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in Imagery Intelligence during the Cuban
Missile Crisis of 1962**

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THE IMPACT OF LOW-LEVEL AERIAL PHOTOGRAPHY IN IMAGERY INTELLIGENCE DURING THE CUBAN MISSILE CRISIS OF 1962

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ABSTRACT

This essay sets out to establish lessons learnt from Imagery Intelligence (IMINT) during the Cuban Missile Crisis. One is the significant impact of IMINT on the strategic decisions behind the blockade on Cuba as well as the planning of eventual air strikes. The author also highlights that this impact was a huge risk once the over-reliance on IMINT and the deficiency of Human Intelligence (HUMINT) were understood. From the analysis of a 'secret low-level photographic operation' codenamed *Operation Blue Moon*, the author states that the successful collection of low-level aerial photography over Cuba was far from well-planned. But, he felt that the most crucial lesson comes from observing the behaviour and interactions between the actors responsible for the planning, authorisation, collection, analysis and consumption of intelligence. Even after fifty years, the crisis represents not only an important moment of the Cold War, but also a guide on the management of intelligence in general.

Keywords: *Asset; Shortcomings; Reconnaissance; Information; Execute*

INTRODUCTION

In the annals of Cold War history, no incident brought the world closer to the brink of nuclear war than the Cuban Missile Crisis of 1962. Countless scholars and statesmen have since tried to take lessons of decision-making, governmental politics and international relations from studying its procession. Yet more than five decades later, the crisis still has much to reveal. Despite the vast research on the subject, public understanding on the use of IMINT during the crisis remains largely limited to the discovery of Soviet offensive missiles in Cuba based on the photos taken by the U-2 overflights of Cuba from 29th August through 14th October, 1962. In contrast, very little was attributed to the use of aerial photography obtained by the 'secret low-level photographic operation codenamed *Blue Moon*', mostly because it remained classified throughout the Cold War.¹ However, with the release of more declassified documents since then, several scholars were able to gain new insights into the role of low-level aerial reconnaissance in order to construct a better understanding of the crisis—a myriad of

weaknesses obscured by the successful aversion from catastrophe.

This essay recovers the findings made by recent literature on this feature of the crisis in an attempt to produce both new analysis and lessons. How did low-level aerial reconnaissance function during the crisis? Was the United States (US) prepared for operational success? To what extent did it drive the US to place a blockade on Cuba among other strategic options? Was American intelligence too dependent on its aerial component? What lessons can we learn from the crisis in the domain of IMINT? By looking at the crisis through low-level aerial reconnaissance, this study aims to present the impact of American IMINT during the crisis in a different light and to provide a better understanding of intelligence in general.

To answer the questions above, we adopt a Chrono-thematic approach. First, we examine the technological and doctrinal context of American air intelligence prior to the crisis. Then, we weigh the use of aerial reconnaissance and aerial photography in the strategic decisions made by American leaders

throughout the crisis (16th – 28th October): (1) the choice of adopting a blockade, (2) the planning of air strikes, and (3) the presentation to the United Nations (UN). At the end, we take a step back and evaluate what these lessons mean to IMINT today and tomorrow.

1956 - 1962: A NEW PARADIGM IN AERIAL RECONNAISSANCE

The Cold War is often characterised as a war of intelligence; the Iron Curtain made the acquisition of HUMINT from the Union of Soviet Socialist Republics

(USSR) extremely difficult. When Dwight D. Eisenhower became president in 1953, he quickly became aware of gaps in American intelligence and worked to address them, including the improvement of technical means.² However, reconnaissance aircraft of that time were principally bombers converted for reconnaissance missions, and were therefore highly vulnerable to anti-air artillery, missiles, and interceptors. One solution was to develop a platform which would permit aerial photography at an altitude beyond the operating ceiling of Soviet fighter jets—the CL-282 by Clarence

Date	Event
Jun 1962	The Soviet plan to install ballistic missiles on Cuba began with Operation <i>ANADYR</i> .
End Jul	Soviet weaponry began to arrive at ports in Western Cuba.
1 – 5 Aug	The construction of surface-to-air missiles (SAM) sites began at Matanzas, Havana, Mariel, Bahia Honda, Santa Lucia, San Julian, and La Coloma.
5 Aug	First U-2 overflight above Cuba for the month of August. Too early for any useful collection.
29 Aug	Second U-2 overflight for the month of August. The National Photographic Interpretation Centre (NPIC) identified at least 8 SAM sites. The administration still believed that Soviet military aid was purely defensive. The Special Activities Division (SAD) of the CIA reduced U-2 coverage over Western Cuba for subsequent flights to reduce vulnerability against the SAM sites.
30 Aug	A U-2 violated Soviet airspace accidentally, prompting public protests from Moscow
1 – 5 Sep	The construction of Intermediate Range Ballistic Missile (IRBM) sites began in Guanajay.
5 Sep	First U-2 overflight for the month of September. The NPIC identified many more SAM sites but it was still too early to notice the construction of offensive missiles. The ‘photo gap’ begins.
8 Sep	A U-2 flown by a Taiwanese pilot was lost over continental China.
10 Sep	Following the U-2’s scandals on 30 Aug and 8 Sep, the National Security Advisor, McGeorge Bundy, called for a meeting with the Committee on Overhead Reconnaissance (COMOR) and the CIA on the future of overflights above Cuba. Future U-2 flight profiles over Cuba were degraded significantly to avoid known SAM sites.
15 – 20 Sep	The construction of MRBM sites began in Western Cuba (San Cristobal and Remedios).
26 – 29 Sep	Two ‘degraded’ U-2 overflights took place but they did not cross Western Cuba and so found nothing suspect.
25– 30 Sep	The construction of MRBM sites began in Central Cuba (Sagua la Grande).
4 Oct	Director of Central Intelligence (DCI), Jone McCone, questioned the lack of coverage over Western Cuba during a Special Group Augmented (SGA) meeting, but the decision to resume coverage was postponed to the next meeting.
7 Oct	Another two ‘degraded’ U-2 overflights took place but they did not cross Western Cuba and so found no evidence of offensive missiles.
9 Oct	The SGA sanctioned one overflight above Western Cuba to be flown by the USAF instead of the CIA. Time was taken to train a USAF pilot to fly the U-2.
14 Oct	A U-2 overflight was made over Western Cuba, the first in over five weeks (since 5 th Sep).
15 Oct	The NPIC detected MRBMs at San Cristobal. End of the ‘photo gap’.
16 Oct	The Cuban Missile Crisis begins.

