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Blinding the Eagle:
Potential Loss of Strategic ISR in the 21st Century

By

Matthew "Gritts" Sartori, Major, USAF

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Advisor: Mr. Michael P. Ivanovsky

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Preface[1]

I have been in the Air Force since 2003. I transitioned from the C-130H to the U-2 in the winter of 2012. I have thoroughly enjoyed the Intelligence, Surveillance, and Reconnaissance mission since that time. When I showed up for upgrade I spoke several times with members of the community who had been told before that the aircraft would be retired, that it was a 'sunset' program, but before it could happen, needs of the Air Force pulled it back to service. They conveyed that they had little concern if the aircraft went away, so long as the replacement filled the shoes. Their and my interest has been in providing the best product possible. It makes a difference, at the end of the day, in the lives of soldiers in the field. All of the strategic concerns aside, and I feel there are many, the ability to support them is what matters. If we do it right, instruments of national power will successfully keep that soldier from the field. If we do it wrong, we will fail him or her there.

Abstract

Anti-Access/Area-Denial (A2/AD) is a" modern [term] referring to warfighting strategies focused on preventing an opponent from operating military forces near, into, or within a contested region."[2] War against future enemies who employ platforms that deny US electro-magnetic capabilities and use cyber war will make the 'manned' high-altitude Intelligence, Surveillance, and Reconnaissance platform a necessity in achieving victory in A2/AD operations. Contested, denied, operations encompass those operations in which the ability of a unit or platform to operate within a specified domain is either contested or denied by adversarial forces in the same or adjacent domains. This paper proposes, as law stipulates, that the U-2 cannot be divested until a truly capable replacement exists, which RQ-4, by design constraints, cannot become due to gaps in technology and cyber security.

H.R. 1735 Report (5 May 2015) noted that "While the committee realizes that the Department can never fully meet the ISR demand of Combatant Commanders, reasonable and necessary ISR requests appear very likely to go unfilled if the current high-altitude airborne ISR collection capabilities of the U-2 are terminated."

This paper compares current high-altitude platforms' abilities to execute in permissive and contested environments and thus their ability to affect an A2/AD campaign. It dissects current budget information as well as national level guidance to shape recommendations on how to proceed to ensure success for Air Force 2030.

Island Denial Warfare—an Isolated Introduction

"Battles are won by slaughter and maneuver. The greater the general, the more he contributes in maneuver, the less he demands in slaughter."

-- Winston Churchill, *The World Crisis*, 1923

The United Kingdom's 20th Century military experience is unique as it provides examples of a nation that was able to muster and defeat an Anti-Access/Area-Denial (A2/AD) strategy through their ability to pierce the fog of war. A2/AD is a "modern [term] referring to warfighting strategies focused on preventing an opponent from operating military forces near, into, or within a contested region."[3] In WWII Chain Home Low allowed the Royal Air Force to see inbound Luftwaffe fighters. In the Falklands, Argentine naval forces inability to remain underway hampered their ability to know the disposition of British naval forces, and to employ their deadly Exocet missiles against British aircraft carriers.[4] The Brits on the other hand, were supplemented by United States (US) Satellite reconnaissance in finding enemy forces.[5] They won based on their ability to achieve dominant battlefield awareness (DBA) through application of intelligence, surveillance, and reconnaissance (ISR).

Moving forward, US forces were able to overwhelm their adversaries during the '91 Liberation of Kuwait. The long term strategic impact of follow-on actions is still playing out, but that aside, it is important to note that other countries have been watching. China, for example, was very critical of the way that Iraq handled the build-up of US forces leading up to the liberation.[6] What's more, as China moves forward the People's Liberation Army has taken to viewing the ideal course of action (COA) for handling future hostilities with the US as waging an A2/AD campaign.[7] Present leaders consider that Iran may have reached similar conclusions.

