hours before the Appeal to Americans speech on October 23, the FBIS received and translated a report from the Peking NCNA (Beijing National Chinese News Agency),

[207] Havana CMQ, "Fidel Castro's 23 October Interview" (Foreign Broadcast Information Service, October 24, 1962), FBIS Daily Reports (HOLLIS), READEX FBIS Histories
[208] Moscow Domestic Service, "Appeal to Americans" (Foreign Broadcast Information Service, October 24, 1962), READEX FBIS Histories, 34–38
[209] Moscow Domestic Service, "Leonov on President's 'Big Lie'" (Foreign Broadcast Information Service, October 25, 1962), READEX FBIS History

which reported that Castro had ordered combat readiness. The NCNA report stated, "Several hundred thousand people have been mobilized within several hours. … The whole nation is now in a state of war. … Weapons are now in position with heroic defenders of the revolution and the fatherland standing behind them … leaders of the revolutionary government ..are ready to sacrifice themselves together with the people heart and soul. Several million people today shouted with unprecedented enthusiasm and a sense of justice this glorious slogan of historical significance; Defend the fatherland to the end, we will win! These voices, roaring like thunder, were heart [sic] throughout the island of Cuba."[210]

Analysis of the NCNA report notes that despite the political conflict between the USSR and PRC, the shared goal of international Communism was worth supporting regardless of flavor. Similar reports supporting Cuba in the Crisis would also come from the DPRK, whose news agency, Pyongyang KCNA, wrote on October 25 that "After sustaining an inglorious defeat [referring here to the failed 1961 Bay of Pigs invasion] the U.S. imperialists resorted more viciously to all kinds of intrigues and machinations against the Cuban people, and now they have directly come out for provoking a new aggressive war against Cuba."[211]

The Legacy of the Cuban Missile Crisis: Verification as a Deterrent

As early as November 1962, President Kennedy had a plan to prevent something like the Cuban Missile Crisis from ever happening again – one which would lay the foundation for the peace and security of both sides for generations to come. The plan was

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[210] Peking NCNA, "Castro Orders Combat Readiness for Cuba" (Foreign Broadcast Information Service, October 23, 1962), READEX FBIS History

[211] Pyongyang KCNA, "DPRK Statement Scores U.S. Cuba Action." (Foreign Broadcast Information Service, October 25, 1962), READEX FBIS History

to increase American dependence on SRPs, having acquired a distaste for the dangerous U-2 overflights into actively combative and adversarial airspace, and to ensure the buildup and success of the Soviet reconnaissance program. As Burrows writes, "A deterrent is useless unless the opponent knows that it exists, and the best way to prove to that opponent that credible strategic weapons do exist is to allow him to photograph them. To a certain extent, each side would, therefore, come to depend upon the other's strategic reconnaissance apparatus, and especially the satellites, to validate its retaliatory capability."[212]

Combined with Schelling's rule of inherent propensity, President Kennedy had learned what President Eisenhower knew when he proposed the Open Skies treaty in 1955 – that the best way to promote peace and security while also balancing geopolitical reality and strategic capability in lieu of complete nuclear disarmament was to allow the adversaries to see each other, to be able to confirm for each by each the capabilities and intentions of the other. This legacy, notably the development of the U.S. NTM, would have a lasting and inherently peaceful effect on the Cold War and the world up to the modern day. Burrows continues, "The Cuban Missile Crisis marked a rite of passage for U.S. space reconnaissance. It came through its formative period and emerged as a strategic system that had already had a profound effect on international relations and was clearly destined to play an even greater role in the years to come," ending with the assertion that "within the darkness, an infrastructure was taking root and beginning to grow: a new generation of reconnaissance satellites … were materializing, and the U-2's successor was being readied for flight."[213] Burrows here refers to the KEYHOLE satellite

[212] Burrows, *Deep Black: Space Espionage and National Security*, 132.
[213] Burrows, 137.

program – the successor to the Discoverer/CORONA program written in Chapter IV, and which is a vital aspect of the following chapter on the U.S. NTM, ASAT, and SDI.

Chapter V.

National Technical Means of Verification, Anti-Satellite Weapons, and the Grand Strategic Threat

Following the surprise launch of *Sputnik* in late 1957 and the resulting feeling of lost prestige and fears of a Soviet missile strike, Secretary of Defense Neil McElroy had been startled into ordering the development of an ambitious project to study the feasibility of shooting rockets out of the sky as part of a program he called Project DEFENDER. DEFENDER, as the precursor to the much better-known Strategic Defense Initiative (SDI) promoted primarily by the administration of President Reagan, had been envisioned in an era when the complex dynamics and consequences of the CORONA/KEYHOLE-based National Technical Means of Verification (NTM) could not have been understood. As a result of the increased faith in and reliance on the wildly successful CORONA/KEYHOLE program, which had made its way into becoming one of the foundations of global security, DEFENDER had been placed on the back burner at the DoD's Advanced Research Projects Agency (ARPA) for fifteen years, until it had been promoted again under President Reagan and promptly met with a negative response from both the American public and the allied international community, thereby killing the program.

This chapter will attempt to fill in the gaps between the two adversarial positions of those who believed that the SRP-based NTM program was sufficient to promote security and those who felt that the NTM program relied on too many assumptions, notably that the Soviets were incapable of working in good faith, and that it had been foolish to rely on verification and reconnaissance at the expense of proper defensive and offensive measures. This chapter will assess and weigh the respective positions considering the rise of the Soviet SRP program, the advent of DEFENDER-like anti-satellite (ASAT) technology, and a rapidly shifting geopolitical landscape, and will argue that SRP-based NTM with the inclusion of a robust OSINT program was and is a sufficient deterrent which would not require the massive financial burdens which accompanied the SDI movement. Utilizing primary sources from the CIA archives and that of ARPA, as well as several secondary temporally noteworthy secondary sources, this chapter seeks to provide the reader with an expanded understanding of how and why the SDI would come to fail as a policy position, how OSINT would provide additional value to SRP-based NTM, the role of alliances and global conflicts, as well as the legacy and implemented aspects of the SDI as a whole.