Table 1: Summary of events leading up to the Cuban Missile Crisis of October 1962, with focus on the five-week ‘photo gap’

Johnson from Lockheed Martin. The concept was rejected by the US Air Force (USAF) but attracted the attention of the Central Intelligence Agency (CIA), and on 1st August, 1955, the U-2 carried out its first test flight.³

With the introduction of the U-2 in 1956, aerial photography became the principal source of information on Soviet missile, military and industrial facilities for the CIA. IMINT from very high altitudes became a rapid success, most prominently in confirming the ‘bomber gap’ then the ‘missile gap’ between the US and the USSR in the late 1950s.⁴ While the U-2’s initial exploits profited from the Soviet’s temporary incapacity to engage it, this was no longer the case after the shooting down of the U-2 piloted by Gary Powers on 1st May, 1960.⁵ More importantly, the doctrine of imagery operations had to be reviewed. The CORONA programme to operationalise strategic reconnaissance satellites was accelerated after the incident, with the first photos arriving in the summer of 1961. Knowing that the U-2 had to be limited to operating outside Soviet airspace after the Gary Powers incident, the US

began compensating aerial reconnaissance with spatial reconnaissance in the 1960s.

The U-2, however, is not the subject of discussion in this study. Several studies have already emerged to address how the US suffered from a ‘photo gap’ over Cuba for five crucial weeks, most notably Holland and Barrett’s *Blind over Cuba*. In summary, a combination of U-2 accidents, election climate amidst the Cold War, inter-agency bureaucracy, and political intrigue in the planning of U-2 overflights delayed the discovery of the Soviet’s deployment of Medium Range Ballistic Missiles (MRBM) a month later than when they were first delivered (see *Table 1*). But when the U-2 overflights resumed, the discovery of MRBM sites in San Cristobal on 15th October, 1962 changed everything: there would be no *fait accompli* for Nikita Khrushchev.

THE INFLUENCE OF IMINT ON EXCOMM’S DECISION TO IMPLEMENT A BLOCKADE

Just before noon of 16th October, President Kennedy convened an emergency meeting which would

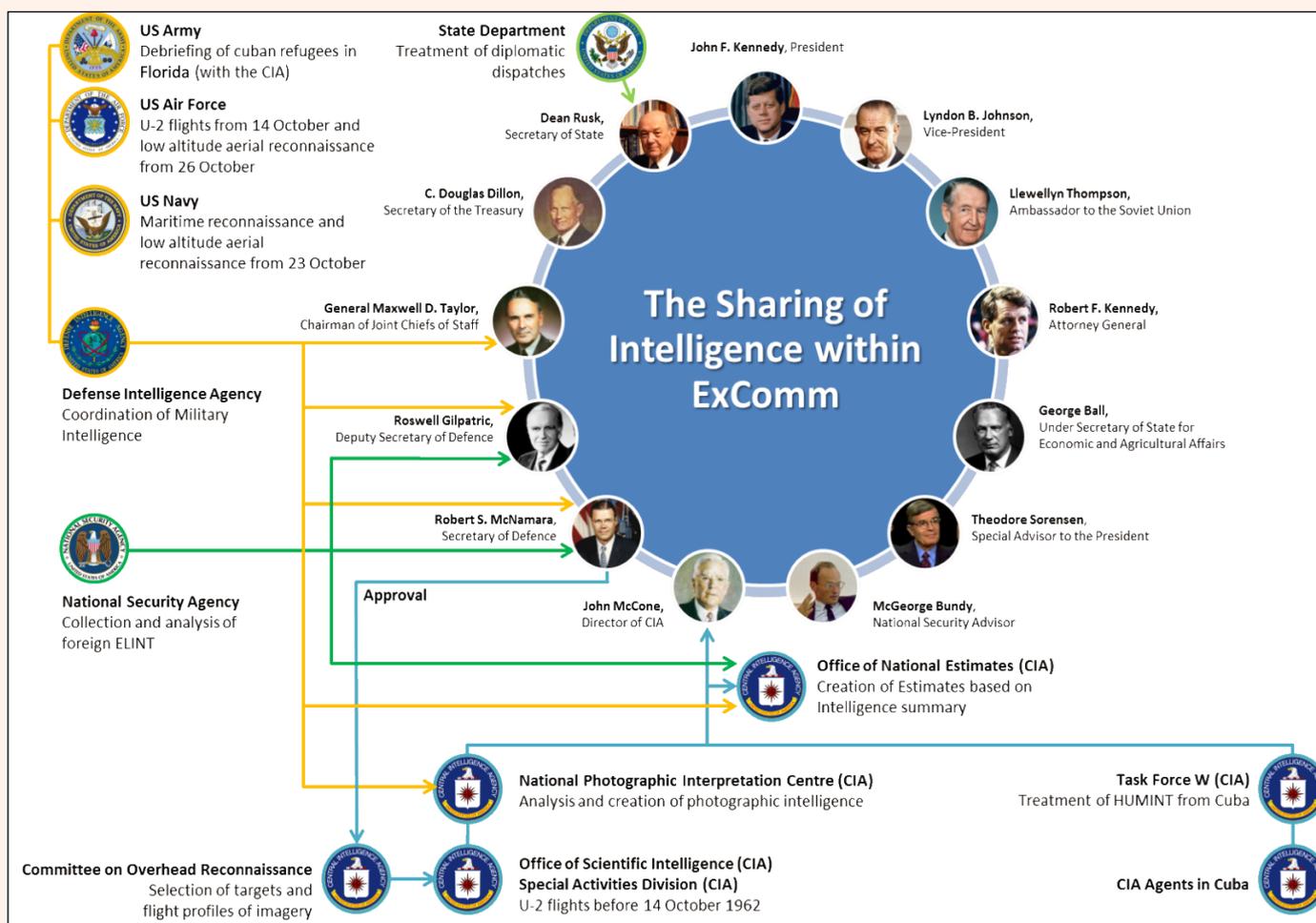


Figure 1: The Sharing of Intelligence within ExComm

soon be called the Executive Committee of the National Security Council (ExComm) (see *Figure 1*). Its objective was to formulate strategies against the dire threat from Cuba.⁶