Western military leaders see their profession as an extension of politics. As such, when considering the political importance of the Strait of Hormuz, winning against an adversary who employs an A2/AD strategy must be a reality. Future leaders paying mind to the 'Pacific Pivot,' and given China's review of '91, should consider Taiwan and current actions involving 'freedom of navigation' as part of a future that may include A2/AD. To reduce the US ability to counter these A2/AD strategies, adversaries may contest and deny operations (CDO). CDO encompasses those operations in which the ability of a unit or platform to operate within a specified domain is either contested or denied by adversarial forces in the same or adjacent domains. If that is the future, how do we learn from the Brits and ensure victory?

The Value of ISR

"Know the enemy and know yourself…you will never be in peril"

--Sun Tzu, *The Art of War*

If you consider the fates of the Falklands and the Battle of Britain, it is clear that when a nation chooses to participate in A2/AD warfare, ISR is a key part. But, not all ISR assets are alike. Because of their inherent use for strategic ISR applications, high-altitude ISR, or HAISR, platforms will be at the center of this discussion. The MQ-1 while providing unique, valuable intelligence, usually in the form of Full Motion Video, can have a strategic impact but its operations are generally tactical in scope. HAISR includes all platforms that operate above 50K' for the majority of their collect. While this term includes the SR-71, for this discussion it will collectively refer to both the U-2 and RQ-4. It should not be confused with National Technical Means, whose operators would consider 50K' being synonymous with high as laughable. For planners, the value brought by strategic ISR as a step in joint intelligence preparation of the

operational environment is immeasurable. This is significant considering one of these platforms is slated for divesture.

A Case Against Singular Tech Dependence

HAISR is an essential piece of determining an opponent's military strategy. At present the US utilizes two main HAISR platforms, the U-2 and RQ-4. Future developments are advertised to make the only difference in these platforms the issue of manned versus unmanned. The reality is that Combatant Commanders need the **best ISR possible**. Attempting to update a weapon system like the RQ-4, not capable of providing just that, will demand an unaffordable opportunity cost. *War against future enemies who employ platforms that deny US electro-magnetic (EM) capabilities and use cyber war will make the 'manned' HAISR platform a necessity in achieving victory in A2/AD operations.*

In supporting this assertion, this paper will first define the concerns for the current and future operating environment through the context of national command authority (NCA) guidance. It will include a discussion of ISR and what to or not to expect from ISR. It will present the challenges that platforms face in both permissive and non-permissive environments and will give an overview of two HAISR platforms currently employed by the US, and their roles in those environments. It will discuss how these platforms operate and deliver their product to the end user. It will then talk about on-going pursuits to improve these platforms and what the Department of Defense hopes to achieve. Finally, it will make predictions based on available data to provide possible forward COAs.

INT—Intelligence

"And ye shall know the truth, and the truth shall make you free"

--John VII-XXXII (inscription on the entrance to the Central Intelligence Agency)

"It is a nice sentiment, but overstates…what is going on."[8] This sentiment, overstatement, is at the heart of what is often lost in considering intelligence. Intelligence is not the truth. It is an interpretation of information, based on the ability to make a prediction of future actions. To that end, for the military, it provides targetable and actionable information that can enhance the warfighter's mission and save lives. In doing so those asking for intelligence are forced to prioritize. In asking for information about the emerging environment, it is the burden of the commander to determine what is not important. Because, if everything is important, then nothing is important. Collection is the means though which analysts acquire exploitable intelligence. In the military this collection is ISR. ISR produces INT (intelligence producing mediums) in a variety of disciplines.[9] Geospatial and imagery intelligence (GEOINT and IMINT) provide visual products that inform the analyst about the earth and features that exist on it. This may include stills or full motion video (FMV) in a variety of bands of the electromagnetic spectrum. Communications and Electronics outputs collectively form the basis for signals intelligence (COMINT, ELINT, SIGINT). Cyber intelligence (CYBINT) uses computers, as the access point to the cyber domain, as the sole platform for collection.[10] When two or more disciplines are combined the result is MULTINT, which should not be confused with 'all source' (which, in a perfect world, pulls from all mediums). These go from collection to use through the architecture of processing, exploitation, and dissemination (PED).