Project DEFENDER: ARPA and The Failure to Launch

On October 28, 1986 the *New York Times* ran the headline, "'Star Wars' Traced to Eisenhower Era" on the front page of its C1 above the fold Science section. The article, authored by Bill Broad, detailed for the public how, relying on recently declassified documents, President Reagan's Star Wars initiative had as its precursor a little-known DoD project called DEFENDER. DEFENDER, Broad explained, was "a top-secret, multimillion-dollar venture involving thousands of the nation's best scientists."[214] Broad was not wrong – by 1966 DEFENDER had been responsible for roughly 46% of ARPA's

[214] William J. Broad, "'STAR WARS' TRACED TO EISENHOWER ERA," *The New York Times*, October 28, 1986, sec. Science, https://www.nytimes.com/1986/10/28/science/star-wars-traced-to-eisenhower-era.html.

entire budget of $277 million, approximately $2.6 billion in 2023 dollars.[215] The article continued to list several early ideas for DEFENDER, which had as its primary goal the attainment of the capability of actively dismantling the threat posed by an incoming ballistic missile. Highlighted in Broad's article was the 1958 BAMBI design, a projectile launched in the vicinity of an incoming missile with the ability to extend over a dozen steel beams and pellets to catch the incoming missile in midair and destroy it on impact. The 1960 design for DINOSAUR involved a crewed spacecraft armed with antimissile projectiles that would be shot at an incoming missile. While neither the BAMBI nor the DINOSAUR designs ever made it past the drawing board, proof had been provided to the public that the idea of anti-ballistic missile technology was one favored by President Eisenhower – concurrent with the development of the U-2 and CORONA SRP. Other ideas related to DEFENDER were the projects HELMET and SAMBO, with HELMET centering around the ability of the U.S. to launch debris over U.S. cities in the hope of preventing the missile's reentry into the lower atmosphere and SAMBO being the placement of metal and stone debris in space in the flight path of suspected Soviet launch sites, acting as an artificial asteroid belt.

While certainly ambitious, projects within the DEFENDER program would never move past the drawing board despite costing billions of dollars across its development. Criticism resulting from the exorbitant cost and lack of actual progress or development would eventually lead to the cancellation of DEFENDER in 1968.[216] However, the spirit behind the idea of active ballistic missile defense would still live despite the success of

[215] Richard J. Barber, "The Advanced Research Projects Agency 1958-1974" (Washington, D.C, December 1975), 331, https://documents2.theblackvault.com/documents/dtic/a154363.pdf.
[216] Paul Theodosis, "National ICBM Defense Systems" (Stanford University, March 2012), http://large.stanford.edu/courses/2012/ph241/theodosis2/.

the U.S. NTM program, which relied more on prevention and early warning than active protection. Between the cancellation of DEFENDER and the emergence of the SDI under President Reagan, a quiet debate had been developing between the supporters of active defense and those who supported verification of Soviet capabilities and launches as a suitable and sufficient way of protecting the U.S. mainland, as will be written on in a section below on alliances, conflict, and perception.

The New Workhorse of Space Reconnaissance: KH-11 and the Advent of Real-Time Intelligence

Beginning with the successful launch of CORONA 9009 and the subsequent capture of its SRV containing the first satellite imagery of the Soviet interior, the U.S. had the most advanced and dynamic reconnaissance program in history – a challenge of considerable note. Perhaps more challenging, as this issue has been faced by all nations, organizations, and people who are at one time the best at something, is the ability to maintain one's competitive edge. Innovation would be required, notably in the power of boosters, SIGINT-based SRPs, concealment of the satellites themselves, and increasing the longevity of SRPs in orbit.

By early 1966, the successful launch and orbiting metrics increased from the early Discoverer programs' 62% to the novel KH-4B/JANUS J-3's 82%, showcasing not only the advancement of the Thor-Agena D (four generations of boosters after the Discoverer's Thor-Agena-A) but also lessons learned. Between late 1966 and 1970, the KH-4B SRP achieved a 100% success rate with 28 straight successful launches, orbits, and retrievals.[217] As Baker writes, "Other, technical, requirements were addressed too, among which were: a reduction in vibration within the camera system ('sputter'); better velocity/height matching to cut the amount of smear on photographs; better film carriage along the guide rails to prevent it jumping; enhanced exposure control using a variable slit selector; and a flexibility to install and operate arrange of different filters and to separate the film loads, … produced the truly definitive CORONA."[218]

A vital and paradigmatic advancement in SRP technology came in 1976 with the KH-11 KENNAN/ satellite series. It succeeded in being the first SRP to securely and instantaneously transmit its photographs to U.S.-operated ground stations, irrespective of the satellite's location. These all-digital SRPs and their reliant advancements' utility cannot be overstated, as the KH-11 singlehandedly made obsolete the idea of the SRV, which had been the subject of both incredible frustration and admiration across the duration of the Discoverer/CORONA program. The KH-11, the first electro-optical satellite, used a mirror-based system with nearly the exact dimensions and telescope diameter (7.7ft vs. 7.9ft) as the Hubble Telescope, which would be launched by NASA 24 years later.[219] The KH-11 had been so advanced that the Soviets, upon seeing the satellite on their radar and running tests and analysis, mislabeled the satellite as non-photographic and made no attempt to jam or block any specific location from view, showcasing the extraordinary changes to the frame of the satellite, which was powered by two solar panels – an additional and consequential addition to the SRP program which