From August 1962, the President had drawn a clear line that he would not tolerate offensive weapons in Cuba, from which the international credibility and strategy of the US depended on.⁷ Now that the Soviets had crossed the line, a strong response was necessary. But the fundamental question was: 'What was the least dangerous strategy likely to be successful?'⁸ The members were initially divided over several proposals but arrived at two options towards 19th October: a blockade or an air strike.⁹ At the start of the crisis, there existed three Operational Plans (OPLANS) for Cuba, all of which included the option of an airstrike.¹⁰

The consensus to implement a blockade instead of an airstrike was linked to the ExComm members' moral and political preoccupations, but not without estimates from planners, largely based on IMINT. By 16th October, the second day of the crisis, photos from the U-2 mission of 14th and 15th October revealed about 2,000 military targets, and planners calculated that there was only a 90% probability of destroying all targets.¹¹ There would be no guarantee of success from one single strike. Over the next few days, constant revisions to the plan based on new IMINT became frustrating for ExComm and the lack of certainty gradually diminished the attractiveness of an airstrike during the first five days of deliberations (16th – 20th October). Here, the IMINT from U-2 photos played a significant role in supporting the ExComm's decision to implement a 'quarantine' on Cuba on 21st October, which was in fact a blockade.

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The reason low altitude aerial reconnaissance was not applied immediately on 16th October was to conserve the element of secrecy. Within ExComm, military representatives pressured for the collection of low-level aerial photography, but the missions were delayed for several days so that the Soviets would not be alerted by the US' degree of knowledge of the Cuban missile—while strategies and options were being debated and developed—which otherwise would likely accelerate the construction and installation of nuclear warheads on the missiles.¹² After the decision on 21st October, President Kennedy delivered a televised speech on 22nd October to reveal the presence of Soviet missiles on Cuba to the world, and announced that the US would impose a 'strict quarantine' of Cuba on 24th October from 1000HRS to block further deliveries of military equipment. In addition, the blockade would be followed by the threat of escalated violence if the Soviets did not co-operate. The option of an airstrike remained on the table, and a more effective tool was necessary to verify and refine the positions and number of targets. Now that secrecy was no longer required, all parameters were reassessed, and IMINT faced new demands necessitating a different type of aerial photography—that of low altitudes.

WHY LOW-LEVEL AERIAL RECONNAISSANCE?

Low-level aerial reconnaissance during the crisis was necessary for two reasons. The first was resolution. The U-2 offered a more discrete and adapted form of collection in order to not alert the Soviets, but cloud cover and small-scale imagery presented serious challenges for interpretation and planning. For instance, during the early stages of the crisis, the photo interpreters at the National Photographic Interpretation Centre (NPIC) had difficulty distinguishing between SS-3 and SS-4 missile launchers because both were similar platforms and the physical measurements taken from U-2 photographs did not have the necessary resolution to support conclusive differentiation. The analysts had to make the hypothesis that SS-4s were deployed based on the latest Soviet live firing records and considering that the range of the SS-4 was more adapted to threaten the US.¹³ The poor resolution also made estimates for the airstrike option more tentative than ExComm was comfortable with during the first few days of the crisis.

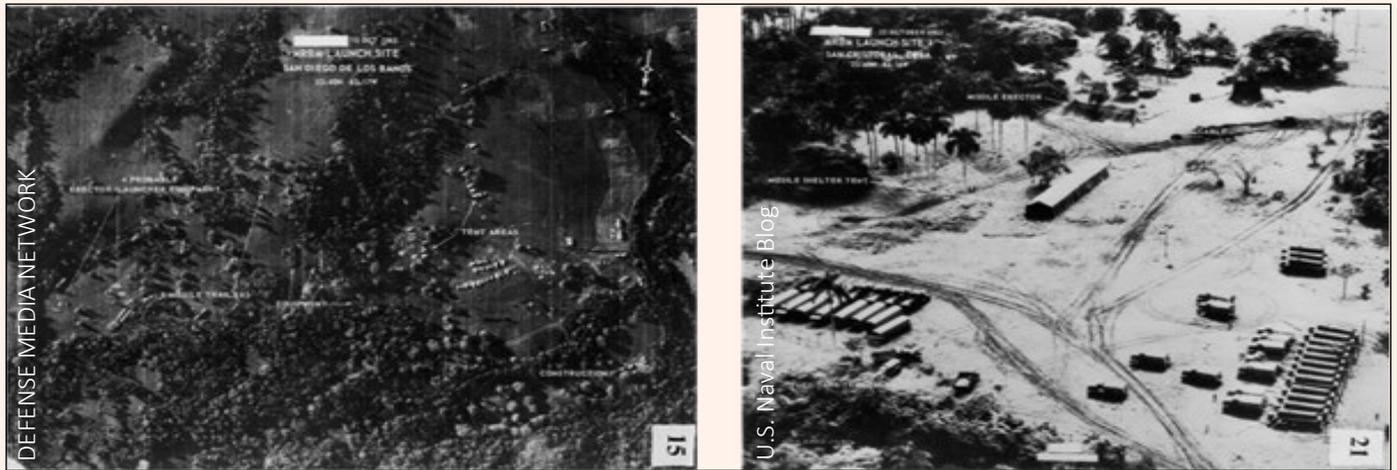


Figure 2: Difference in resolution between photos taken by the U-2 (left) and those from the RF-8A (right) over Cuban MRBM sites.¹⁴

Figure 2 shows the resolution difference between photos taken by the U-2 and photos taken from low-level aerial reconnaissance to illustrate how difficult it was for the NPIC and airstrike planners to make accurate estimates.