National direction

The military is one of the four key instruments of power; accordingly ISR is where the instruments of military and information meet. The National Security Strategy (NSS) states that "all our tools are made more effective by the skill of our intelligence professionals and the quality of intelligence they collect, analyze, and produce." It goes on to say that "Although our military will be smaller, it must remain dominant in every domain…We will protect our investment in foundational capabilities like the nuclear deterrent, and we will grow our investment in crucial capabilities like cyber; space; and intelligence, surveillance, and reconnaissance. "[11] The National Military Strategy (NMS) echoes this in stating that "globally integrated operations…rely upon…ISR capabilities."[12] Furthermore, Military Defense of the Homeland (#2 of Joint Force Prioritized Missions, #1 being Nuclear Deterrence) is similarly reliant on such capabilities.[13] It is clear that the President and Chairman of the Joint Chiefs of Staff value ISR, but it is necessary to frame future capabilities and clarify global integration of operations.

Global Integrated ISR

NSS, for the operations piece, places heavy emphasis on continued work against Da'esh, in coordination with the Gulf States. It also alludes to efforts to keep Russia at bay with European partners. Additionally, in conjunction with 'Pacific rebalancing' it discusses the challenges with China given all of the regional territorial disputes.[14] Finally, it addresses concerns in Africa. The NMS differs little in that it only expands the concerns to include North Korea, along with other rogue states as the keys to regional instability. What is of note in the NMS is that while "the probability of US involvement in interstate war with a major power is assessed to be low but growing," 'hybrid' conflicts may become the new norm.[15] "Hybrid

conflicts serve to increase ambiguity, complicate decision-making, and slow the coordination of effective responses."[16] The added danger of hybrid conflicts is, because they have state sponsorship, however hidden, their ability to conduct CDO will be ever higher.[17]

Current AF doctrine views ISR as part of global integrated ISR, much in the understanding that information not being fed to a decision maker is useless. This starts with integration into the Joint Operation Planning Process and moves forward into all phases of operations. Products are expected to have certain tenants by which they gauge their effectiveness.[18] It needs to be relevant, meaning it provides a product that is aligned with the users' needs. It needs to be timely, as will be discussed most assets operate with a goal of 'near-real time.' Next that data must meet a paradox in terms, it must both be secure and accessible, relative to those who the joint force thinks needs it. It is defined to be and provides "cross-domain synchronization and integration of the planning and operation of ISR assets; sensors; processing, exploitation and dissemination systems; and, analysis and production capabilities across the globe to enable current and future operations."[19]

Environments

Permissive Environments

The fact that the Afghanistan IADS was negligible and the "Iraqi radar [became] a no-show in the 2003 [Iraq] campaign,"[20] means that US Air Forces have been fighting in a relatively permissive, free from kinetic threat, environment for over 10 years. But, a permissive environment still brings threats or at least noteworthy concerns. The first of these is weather. In addition to obvious concerns like thunderstorms there are seemingly innocuous events that can make a big impact on collect. Dust storms or fog can obscure an area from being seen by non-

radar IMINT sensors. Even thermal crossover can make collection ineffective at times. For an ISR collector icing or severe weather may deny an area targeted for collection. Potentially, an asset may not be able to remain on station collecting as weather at the recovery field could deny safe return at the scheduled time. Far from a threat, but still a consideration even in permissive environments is maintenance. Platforms which conduct ISR normally require highly sensitive equipment. This may be complicated if they operate in abnormally harsh environments. The other concern is that with a modular platform that has a limited number of expensive components the maintenance required to swap out components may be extensive. Another concern is that many ISR platforms, due to the areas they operate, especially over the open seas, do so under the condition of 'Due Regard.' As they must remain in 'Visual Conditions' during this time, and receive reduced or no Air Traffic Control support See-And-Avoid considerations from other platforms are of significant concern. For a manned platform this can be a challenging task, but it is more complicated for a platform where the ability of the pilot to see outside of his or her aircraft is generally negligible. They then need off-board cueing in order to safely operate in 'Due Regard.' The final concern for permissive environments is one that borders on qualifying it as non-permissive, as it is the transition to CDO. That is actions, by collection targets, that occur in adjacent domains that complicate or degrade an ISR platform's ability to collect. This may be as simple as GPS jamming or decoys or as complex as radar jamming. In any case all of these problems complicate the solution for a collection asset and may give an edge to the adversary.