[217] Baker, *US Spy Satellites: 1959 Onwards (All Missions, All Models) Owners Workshop Manual*, 97.
[218] Baker, 97 paras. 4–5.
[219] Baker, 166.

extended the satellites life in orbit significantly.[220] The KH-11 had also been the focus of a consequential incident of espionage, with CIA officer William Kampiles selling a copy of the classified KH-11 manual to the Soviet embassy in Athens, Greece, for $3,000 in 1977, equivalent to more than $15,000 in 2023 dollars. Kampiles later returned to the U.S. and alerted his superiors at the CIA of his actions and requested to become an asset and double agent in his own right, to which the CIA responded by having Kampiles arrested, charged under the Espionage Act, and sentenced to 240 years in prison, of which he served only 18, and which has become a cautionary tale amongst operators of the U.S. SRP program.[221]

While the KH-11 is one of the most secretive programs within the USIC, its existence being acknowledged sporadically and only one photograph published being from a tweet from President Trump in August of 2019, some specifications of the satellite have been elicited through NASA documents and declassified reports relating to HST design.[222] Although the actual resolution of the KH-11 is still unknown to the public, various sources and calculations have provided insight into the maximum resolution and specifications of the KH-11 craft. According to Baker, primarily relying on NASA documentation, the first KH-11 was 64ft long and 10ft wide, with a resolution of six

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[220] "This Week in DIA History: DIA Identifies Leak of Classified KH-11 Capabilities," Defense Intelligence Agency, https://www.dia.mil/News/Articles/Article-View/Article/1824367/this-week-in-dia-history-dia-identifies-leak-of-classified-kh-11-capabilities/.

[221] Christopher Burgess, "This Day in History: William Kampiles Convicted for Espionage to Russia," ClearanceJobs, November 17, 2021, https://news.clearancejobs.com/2021/11/17/this-day-in-history-william-kampiles-convicted-for-espionage-to-russia/.

[222] Geoff Brumfiel, "Trump Tweeted an Image from a Spy Satellite, Declassified Document Shows," *NPR*, November 18, 2022, sec. National Security, https://www.npr.org/2022/11/18/1137474748/trump-tweeted-an-image-from-a-spy-satellite-declassified-document-shows; "Top Secret KH-11 Spysat Design Revealed By NRO's Twin Telescope Gift to NASA - AmericaSpace," June 6, 2012, https://www.americaspace.com/2012/06/06/top-secret-kh-11-spysat-design-revealed-by-nros-twin-telescope-gift-to-nasa/.

inches, meaning that objects six inches and larger would be able to be discerned in ideal conditions.[223] According to Burrows, the KH-11 would have to have a resolution of at least 3.6 inches, given that the terms of the second Strategic Arms Limitation Talks (SALT II) required that "not only limits each side to the development of only one new ICBM, but stipulates that ICBMs existing at the time the treaty came into effect could not be altered in length, diameter, launch weight, or throw weight (size of their payloads) by more than 5 percent. … imaging platforms could produce pictures that would show whether changes of more that 5 percent were being made on Soviet ICBMs. … The smallest Soviet ICBM at the time SALT II was concluded was the SS-11 … that was sixty-four feet long and six feet in diameter. Five percent of six feet is 3.6 inches. That is how good resolution in the visible light spectrum has to be to enable the United States to spot a widening of the SS-11 by 5 percent or more."[224] Notably, the KH-11 had been the platform responsible for locating and tracking the American hostages in 1980 Tehran, as well as providing the first photographic evidence of the nuclear reactor explosion at Chernobyl in 1986 – the KH-11 had become the new workhorse of the U.S. space reconnaissance platform indeed.[225]

Later developments that touch on the reach of declassification regarding SRPs include the advent of the modular and repairable SRP, notably the KH-12. The KH-12, which began launching in 1984, initiated the ability for the U.S. to send engineers into LEO to repair a malfunctioning sensor, navigation component, or communication package. Notably, the advent of orbital refueling also began in this era, with Kathryn

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[223] Baker, *US Spy Satellites: 1959 Onwards (All Missions, All Models) Owners Workshop Manual*, 166.
[224] Burrows, *Deep Black: Space Espionage and National Security*, 248.
[225] Burrows, 249.

Sullivan and David Leestma pioneering the ability to refuel an active satellite while in orbit, thereby extending an SRP's lifespan exponentially – Sullivan notably became the first woman in history to perform an extravehicular activity (EVA) commonly referred to as a spacewalk during the 1984 Challenger/41-C mission.[226] Despite these monumental advancements, the USSR had plans of their own regarding their SRP program.

The Soviet Means of Satellite Reconnaissance and Verification

By the early 1970s, the Soviet SRP program had taken off in earnest, having been over a decade behind in technological terms relative to the Americans. This gap existed for several reasons. First, the USSR had never and would never be a true technological peer with the U.S. regarding military technology outside of firearms and nuclear weapons due to various factors, including economic pressures from the West and inefficient use of political power due to infighting, paranoia, and a centralized command system. Second, the Soviets did not require the same level of reconnaissance capability that the Americans needed, given the signal differences regarding the amount of denied territory between the U.S. and USSR – from the Soviet point of view, they did not need to have a robust reconnaissance program on a country with a robust free press and freedom of movement – why would they spend billions of rubles on information that they could obtain by parking near a military installation and taking pictures? Third, the USSR could not organize the public-private partnerships that enabled the advancement of reconnaissance technologies, having continuously suffered a grave brain drain and a lack of an actual private sector. Nor did the USSR implement computational analysis the same way as the

[226] "35 Years Ago: STS-41G – A Flight of Many Firsts - NASA," October 3, 2019, https://www.nasa.gov/history/35-years-ago-sts-41g-a-flight-of-many-firsts/.