The second reason was accessibility. Although President Kennedy had given blanket clearance on 16th October for U-2s to overfly Cuba as often as required, the profiles remained limited from interior zones in order to avoid operational SAM sites. In contrast, two aerial reconnaissance aircraft capable of flying at 1100km/h at 500 feet offered a means to elude Soviet anti-air defences: the RF-8A of the US Navy and the RF-101 of the USAF.¹⁵ Permitting a more precise collection and more sure than the U-2 in navigating interior zones, low-level aerial reconnaissance was an attractive option.

However, just as strategic reconnaissance faced a dangerous 'photo gap' of five weeks, aerial reconnaissance also faced a myriad of technical and organisational difficulties which could have complicated the low altitude missions, or even render them impossible.

OPERATION BLUE MOON: A COMPLICATED SUCCESS

Photography at very low altitudes and very high speeds required specialised cameras. The RF-101 from the USAF 363rd Tactical Reconnaissance Wing (363-TRW) were ready to execute the mission on 22nd October, but none had ever conducted photography tests similar to those required. After the first sorties were flown on 23rd October, the USAF realised that the photographs taken by their KA-53 cameras were not exploitable.¹⁶ As

documents related to this event are likely still classified, the reasons for which the USAF was not adequately prepared for a mission of such importance on 23rd October remains obscure. We can, however, present a hypothesis based on available information: well before the crisis, on 30th August, a review of low-level aerial reconnaissance over Cuba was presented to the United States Intelligence Board (USIB) and concluded that the use of the RF-101 and the RF-8A 'would be feasible from a military point of view'.¹⁷ Actions to prepare the RF-101 to be employed for aerial reconnaissance were recommended by the Deputy Director of Central Intelligence (DD/CIA), General Marshall Carter, on 7th, 10th, and 13th September to the Secretary of Defence, Robert McNamara, in order to verify certain SAM sites on Cuba which, according to the CIA's hypothesis, were hiding something.¹⁸ However, McNamara did not want to consider the operation before new results were obtained from U-2 reconnaissance. Unfortunately, this decision corresponded to (1) the loss of two U-2 aircraft during the period which diminished the political appetite for aerial reconnaissance significantly, (2) the decision on 10th September to degrade the U-2 surveillance regime over Cuba, (3) the Special National Intelligence Estimate (SNIE) of 19th September which minimised the possibility of an offensive Soviet deployment, and (4) the fact that airspace intrusion by aerial reconnaissance aircraft could be considered an act of war. These factors would have diminished the will of McNamara to authorise tactical reconnaissance over Cuba. In the absence of his authorisation, one can suggest that little was done to prepare the RF-101 until the missiles' discovery on 16th October.

Nevertheless, the USAF was aware of the USIB review on 30th August and had at least a month to schedule the test flights necessary to conclude if the reconnaissance capability (or incapability in this case) of the RF-101 and its KA-53 camera were effective in conditions similar to that in the Cuban theatre. Yet the mission failure on 23rd October suggested otherwise. In this manner, one can postulate two explanations. First is the blind confidence on the part of mission planners which did not make the effort to verify the 'feasibility' of the RF-101 for low-level aerial reconnaissance over Cuba highlighted in the USIB review. Second is the political choice not to employ low-level aerial reconnaissance until the discovery of 16th October, which likely stymied any verification attempts by the USAF on the RF-101's capabilities. In any case, the USAF was ill-prepared to carry out its mission on 23rd October.

In contrast, the RF-8As from the Photographic Reconnaissance Squadron 62 (VFP-62) of the US Navy, equipped with modified forward firing KA-45 and KA-46 cameras, succeeded in obtaining high quality photos on their first *Blue Moon* mission on 23rd October. In response, the 363-TRW had to refit new cameras on its RF-101 and only resumed operations on 26th October, or day 11 of the crisis.¹⁹ Considering the urgency of the situation, had the VFP-62 not achieved mission success on 23rd October, the consequences would have been far-reaching. What is surprising, however, is that the RF-8A did not succeed because it followed through with the USIB report on 30th August; their modified KA-45 cameras were a result of tests in the carrier environment while flying at high speeds and at altitudes between 1000 to 1500 feet, a few months before the crisis began.²⁰

That is not all. The VFP-62 had no access to the U-2 photos—which were classified Top Secret *Talent*, *Talent* being the codename for distribution control—for their early missions, and were told to 'look for suspicious activity, such as construction sites, military vehicles, or other unusual goings on.'²¹ Paradoxically, the 363rd TFW obtained these classified photographs although their cameras were ineffective. According to William T. Hocutt, an officer in the Atlantic Intelligence Command (AIC) during the crisis, bureaucratic miscommunication of *Talent* clearance within the AIC appeared to have caused the delay for the US Navy.²² Seen from this angle, the immediate success of American low-level aerial reconnaissance during the crisis appears more fortunate than we thought.

THE INFLUENCE OF LOW-LEVEL AERIAL RECONNAISSANCE

Despite the problems faced by the low-level aerial reconnaissance which began on 23rd October, ExComm obtained elaborate analysis of the first photos taken at low altitudes on 24th October. These photos contributed to a better understanding of the nature of the Soviet deployment which the U-2 photos were incapable of providing.²³ The low altitude overflights also made clear how vulnerable the missiles were while challenging previous assumptions by imagery experts based on U-2 photos, allowing for a better planning of eventual airstrikes.²⁴ In fact, by 25th October it seemed that low-level aerial reconnaissance over Cuba had improved American intelligence to the point that a surgical strike was possible.²⁵ Here, the success of low-level aerial reconnaissance raises an interesting point: while estimates of a large number of airstrike targets before 24th October had supported the blockade option, they were false. We can postulate that if the estimates were reduced in the first few days of the crisis, perhaps by the integration of significant HUMINT, an airstrike might have been more attractive and it would have taken ExComm a longer time to arrive at a consensus for the blockade.