Non-permissive environments

ISR does not always occur against an insurgent threat or enemy who is not hostile. In truth ISR must be able to operate in the full range of military operations to include reconnaissance in support of nuclear operations (RISNO). Traditionally these threats in these

environments engage the platform in the same domain in which it is operating. Integrated air defense systems (IADS) can prove highly effective at stopping an asset. It is for this reason that the AF utilized platforms like the RF-4, that had the agility of a fighter, and the SR-71, that had the speed to complicate any enemy's targeting solution. While the non-permissive (potentially wartime) environment is one that the AF trains against, it has certainly not been a major part of the mission set for the last ten years. Looking toward future operations there are two considerations that have to be valued. The first of these is the cyber domain. On a platform where all control is performed remotely, though computer terminals, the impact of a cyber-attack could be devastating. If that is coupled with a complete HAISR reliance upon remotely piloted aircraft then platforms used for warfare become critical vulnerabilities. This would be happening "at a time when our adversaries' strengths are in cyber-attack and industrial espionage."[21] The second is data-link jamming, which could disrupt the ability of controllers to continue to make inputs. The RQ-170 incident in Iran, gives concern, though Iran's claims of hacking the system were refuted.[22] However, a 2014 RAND report indicates that the Russians, performing hybrid conflict operations in Crimea, were able to sever the link between platform and operator in March of the same year.[23]

ISR Platforms

Manned vs. Unmanned, a contradiction?

Manned aircraft are those that have a pilot that provides direct control input from within. Unmanned, akin to the common vernacular 'drone,' is a bit of a misstatement. Platforms like the RQ-4 are far from unmanned, as their manning matches or at times exceeds their functional counterparts, though the professionals who provide their control input do so remotely. This is important for three reasons. First, the unmanned nature of the remotely piloted aircraft does not

reduce the manning burden. Second, while the pilot is not directly in harm's way, the data-link he or she uses to communicate with it presents a separate set of risks, such as the link itself or delay between controller and aircraft. Finally, while the remote nature of piloting certain aircraft reduces certain burdens upon the pilot, it can be argued that spatial cues, un-synthetic sensations, and 'skin in the game' are all potential benefits worth keeping. All things being equal, "[the Air Force] will require always manned platforms, since computers can never achieve autonomy - the ability to make decisions in new situations."[24]

U-2

"There is no way to replace the vital data provided by piloted airplanes...No president or intelligence agency should have to operate with only one eye in such an uncertain and dangerous world."

--Richard Helms (Former Director of the CIA)

The U-2 has been a part of the ISR and national security discussion since 1955. Its existence was brought forward after the shoot down of Gary Powers over the Soviet Union May Day, 1960. Since then the aircraft that was designed to be a two-year project has undergone multiple adaptions to remain a relevant tool of Combatant Commanders. The platforms flown today are of the same vintage as later 4th-generation fighters, being delivered in October of 1989. In 1994 the airframe was overhauled and the U-2S, which utilized the new GE F118-101 engine, became the standard for HAISR. They keep their predecessors claim of 'above 70K' for 'over 14 hours.' The AF went a step further completing the U-2 Cockpit Altitude Reduction Effort (CARE) in June of 2013.[25] This effectively lowered cabin altitudes from around 29K' to 15K', lowering the chance of De-compression Sickness (DCS) and making sustained operations safer. As of this writing there have been no incidents of DCS while a pilot was flying a CARE jet. That said, Air Combat Command still limits the Flight Duty Period for single seat aircraft to

12 hours.[26] However, mission requirements have allowed an extension frequently to 14 hours, not what an unmanned craft can accomplish, but substantial, especially given the speed of the U-2.[27] Further keeping the pilot safe the aircraft has fielded the BAE AN/ALQ-221 defensive suite since 2005.[28]