U.S. did, an additional marker of the difference between the U.S. and Soviet economies. However, none of this is to say that the USSR did not have its own SRP system, only that it was different and had different goals than that of the U.S.

A critical difference between the U.S. and Soviet SRP programs throughout the 1970's and 1980's and into the fall of the USSR in 1991 (and thus into the formation of the Russian Federation) was the quality of the satellites themselves, though not in the way one might expect. While the U.S. SRP program depended on a few highly advanced, costly satellites built slowly and with the specified intention of an extended orbital lifespan, the Soviet SRP program depended on relatively simple and cheap platforms intended to be used for specific instances and goals for only a short time. As Burrows explains, "The most fundamental difference between U.S. and Soviet space reconnaissance operations has to do with the frequency of launches -- with the number of satellites that are put into orbit. While the United States sends up relatively few reconnaissance satellites each year, the Russians launch thirty-five or more (some being civilian earth resources surveyors, similar to the Landsat series used by the United States or France's SPOT spacecraft.) This is possible because … Soviet reconnaissance satellites are relatively simple and are produced in quantity. And although the computer technology used to run those satellites isn't as good as the kind at Sunnyvale, Colorado Springs, and elsewhere, there is no truth to the occasional assertion that Moscow uses many satellites to compensate for relatively poor imaging resolution. Rather, it is a matter of trying to keep costs down while maintaining as much flexibility as possible." … They have a technology philosophy which they adhere to -- … of building a lot of cheap things instead of building very few, very sophisticated things."[227]

The Soviet SRP program, referred to as COSMOS, allowed the Soviets to respond to geopolitical events far more quickly than the U.S. could, with some satellites being launched and deorbited within four days, with the U.S. having observed "many times that they put up a new satellite within twenty-four hours of a world crisis" with the ability to have launched, in orbit, and active at least six photoreconnaissance satellites within 24 hours of the beginning of the 1973 Arab-Israeli War, in the words of Nicholas Johnson, then NASA's Chief Scientist for Orbital Debris, "The ability to handle such an assortment of missions at the same time is indicative of the maturity of the Soviet photographic reconnaissance program."[228] An additional but by no means unimportant aspect of the Soviet's sending up cheaper, quicker (though less technologically impressive) satellites is their resilience to ASAT technology. For the U.S., the loss of a single SRP would mean two things: the U.S. had lost an exorbitant amount of money, and the U.S. would be flying blind for days or weeks while another satellite of similar quality was launched, providing the adversary who utilized the ASAT tech ample time to take advantage of the U.S.' blindness. This was not the case for the USSR, with their stockpile of satellites ready to be launched with less than a day's notice and built via assembly line in a way unimaginable by those at Lockheed who built each satellite by hand using precision engineering. In a sense, the U.S. SRP program would come to be considered by some as overengineered and too dependent on the idea that the USSR or any adversary

[227] Burrows, *Deep Black: Space Espionage and National Security*, 255.
[228] Nicholas L. Johnson, *Soviet Space Programs, 1980-1985*, Science and Technology Series (American Astronautical Society) ; v. 66 (San Diego, Calif.: Published for the American Astronautical Society by Univelt, 1987).

would act in good faith of verification and intelligence and not knock a satellite out of orbit, thereby leaving the U.S. blind. Thus, the proponents of the SDI would come to ask a valid question – is it worth depending on ideas of fairness and good faith at the possible expense of one's security? One wonders if they had perhaps studied Xenophon.

Open Source Intelligence as a Supporter of Verification: The Advent of Commercial Satellites

While definitions of open source intelligence vary and shift, there is little doubt that OSINT includes commercial intelligence, i.e., anything publicly available that can be purchased can be considered OSINT – the same can be applied to satellite reconnaissance. With the advent of commercial satellite programs, supported by and significant by state space programs, the story of how satellite reconnaissance was utilized during the Cold War becomes even more complicated. With modern companies such as Maxar Technologies, whose photoreconnaissance satellites have had a massive impact particularly on increasing understanding on the effects of climate change and the 2022 Russian invasion of Ukraine, among countless others, the support of commercial satellites as a public-private partnership is difficult to overstate, given the role commercial imagery has played and continues to play in the OSINT space.[229] The advent commercial satellites begins in 1974 with the Earth Observation Satellite Company

[229] "What Is Maxar? The Satellite Company Showing the Horrors of War in Ukraine - Harvard University," a https://hollis.harvard.edu/primo-explore/fulldisplay?docid=TN_cdi_proquest_wirefeeds_2654038552&context=PC&vid=HVD2&lang=en_US&search_scope=everything&adaptor=primo_central_multiple_fe&tab=everything&query=any,contains,MAxar%20Ukraine,AND&mode=advanced&offset=0.