Low-level aerial reconnaissance also influenced the crisis in a bellicose manner. Compared to the less visible U-2, the RF-8A and RF-101 overflights provoked Soviet and Cuban soldiers on the ground and serve as 'psychological reminders, (...) [a 'hooliganism' which] became an effective pressure tactic and negotiating tool for the removal of all offensive weapons, and a guard against their reintroduction.'²⁶

Taking into account the nature of the crisis and its implications on the Cold War, the US had to convince the world with irrefutable evidence that the Soviets had deployed unacceptable weapons on Cuban soil. However, even though the U-2 photos could be analysed by photo interpreters, their poor resolution was not ideal for direct consumption.²⁷ The cogency of American photographic evidence was therefore especially important at the presentation to the UN on 25th October. Although low-level aerial reconnaissance only began on 23rd October for strategic reasons explained earlier, details of the presentation to the UN Security Council suggest that the American ambassador to the UN, Adlai Stevenson must have used photos taken by low-level aerial reconnaissance carried out by VFP-62 to convince the council. Ecker and Jack highlighted phrases such as 'even an eye untrained in

photographic interpretation can clearly see,' 'these photographs are on a larger scale than the others,' 'these enlarged photographs clearly show,' and 'the next photo shows a closer view', to demonstrate that low-level photography were used in his presentation.²⁸

As James M. Lindsay described the impact of aerial photography on the Security Council:

Stevenson [asked Valerian Zorin, the Soviet ambassador]: "All right, sir, let me ask you one simple question: Do you, Ambassador Zorin, deny that the U.S.S.R. has placed and is placing medium- and intermediate-range missiles and sites in Cuba? Yes or no—don't wait for the translation—yes or no?" When Zorin refused to answer, Stevenson snapped: "You can answer yes or no. You have denied they exist. I want to know if I understood you correctly. I am prepared to wait for my answer until hell freezes over, if that's your decision. And I am also prepared to present the evidence in this room" With Zorin still continuing to refuse to answer, Stevenson's aides proceeded to produce large photos of the Soviet missiles in Cuba. The delegates in the room, and everyone watching on television, saw the Soviets unmasked as liars. Zorin could only simmer. The mild-mannered Stevenson had scored an enormous political and diplomatic victory for the United States.²⁹

Taking into account the nature of the crisis and its implications on the Cold War, the US had to convince the world with irrefutable evidence that the Soviets had deployed unacceptable weapons on Cuban soil.

With the help of low-level aerial photography, the objective to mobilise the international community to pressure the Soviets into a retreat was achieved. But the Soviet missiles were still in Cuba—a diplomatic solution between the two superpowers was still necessary.

On 26th October, 'a 48-hour moment for decision was approaching' for the president. This evaluation was based on (1) the president's daily consultation with IMINT over the operational state of the missiles, (2) the observation that no Soviet ship had challenged the quarantine since 24th October, and (3) the pressure from his advisors to act with an airstrike no later than 29th October.³⁰ However, a more profound examination of the 27th October intelligence report to ExComm revealed an analysis almost entirely supported by the analysis of aerial photography.³¹ More importantly, the report was based on analysis from photos taken on 25th October, or information from two days ago! All these point towards the phenomenon of analysis delay: due to a significant delay from the collection of raw information to the time necessary for analysis and



Figure 3: Map showing the location of SAM, SSM, and Aerodrome sites during the Cuban Missile Crisis of 1962

finally the presentation of intelligence, the intelligence itself, once presented to ExComm, could often be incomplete, misinterpreted, or simply wrong.

The window of decision between 26th to 28th October was therefore much influenced by what IMINT could reliably provide, and such over-reliance could have proven costly: during the crisis, the photo interpreters never managed to find firm evidence of the nuclear warhead storage sites. The photos of the actual sites, Bejucal and Managua, were taken but as Ecker and Jack wrote, ‘security around the actual nuclear storage sites was so primitive, they were ignored.’³² Moreover, the CIA ‘grossly [underestimated] the number of Soviet troops in Cuba (10,000 versus an actual 43,000). Gathering this kind of intelligence show have been accomplished by HUMINT, not aerial reconnaissance.’ Although these weaknesses were identified during the crisis, nothing was done to resolve the excessive dependence towards IMINT compared to HUMINT. When members of ExComm read the report of 27th October, they would not have been cognisant of the origin and reliability of the analysis made. The Cuban missile crisis was resolved in a diplomatic manner, but had the US decided to intervene militarily, these estimates could have proven disastrous.

Fortunately for the world, Kennedy’s reserve eventually bore its fruits. On 28th October, Khrushchev announced on Radio Moscow that the ‘offensive’ Soviet weapons in Cuba would be dismantled and returned to

the USSR. In actual fact, the crisis was defused by a secret agreement between the US and the USSR to remove all American nuclear missiles in Southern Italy and Turkey in exchange for the removal of all Soviet nuclear missiles in Cuba.³³ But the end of the crisis did not signal the end of low-level aerial reconnaissance. The missions continued until mid-1963 for the purpose of verification.

LOW-LEVEL IMINT: MORE THAN MEETS THE EYE

“Over the long run, the prospect of preserving intelligence and policy in their most constructive orthodox roles will depend on the real-life resistance which intelligence officers apply to these pressures, as well as to the self-imposed restraints which impede the policymakers from originally exerting them.”

–Thomas Hughes, during his farewell address at the US State Department’s Bureau of Intelligence and Research in 1969.³⁴

While low-level aerial reconnaissance as a tactical concept may no longer be as applicable today, its involvement in the Cuban Missile Crisis highlighted:

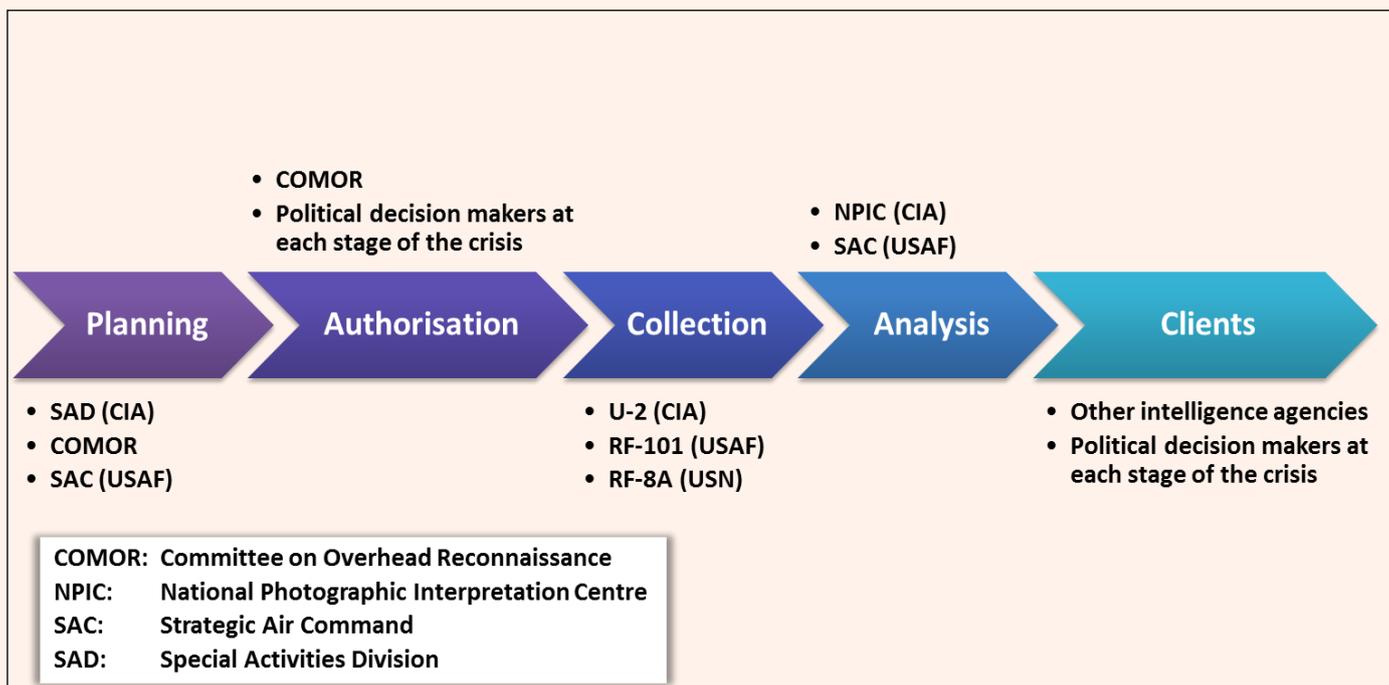


Figure 4: Principal actors in the cycle of American Imagery Intelligence

(1) how the reality faced by ExComm was a far cry from public belief of a masterful handling of the crisis, (2) the dangers of over-reliance on IMINT, and (3) the intricacies of intelligence operations that policy makers are not always aware of. As the analysis of low-level IMINT during the crisis has shown, details such as security classifications, inter-service competition, bureaucratic handles, distribution lapses, and technical difficulties all combine to affect the quality and timeliness of intelligence (see *Figure 4*). As such, it is important that intelligence processes are constantly reviewed and improved upon to prevent lapses similar in nature to those that occurred during the Cuban Missile Crisis. With the continual expansion of the Command, Control, Communications, Computer, Intelligence, Surveillance and Reconnaissance (C4ISR) domain, advancements in IMINT and Signals Intelligence (SIGINT) present not only introduce technical challenges but also cultural challenges in the form of attitudes and reputations.

As such, it is important that intelligence processes are constantly reviewed and improved upon to prevent lapses similar in nature to those that occurred during the Cuban Missile Crisis.

From the planning of airstrikes to the presentation at the UN Security Council, we also observe the general trend of analysts giving more credit to scientific forms of intelligence compared to HUMINT. However, the reader should not be led to think that it was a lack of HUMINT which had to be compensated by other intelligence means. The problem comes from the difficulty of appreciating the credibility of HUMINT from Cuba over short timeframes. In other terms, electronic and photographic collection is relatively simple to validate and analyse because the sources of misinformation and deformation can be readily identified and understood, whereas the process is much more problematic for HUMINT. From the initial impact

of U-2 photos on the discovery of Soviet missiles, ExComm favoured the use of IMINT in the formulation of strategies. The accessibility of IMINT compared to HUMINT had increased not only its probability of being employed by decision makers, but also the willingness of the intelligence apparatuses concerned (such as the CIA and the USAF) to adapt their reports and estimates accordingly. The impact of IMINT during the Cuban Missile Crisis was arguably amplified by the favours it received, thereby creating a disequilibrium between its impact and its actual merits. As the misestimates over nuclear warhead storage sites and troop numbers have shown, this disequilibrium produced analysis errors which could have had proven disastrous. In this age of analytics and big data, the Cuban Missile Crisis teaches us that it is important for policy makers and intelligence organisations to continue practising a balanced approach towards the newer forms of collection and analysis methods.

CONCLUSION

Today, the pace of deliberation by ExComm over two weeks seems almost glacial compared to the modern intelligence cycle. In collection, we have progressed from black-and-white photography to persistent satellite imagery. In decision, we have progressed from the challenge of information delay to the challenge of information saturation. Yet some things remain unchanged. This essay sets out to establish lessons learnt from IMINT during the Cuban Missile Crisis. One is the significant impact of IMINT on the strategic decisions behind the blockade as well as the planning of eventual air strikes. We also learnt that this impact was a huge risk once the over-reliance on IMINT and the deficiency of HUMINT were understood. From the analysis of *Operation Blue Moon*, we also learnt that the successful collection of low-level aerial photography over Cuba was far from well-planned. But the most important lesson comes from observing the behaviour and interactions between the actors responsible for the planning, authorisation, collection, analysis and consumption of intelligence. Over fifty years later, the crisis still represents not only an important moment of the Cold War, but also a guide on the management of intelligence in general.