(EORSAT) headquartered in Landover, MD, and which would later be renamed as Omnistar in 2008, which primarily focuses on GPS capability.[230]

However, the first genuine private photo-reconnaissance company to impact the global security space was the SPOT I satellite, a joint project between the public/private partnerships of France, Sweden, and Belgium. The SPOT I satellite, launched February 21, 1986, into a sun-synchronous orbit within 1.5 degrees of a KH-11 satellite, carried with it two cameras with all-digital capability ostensibly pulled from that of the KH-11 given the relationship between NASA and the French national space organization, would end up competing and winning against EORSAT with contracts relating to remote sensing and SIGINT.[231] The SPOT I played a significant role during the Chornobyl crisis when a yet-undisclosed commercial client paid to have photos taken of the smoldering nuclear reactor and the nearby soccer field, which appeared on the front page of the *New York Times* the following morning, showcasing to the global public, including some Soviets with access to the Western press, the existence of the event itself.[232]

While commercial satellite imagery would not significantly impact geopolitical reality until the 21st century, as noted, the mere existence of SPOT I and its capability of threat inflation remains salient in terms of historical significance. As Burrows notes, “In a world where knowledge is power, remote sensing has become a key source of information” and “Given the long-standing policy of not revealing satellite imagery of the USSR so as not to unduly embarrass the Kremlin, what might Washington’s reaction by if Soviet ballistic missile silos are inventories on the evening news? … Spot I is bound to

[230] “History,” OmniSTAR, https://www.omnistar.com/history/.
[231] Burrows, *Deep Black: Space Espionage and National Security*, 324–25.
[232] “SPOT 1 Objectives - https://earth.esa.int/eogateway/missions/spot-1/objectives.

encroach to some extent on the traditional preserve of military space intelligence, and in the process provide the ordinary citizen with a perspective of the world that only a generation or so ago was taken to be the exclusive domain of comics supermen and angels."[233] While the West, particularly the U.S. with Maxar, would utilize commercial intelligence to its fullest extent through massive government contracts, the applicability of commercial reconnaissance satellites as OSINT to the U.S.' national security and global security apparatus' is impossible not to recognize. One expects this trend to continue as international partners, both within and outside of the West, begin to question their own OSINT and commercial space reconnaissance capabilities.

The Global SDI: Alliances, Conflict and Perception

By 1984, with the beginning of President Reagan's administration, the SDI came out in full force against the forces of verification, as noted. President Reagan's SDI proposal included ideas such as "space-based chemical lasers designed to destroy missiles shortly after liftoff; ground-based lasers, utilizing sensors in space, to destroy missiles in the re-entry stage; a space-based, nuclear-generated, X-ray laser; a space-based, particle beam weapon; kinetic-energy weapons such as interceptor missiles and "hyper-velocity guns," based on the ground or in space, to hit enemy warheads at midcourse or re-entry; and microwave weapons using high frequencies to electronically disrupt enemy communications and targeting."[234] One can understand how the contemporary news media began to call the SDI 'Star Wars' given its inclusion of lasers, particle beams, and

[233] Burrows, *Deep Black: Space Espionage and National Security*, 324–27.
[234] (REDACTED) Chief of the European Issues Division, "Allied Attitudes Towards the Strategic Defense Initiative and US Development of Anti-Satellite Weapons" (Office of European Analysis, June 20, 1984), CIA FOIA Reading Room.

microwave weapons. Aware of challenges related to allies' understanding, acceptance, and deployment of such measures, President Reagan commissioned in early 1984, shortly after his inauguration, his CIA to produce a report on the Allied Attitudes Towards the Strategic Defense Initiative, cited above and which outlined for the President the reality that European allies, in particular, were relatively unsure about the feasibility of the SDI as applied to Western Europe. The key interest of Western European nations with regard to the proposed SDI was a dramatic reinvention of the U.S.-led security umbrella and guarantees which had at that time and beyond proved to be a suitable deterrent against nuclear strikes on U.S. allies.

The report's results could not have pleased President Reagan, who saw more or less a resounding 'no' from European allies whom the President saw most at risk of a Soviet strike. The report concluded that the French were the most worried about being pushed into a new technological war with the Soviet Union, just as they were developing their own SRP program. It stated that they actively favor negotiation related to banning the development of the SDI, concluding that "Soviet competition with the US … could threaten the deterrent value of existing and modernized French strategic forces, strip Western Europe of US nuclear protection, and lead to serious acrimony within NATO. … At the same time, France apparently believes it must now consider developing its own strategic defense capability to protect its forces to ensure that the US and USSR do not gain a monopoly on defensive systems," a sentiment shared by the government of West Germany, the Netherlands, the Kingdom of Norway, and Canada.[235]

[235] Chief of the European Issues Division, 7.

The most notable outlier in the report is the United Kingdom of Great Britain which, under the leadership of Reagan ally Prime Minister Margaret Thatcher, agreed publicly with the SDI initiative but privately stressed "numerous reservations … particularly on the potential expense involved and the ramifications for NATO strategy."[236] However, Prime Minister Thatcher's background as a chemist had provided her with the view that she was better equipped to understand the science behind lasers and ASAT technology than some of her advisors, which further enabled her to conclude that, while the SDI was not feasible and would inherently upset the delicate and essential balance between nuclear-enabled states, research into technologies related to the SDI would be a strategic imperative.[237]

Prime Minister Thatcher would go on to rebut President Reagan's argument that the SDI could elicit a nuclear-free world during a Camp David summit in 1984, saying that while it would be "essential to pursue the research," consideration would have to be given to potential violations of the 1972 ABM Treaty and the 1967 Outer Space Treaty which would require renegotiation, with the fear that "deployment of a Ballistic Missile Defense (BMD) system would be de stabilizing and that while it was being constructed a preemptive first strike against it would become an attractive option."[238] Prime Minister Thatcher, in coordination with NSA Bud McFarlane on a visit to Hong Kong, wrote the UK's policy toward the SDI which outlined four points, "(1) the US, and Western, aim was not to achieve superiority, but to maintain balance, taking account of Soviet

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[236] Chief of the European Issues Division, 8

[237] Aaron Bateman, "Intelligence and Alliance Politics: America, Britain, and the Strategic Defense Initiative," *Intelligence and National Security* 36, no. 7 (November 10, 2021): 12, https://doi.org/10.1080/02684527.2021.1946958.

[238] "Cold War: Thatcher-Reagan Meeting at Camp David (Account of Conversation) [Memoirs Extract] | Margaret Thatcher Foundation," para. 2, https://www.margaretthatcher.org/document/109394.

developments; (2) SDI related deployment would, in view of Treaty obligations, have to be a matter for negotiation; (3) the overall aim is to enhance, not undercut, deterrence; (4) East/West negotiation should aim to achieve security with reduced levels of offensive systems on both sides."[239]

Joining with the French and Norwegians, and eventually the Soviets themselves, the Canadians under the leadership of Prime Minister Pierre Trudeau began pushing for an outright ban on ASAT technology, with the report saying that "Ottawa for some time has been pushing for a ban on testing and deployment of high-altitude ASAT weapons. … Canada has used discussions of the Trudeau Initiative [Canadian anti-ballistic missile initiative] to stimulate Allied interest in arms control and put pressure of the US," concluding with hope that given PM Trudeau's contemporary announcement of resignation that the Ottawa and Moscow "may be receptive to discussions in these areas next year."[240]

The Soviet response to President Reagan's SDI had been decidedly negative, with its defense minister saying in 1985 in an FBIS-collected report, "The Pentagon is now rushing into space. What for? Once again, to attempt to achieve military superiority over the USSR, this time through space. President R. Reagan's so-called "Strategic Defense" Initiative is only called "defensive" as camouflage, while it is in fact aimed at creating a new class of weapon, a space strike weapon."[241] The Soviets saw the SDI not as a program, as President Reagan had described it, with the intent of setting the American

[239] Chair: Prof. Sir Lawrence Freedman, KCMG, CBE and Holger Nehring, "The British Response to SDI" (London, United Kingdom: Centre for Contemporary British History, Kings College London, July 9, 2003), 18–19, https://www.kcl.ac.uk/sspp/assets/icbh-witness/sdi.pdf.
[240] Chief of the European Issues Division, "Allied Attitudes Towards the Strategic Defense Initiative and US Development of Anti-Satellite Weapons," 8.
[241] S.L. Sokolov, "Answers of USSR Defense Minister, Marshal of The Soviet Union S.L. Sokolov, to TASS Correspondent's Questions" (Moscow, USSR, May 5, 1985), FBIS Daily Reports (HOLLIS).

people free from the fear of nuclear weapons, but instead as a not-so-cleverly disguised attempt at providing the U.S. unparalleled first-strike capability well outside treaties and other agreements dependent on the idea of verification. The Soviets would go on to operate under the understanding that, "to the original Reagan administration claim that SDI will provide us with a world free of nuclear weapons, the Soviets have replied by maintaining that, on the contrary, SDI will in fact be the 'catalyst of an uncontrollable race in both offensive and defensive arms."[242]

The Soviets, who had desired an all-out ban of the SDI, were not satisfied with several concessions offered by President Reagan in the 1986 Reykjavik Summit, which included a 10-year moratorium on SDI research and testing. According to Secretary General Gorbachev, the USSR had also been pursuing a ban on ballistic missiles, which led to an agreement to reduce strategic ballistic stockpiles by 50% over five years. President Reagan saw the Soviet desire to end SDI and ASAT testing as an irreconcilable difference between the two parties, saying in a press conference following Reykjavik, "For us to abandon SDI would leave them with an immediate, permanent advantage, and a dangerous one, and this I would not do. Abandoning SDI would also leave us without an insurance policy that the Soviets will live up to arms reduction agreements. Strategic defense is the key to making arms reduction work. It protects us against the possibility that at some point, when the elimination of ballistic missiles is not yet complete, that the Soviets may change their minds."[243] With President Reagan and Secretary General

[242] Mary C. FitzGerald, "The Soviet Military on SDI," *Studies in Comparative Communism* 19, no. 3 (1986): 5, https://doi.org/10.1016/0039-3592(86)90019-0.
[243] "Remarks and a Question-and-Answer Session With Broadcast Journalists on the Meetings in Iceland With Soviet General Secretary Gorbachev | The American Presidency Project," https://www.presidency.ucsb.edu/documents/remarks-and-question-and-answer-session-with-broadcast-journalists-the-meetings-iceland.

Gorbachev's immediate refusal to agree to what he considered the killing of his SDI program, the Reykjavik Summit would end without actively fruitful agreements.

An additional element to the perception of the SDI comes from the views of scientists and engineers who saw the SDI as an untenable step in the wrong direction of nuclear disarmament and global security. However, the split between those who opposed the SDI itself differed from those who opposed the testing of technologies related to it. In a 1985 survey developed by the Union of Concerned Scientists (UCS) and conducted by an independent research firm "showed that physicists opposed deployment of SDI by nearly 2 to 1, but that they favored basic laboratory research by a greater margin."[244] As noted above, this view was mirrored across the international and allied community. The primary reasons why so many scientists opposed the SDI are similar to those of allies, such as cost, effectiveness, and opposition to what had been seen as a fundamental change in geopolitical reality, with some arguing that the U.S. NTM system was a sufficient deterrent. At the same time, discussions were ongoing regarding the decrease in the nations' respective missile stockpiles. A common criticism of the SDI was brought up in a 1985 Opinion piece in the *New York Times*, saying that "Opponents of S.D.I. want both the Soviet Union and the U.S. to halt their programs. A scientific boycott of "Star Wars" is necessary to alert the Reagan Administration to its potential dangers."[245] The argument that both sides needed to de-escalate their research into the SDI and ASAT

[244] Thomas Aeppel, "Scientists Lining up for and against Reagan's `Star Wars'. Politics Intrudes on Missile Defense Research," *Christian Science Monitor*, October 23, 1986, para. 7, https://www.csmonitor.com/1986/1023/adeb.html.