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ENDNOTES

1. Ecker, William B., Jack, Kenneth V., *Blue Moon Over Cuba*, (Osprey Publishing Company, 2012), p. 5
2. Eisenhower's foreign policy was marked by a CIA involved in assassinations and coups d'états, such as Operation Ajax (Iranian coup d'état in 1953) and Operational Pbsuccess (Guatemalan coup d'état in 1954), but his preoccupations with the Soviet Union and the difficulty of obtaining information from the closed society of the USSR drove him to pursue intelligence solutions based on advanced technology. The Director of CIA during that period, Allen Dulles, was able to expand the budget and influence of the CIA significantly throughout the 1950s thanks to a cordial relationship with the President as well as the fact that the Secretary of State was his brother, John Foster Dulles. Eisenhower's authorisation to purchase and deploy the U-2 is one such example, where the President's fascination with air intelligence from his past as the Supreme Commander of the Allied Forces in World War II might have been important as well.
3. Pocock, Chris, *50 Years of the U-2: The Complete Illustrated History of Lockheed's Legendary Dragon Lady*, (Schiffer Publishers Ltd, 2005), p. 12-31.
4. The "bomber gap" refers to an unfounded fear in the United States during the Cold War that the Soviet Union was superior in the deployment intercontinental strategic bombers in the late 1950s. Widely accepted for several years, the gap was used to justify a strong growth in military spending. The "missile gap" was the term used to describe the perceived difference between the number and power of ballistic missiles between the United States and the Soviet Union during the Cold War. The National Intelligence Estimate (NIE) 11-5-58 in 1958 predicted that the USSR could be equipped with 500 Intercontinental Ballistic Missiles (ICBM) by 1962, but with photographic proof from U-2 overflights, the NIE 11-8/1-61 three years in 1961 estimated that the USSR had no more than 25 ICBMs. In contrast, the US had about 180 ICBMs during the Cuban Missile Crisis.
5. The CIA had assured President Eisenhower that the flight altitude (70,000 feet) would render the U-2 invisible to Soviet radars, although a study from the Office of Scientific Intelligence (OSI) in the CIA had concluded otherwise. Not surprisingly, the first flights in July 1956 were detected and followed by Soviet protests. However, it is difficult to judge if the anti-air system of that period, the SA-1, was capable of intercepting an aircraft at such an altitude. Oleg Penkovsky, a colonel from the Soviet GRU who spied for MI6, mentioned that this was indeed the case. The successor to SA-1, the SA-2 which was responsible for shooting down the U-2 of Gary Powers in 1960, only began installation in 1957 and it took no less than 14 missiles to strike the target. Moreover, the analysis of the crash revealed that it was likely the shockwave from the missile's explosion and not a direct hit which caused a loss of control of the U-2, an explanation supported by Gary Powers himself. For the OSI report, see Pedlow and Welzenback, *The CIA and the U-2 Program, 1954-1974*, (DIANE Publishing, 1998), p.95. For the effectiveness of Soviet missiles to strike the U-2, see Penkovsky, Oleg, *The Penkovsky Papers: The Russian Spy who Spied for the West*, (Collins, 1996), p.264. Concerning the number of missiles fired, see *ibid.* p.264-266. For the statement from Powers, Gary, see Powers, Francis Gary, with Curt, Gentry, *Operation Overflight: A Memoir of the U-2 Incident*, (Potomac Books Inc., 2004), p.60-62.
6. His choice to tackle the problem with this configuration can be explained by his experience in the Bay of Pigs debacle, caused by a poor appreciation of the situation in Cuba. After the embarrassing error, Kennedy believed that foreign policy should be centralised in the White House, and not in the State Department.
7. Allison, Graham T., Zelikow, Philip, *Essence of Decision: Explaining the Cuban Missile Crisis*, (Longman Publishing, 1999), p.339-340
8. Bernstein, Barton J., "Cuban Missile Crisis", In *Encyclopaedia of U.S. Foreign Relations*, (Oxford University Press, 1996), p.391. Cited by Barrett and Holland, p.24.

9. The complex process of deliberation is not the subject of this study, but a useful presentation can be drawn from the work of Allison and Zelikow, *ibid.*, p.225-228, 339-347. In summary, in the beginning the Joint Chief of Staff (JCS) Maxwell Taylor proposed an invasion or at least an airstrike, while the Secretary of Defence Robert McNamara proposed a blockade to prevent future deliveries of weapons to Cuba, accompanied by negotiations. In the end, four options were presented: a blockade-negotiation, an airstrike, a blockade-airstrike, or UN intervention; each option its own advocates. For Kennedy, the difficulty of an offensive option was partly moral but mainly politic, including the risk of retaliation against Berlin and the scale of an international crisis with her allies if the United States was to blame for the start of a war to defend Berlin. For him, with the absolute superiority of the United States in the hemisphere weighing on negotiations, the blockade-negotiation option was the most attractive.
10. Barlow, Jeffrey G., *Some Aspects of the US Participation in the Cuban Missile Crisis*, (*Naval Historical Center*, 1992), cited by Ecker and Jack, *ibid.*, p.61.
11. Allison and Zelikow, *ibid.*, p. 230.
12. McAuliffe, Mary S., *CIA Documents on the Cuban Missile Crisis*, (*DIANE Publishing*, 1992), p.183.
13. *Ibid.*, p.176-177.
14. Robert F. Dorr, U-2 Pilot Maj. Rudy Anderson: The Only American Killed during the Cuban Missile Crisis, *Defense Media Network*, <https://www.defensemedianetwork.com/stories/u-2-pilot-maj-rudy-anderson-the-only-american-killed-during-the-cuban-missile-crisis/>
SteelJaw, October's Missile Crisis and BLUE MOON, *U.S. Naval Institute Blog*, <https://blog.usni.org/posts/2009/10/11/octobers-missile-crisis-and-blue-moon>
15. Flying below the effective altitude of the SA-2 SAM (1,500 feet) and using the terrain, these aircraft combined both surprise and detection. They were even able to fly above the speed of sound before entering and after leaving the area of operations (although the photos would have been taken at slow speeds due to technical limitations). Zaloga, Steven, *Red SAM: The SA-2 Guideline Anti-Aircraft Missile*, (*Osprey Publishing*, 2007), p.28-29. Ecker and Jack, *ibid.*, p.83-87.
16. The KA-53 were capable of taking low-level photographs, but below 500 feet, the blur caused by the movement of the image at high speeds was too significant for any useful interpretation. Gordon, Doug, *Tactical Reconnaissance in the Cold War*, (*Pen and Sword Aviation*, 2006), p. 179-180.
17. McAuliffe, *ibid.*, p.39.
18. *Ibid.*, p.40-41.
19. By day eleven of the crisis, the photos provided would have been too late to influence the critical decisions leading up to the blockade as well as the presentation to the United Nations. Ecker and Jack, *ibid.*, p.116-120.
20. A few months before the crisis, the VFP-62 tested the KA-45 camera in a carrier environment and developed methods to produce photographs of good quality while flying at high speeds and at an altitude between 1,000 and 1,500 feet. For the preparation of VFP-62, see *ibid.*, 95-112; Brugioni, Dino, *Eyeball to Eyeball: The Inside Story of the Cuban Missile Crisis*, (*Random House*, 1990), p.369-372.
21. Ecker and Jack, *ibid.*, p.88-89.
22. The U-2 photographs were sent to a photo laboratory to make copies for all the aircraft carriers and the AIC had planned to send them to the US Navy. However, the director of AIC declared that someone from the CINCLANT headquarters had said that whoever sent those photos would be court-martialled. In retrospect, the 'someone' from CINCLANT headquarters might have made the wrong judgment as to the importance of the photographs to the US Navy's mission on October 23. As a result, the photos were left in the office for several days. Hocutt, William T., *Cuban Missile Crisis 1962*, unpublished, p. 46-52, cited by Ecker and Jack, *ibid.*, p. 92-93.