[245] "Opinion | Self-Defeating Strategic Defense Initiative," *The New York Times*, October 16, 1985, sec. Opinion, https://www.nytimes.com/1985/10/16/opinion/l-self-defeating-strategic-defense-initiative-083446.html.

capabilities would continue to be recalled by activists promoting nuclear disarmament and de-escalation in its own right.

Although the SDI never 'took off' as it were, having been met with considerable challenges regarding cost, feasibility, public opinion, and international perception, its legacy as one of the most Reagan-esque policies remains firmly in the American imagination – a concept undoubtedly aided by the U.S. media's pejorative use of the term 'Star Wars' to describe the laser-focused policy of active defense. However, the legacy of the SDI is not as pejorative. Despite the failure of the SDI to "achieve a unilateral strategic advantage" and the corresponding maintenance of the NTM as the U.S.' primary nuclear deterrence mechanism, President Reagan's SDI and its effect on the denuclearization of the USSR and U.S., as well as arguments supporting the idea that the SDI and its costliness 'scared' the Soviets into collapsing, cannot be so easily discounted. Of course, the collapse of the USSR in 1991 had many reasons, some of which are still being explored today, Soviet and allied responses to the SDI and its consequential promise of another space and weapons race certainly played a part not only in the failure of the USSR as a viable political entity but also concerning the perception of geospatial intelligence.

Conclusion

In covering the length of the Cold War from 1949-1991, this author hopes to have provided the reader with ample evidence to support the claim that the combination and confluence of GEOINT and OSINT were imperative in keeping the Cold War cold, particularly in enabling policymakers to better understand Soviet capabilities through GEOINT and intentions through OSINT. This thesis also sought to prove to the reader that across their development, Space Reconnaissance Platforms were built with intention toward and were utilized following promoting Schelling's adapted argument of inherent propensity toward peace, thereby enabling policymakers to make decisions geared toward defense and security. Drawing on primary and secondary sources, this thesis also sought to convince the reader that answers to this generation's most difficult to solve practical intelligence questions could be found in the past. Topics such as project security, how to protect the balance between intelligence requirements and civil rights and values held by Western democracies, how artificial intelligence and machine learning in intelligence collection and analysis should be used, the issue of having more data than one's staff can handle, the classification crisis, and the conditions which support and bring about paradigmatic technological change, having been written on in detail throughout this thesis.

In Chapter I, this thesis first approached the beginning of American geospatial intelligence by defining intelligence requirements set by the Beacon Hill Report and the Technological Capabilities Panel. Chapter I sought to highlight that the U.S. had been aware of the need to develop high-altitude or spaceborne reconnaissance platforms to answer questions relating to the missile gap and gain a more parsimonious understanding of the Soviet adversary from the earliest days of the Cold War. Evidenced through reading of primary sources primarily from the administration of President Truman, Chapter I sought to connect the intelligence requirement of being able to see one's adversary with the increasingly adversarial relationship between the U.S. and the USSR, which had reached a temporally significant peak, respective to the past, with the launch of *Sputnik* in 1957.

In the case study on *Sputnik*, this thesis sought to provide the reader with context surrounding the urgency of generating the first space or aerial reconnaissance platform, having recognized publicly and for the first time Soviet technological superiority concerning rocket technology. The *Sputnik* case study had the additional goal of making known to the reader the precise ways in which the Soviet satellite impacted the minds of policymakers and urged them to press forward with their missile technology, notably the U-2 spy plane.

Chapter II focused on developing the Foreign Broadcast Information Service and highlighted its contributions to policymakers and geopolitical events across the early days of the Cold War. Chapter II sought to convince the reader of the utility of the FBIS in an era and system when SIGINT and HUMINT were prized not only by policymakers and executives but also by the public. Chapter II also sought to provide evidence for the assertion that OSINT had been the key driver in providing policymakers with enough intelligence to make assumptions regarding Soviet intentions while relying on as few assumptions as possible. Chapter II provided the reader with evidence to support the claim that OSINT had been vital to producing the U.S. classification program, relying on primary and analytical secondary source analysis of Sherman Kent's Yale Report.

Chapter II showcased that considerations relating to the First Amendment were at the top of President Truman's mind as he began to shape the novel classification system despite being under immense pressure from Congress and the Press to allow the grievously underestimated contribution a free press provides to less accessible adversaries of the U.S. Chapter II sought to enable the reader to conclude that classification did not and does not inherently infringe on the rights of the American public to a free press, but would instead enable that same public to a level of security and growth inconceivable even two generations prior.

The second case study in this thesis, on the topic of the U-2 spy plane, sought to provide the reader with evidence of true American ingenuity and to focus on the power of the public-private partnerships that the American economic system makes possible. Relying on declassified information on the conception and development of one of the most critical reconnaissance technologies ever deployed, the case study provided evidence that Soviet technological superiority was nothing more than a fallacy – something to be tossed aside within weeks of the first U-2 takeoff. The case study highlights the contributions to U.S. GEOINT capability while reminding the reader of its initial purpose as a fill-in while proper SRPs were being developed. This case study also argued that, particularly for President Eisenhower, the idea of sending an unarmed pilot deep into Soviet territory highlighted the concept that for him, American life was something sacred and worth protecting, even in the face of intelligence requirements and operations that would put even a single American life in harm's way. The case study concluded by evidencing that the solution to President Eisenhower’s problem was in development as the first SRP program.

Chapter III, which has as its focus the perceived missile gap and the progression of spaceborne intelligence, critically argued that the idea, later considered a fallacy driven by war hawks inside and outside of Congress, that the Soviets had an exponentially more robust stockpile of missiles ready to launch at the U.S. at a moment's notice. Chapter III also used the topic of interagency rivalry as a primary motivator of the continuation of the missile gap, showcasing for the reader the precise ways in which rivalry hindered the exploration of the missile gap and led directly to grievous misuse of funds. Chapter III also defined the first and second-generation intelligence communities, focusing on President Eisenhower's outright distress at how the USAF, in particular, had handled the novel requirement of better understanding Soviet capabilities, which would be entirely alleviated with the advent of SRPs, notably the Discoverer/CORONA program.

Chapter IV, which focused on the development of the Discoverer/CORONA reconnaissance platform and its progression into the KEYHOLE system, argued that the CORONA system had been built with the inherent propensity toward peace of mind and that the advent of verification technologies was critical in keeping the Cold War cold. Chapter IV traced the path from the SIGNT-based GRAB satellite system to the accurate and strategically advantageous camera-based system. Chapter IV also argued that the Agena-Thor engine system provided the U.S. with a comparative advantage over the Soviets regarding missile technology. Chapter IV highlighted the advantages of the Discoverer program and its resulting successes, beginning and ending with a robust analysis of the success of Discoverer 14/CORONA 9009. Chapter IV's argument, substantiated by the sources presented, was that the U.S. had developed a peaceable and unmanned reconnaissance method, outperforming the U-2 in reconnaissance capability and quality of intelligence within three years of the program's initiation.

The third and final case study in this thesis, which concerned the Cuban Missile Crisis from the perspective of reconnaissance and intelligence policy, argued that U.S. OSINT and GEOINT capabilities had finally combined and had served to maintain peace in the face of the most dramatic geopolitical event of its time. Relying not only on FBIS and NRO sources but also declassified Soviet sources and secondary analysis, Case Study #3 provided novel contributions to the field of Intelligence History by considering newly declassified sources and secondary analysis within the context of OSINT and GEOINT. Case Study #3 also provided the reader with additional context to support the argument that OSINT had been pivotal in the resolution of the Crisis as a whole, having impeded false Soviet claims related to the stationing of missiles on the island nation for use against the U.S. The case study further proved that diplomacy, which had effectively solved the Crisis, had been backed by OSINT and GEOINT in the form of FBIS reports and analysis of U-2 overflight data. The case study concluded with an analysis of the legacy of the Crisis and its instigation of a more robust unmanned reconnaissance program, which led to support for Reagan's Strategic Defense Initiative.

Chapter V argued that despite President Reagan's desires, his SDI was not only technologically unfeasible and diplomatically toxic but that the U.S.' National Technical Means of Verification had provided a sufficient deterrent to the reality of nuclear-enabled states. Chapter V also highlighted the advent and banning of ASAT technologies across a shifting geopolitical landscape by providing the reader with appropriate context regarding the history of the SDI and showcasing the particular ways such a technology would be impractical given the geopolitical reality of competition. Chapter V also provided the reader with details regarding the still-classified KH-11 and its corresponding radio-enabled downlink technology, which resulted in the dissolution of SRV technology. Chapter V then enabled the reader better to understand the Soviet means of verification and reconnaissance, highlighting the differences between the systems of the U.S. and the USSR, showcasing that those economic realities between market and command economies had a noticeable impact on the development of the respective reconnaissance systems. Chapter V would argue that the advent of commercial satellites – a core component of modern OSINT – had been developed and utilized within this thesis's scope and had impacted the overall reconnaissance landscape provided not only to policymakers but to the public as a whole. In effect, Chapter V highlighted the further confluence of OSINT and GEOINT as legitimate means of intelligence collection and analysis across the Carter and Reagan administrations, showcasing specific examples of a shift in perception for both 'INTs.'

This thesis asserts and proves the core argument that neither GEOINT nor OSINT alone were sufficient means of keeping the Soviet threat at bay and instead proves that only the combination of those two intelligence collection methods could provide analyses faithful enough to impact policy positively. Utilizing hundreds of individual primary and secondary source materials from the CIA, NSA, Soviet archives, and academic scholarship, this thesis sought to prove the assertion that SARPs were critical components not only in preventing full-scale nuclear war but also in advancing cooperation between allies and adversaries alike. Historians whose scholarship reviews and impacts the modern era should preserve the central idea that it is best to know one's adversaries' intentions and capabilities. In an age of disinformation, shifting alliances, changes in perceived realities, and robust – nearly sporadic – technological advancement with the advent of artificial intelligence as intelligence collection and analysis, this thesis has faithfully provided the reader context to solve such problems. While noting the contributions of over a dozen individuals whose expertise instigated one of the greatest revolutions in intelligence, this thesis sought to prove the assertion that second-generation OSINT, when combined with the stellar contributions of the U-2 and CORONA GEOINT platforms, led the West not only into peace but also contributed significantly to its economic and social dominance over the East. While neither Xenophon nor Herodotus nor Sun Tzu could have reasonably expected the rise of Western geospatial power, this thesis concludes with the idea that being able to understand one's adversaries' intentions and capabilities is key to dominance.

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