23. The photos taken by VFP-62 on 25 October on the central region of Cuba showed that the Soviets had deployed tactical missiles which could be employed with nuclear warheads. On 26 October, the photos taken showed that one of the MRBM sites in San Cristobal could be operational. For the report on the tactical missiles, see Michael Dobbs, *One Minute to Midnight*, (Random House, 2009), p. 455. For the MRBM site, see McAuliffe, *ibid.*, p. 313-314.
24. May and Zelikow, *ibid.*, p.403
25. Thus, as May and Zelikow pointed out, Robert McNamara reported to the president on 25 October that “we’re moving to a position now, where we can attack those missiles and have a fair chance of destroying them with very few aircraft.” May & Zelikow, *ibid.*, p. 403.
26. Ecker and Jack, *ibid.*, p.223; Memorandum of Conversation, (*National Security Council*, 1962), 1640-1955hrs, FRUS, Document 218
27. During the ExComm meeting on 18 October, when asked if the non-initiated could be persuaded that the U-2 photos showed MRBM sites, Arthur Lundahl, the chief of the NPIC, replied: “probably not, and that we must have low-level photography for public consumption.”. McAuliffe, *ibid.*, p. 183.
28. Ecker and Jack, *ibid.*, p.129
29. Zegart, Amy, “The Cuban Missile Crisis as Intelligence Failure”, (*Policy Review*, 2012), <http://www.hoover.org/publications/policy-review/article/128991>, [Accessed 4 February 2016]
30. The situation was equally tense on the Soviet side, as Khrushchev began to soften his position while demanding the approval of the Soviet Presidium for an offer to retreat the missiles if the United States promise not to invade Cuba. Ecker and Jack, *ibid.*, p. 148; Fursenko, Aleksandr, Naftali, Timothy, *One Hell of a Gamble : Khrushchev, Castro, and Kennedy, 1958-1964*, (W.W. Norton, 1998)
31. A summary of the report can be drawn from Ecker and Jack, *ibid.*, p.147. The key points from the report are: on 25 October, (1) there was no evidence indicating any intention to halt construction, dismantle or move the missile sites, (2) five out of six MRBM sites were believed to have full operational capabilities, (3) the Soviets had the capability of launching up to 24 MRBMs within six to eight hours of a decision to do so, and a re-fire capability of up to 24 additional MRBMs within four to six hours, (4) a total of 33 MRBMs observed, and (5) no high-altitude coverage suitable for searching the Remedios area, where IRBM sites were being constructed, had been conducted since 22 October. With the exception of the second point which was supported by ELINT, the key points of the report relied on IMINT for estimates. For the original report, Supplement 7 to Joint Evaluation of Soviet Missile Threat in Cuba, (*CIADOCS*, 1962), see McAuliffe, *ibid.*, p.323-326.
32. Ecker and Jack, *ibid.*, p.229. At the start of the crisis, the CIA estimated that the *Bejuca* site was the best candidate for storing nuclear weapons and marked the site for surveillance in a report to the president on 16 October. However, on 22 October, the CIA had turned its attention on another site close to *Marief* which indicated higher levels of security. The photos of *Bejuca* and *Managua* were still taken during the second week of the crisis but the analysts did not pay much attention to them due to the lack of visible security. The actual nuclear storage sites were revealed by Michael Dobbs after he compared interviews with Soviet commanders and photographic evidence in his work, *One Minute to Midnight*. For the 16 October report, see USAF, ‘Suspect Missile Sites in Cuba’, (*National Security Archive*, 1999), <http://www.gwu.edu>, [Accessed 7 Feb 2016]; for the 22 October report, see Dobbs, *One Minute to Midnight*, p. 64.
33. President Kennedy secretly assured the Soviet ambassador, Anatoly Dobrynin, that the American missiles would leave Turkey in four to five months, but this *quid quo pro* could not be acknowledged publicly. Chang, Laurence, Kornbluh, Peter, *The Cuban Missile Crisis, 1962: A National Security Archive Documents Reader*, (*New Press*, 1999), <http://www.gwu.edu>, [Accessed 5 Feb 2016]. ‘Memorandum for the Secretary of State from the Attorney General, on Robert Kennedy’s October 27 Meeting with Dobrynin,’ 30 October 1962, *ibid.*, ‘Dobrynin Report of Meeting with Robert Kennedy on Worsening Threat’, 27 October 1962, *ibid*
34. Hughes, Thomas L., *The Fate of Facts in a World of Men: Foreign Policy and Intelligence-Making*, (*Foreign Policy Association*, 1976), p. 27.



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