The airframe being what it is, its raison d'être is to put sensors over a collection point. Much as the aircraft has evolved over the years, so have the sensors. While it first was equipped with only a camera, the IMINT collection was soon expanded to include a Synthetic Aperture Radar and an Electro-Optical Infrared (EO/IR) collection sensor. As of "1996 the House Intelligence Committee directed a budget increase of $57 million"[29] for improvements to the sensors. This included the ASARS (Advanced Synthetic Aperture Radar System), SYERS (Senior Year Electro-Optical Reconnaissance System), and OBC. "ASARS-2A is normally employed in a tethered mode of operation, which allows transmission of data in near real-time via data link for exploitation of the collected imagery"[30] The SYERS-2B is currently fully fielded, with an upgrade to -2C that began in 2014.[31] This upgrade "features the latest in multi-spectral technology and increases the spectral resolution and image interpretability beyond that of the baseline system - which already provides the longest range on the National Imagery Interpretability Rating Scale (NIIRS)"[32] The OBC, does provide a film product that is easily disseminated, but it is PED intensive. On the SIGINT side, U-2s carry the Raytheon Remote Airborne Sensor (RAS-1R)[33] as well as Northrop Grumman's Airborne Signals Intelligence Payload (ASIP).[34] All of this can be passed from the U-2 to the Distributed Ground System for PED via the Dual-Data Link 2 (DDL2)[35].

RQ-4

"The next war may be fought by airplanes with no men in them at all…

Take everything you've learned about aviation in war, throw it out of the window,

and let's go to work on tomorrow's aviation."

– General H. H. 'Hap' Arnold

In 1994, Teledyne-Ryan sought to win the contract for a High Altitude Long Endurance vehicle.[36] Northrop Grumman has since acquired Teledyne-Ryan and the RQ-4 Global Hawk (GH) has moved a long way since the nascent capability that existed in the 90s. The Block 30 of today advertises a 60K' maximum altitude, with a 24-hour on station endurance time.[37] Its crews perform their control of the GH through two sets of crews. A Launch and Recovery Element (LRE) is co-located with the launch point of the GH and provides support as its name implies. The Mission Control Element (MCE) provides command and control of the platform once the mission is underway. While crew rest constraints are similar to that of the U-2, the ability to cycle pilots in and out of the LRE and MCE means that the only limitation of duration is the aircraft, not the pilot.

For collection the GH currently utilizes the Enhanced Integrated Sensor Suite (EISS) for synthetic aperture radar/moving target indicator (SAR/MTI) or EO/IR sensor. The GH couples the EISS with ASIP.[38] Continued conversation has stated that the GH does not provide an ISR product comparable to the U-2. In response to this, Northrop Grumman (NG) began flight tests of their 'Universal Payload Adapter' that will allow them to use SYERS-2 (amongst others), of note within AF the 'Adapter' is being called the ISR Payload Adapter (IPA). This first test began December 2015. NG says it "expects to receive an operational sensor from the service

[USAF] next month that it will test and fly on the RQ-4B, 'to validate the ability of Global Hawk to seamlessly integrate into the USAF tasking, collection, processing, exploitation and dissemination Architecture.'"[39] Regarding the See-And-Avoid concern, the AF is leading an effort to put Unmanned Sense, Track and Avoid Radar (USTAR) on the RQ-4A Global Hawk.[40] If they embrace this technology the weight cost will reduce their usable sensor payload. Otherwise, off-board assets will have to provide cueing for the aircraft, which in future operations may present an excessive cost or inherent vulnerability. These weaknesses aside, the NATO procurement of GH[41] directly supports the NMS goal to "Strengthen Our Global Network of Allies and Partners."[42] Knowing the comparison between these two platforms, the way forward will be driven by how this is articulated by AF senior leaders to Congress and the President.

High-Altitude Transition (HAT)

National Defense Authorization Act (NDAA)

H.R. 1735 Report (5 May 2015) noted that "While the committee realizes that the Department can never fully meet the ISR demand of Combatant Commanders, reasonable and necessary ISR requests appear very likely to go unfilled if the current high-altitude airborne ISR collection capabilities of the U-2 are terminated." Current plans outlined by Headquarters Air Force (HAF) indicate that the U-2 will begin divestment in 2019 to be divested by 2020. Current legislation stipulates that aircraft will be kept in a ready status for three years. So, it would seem that once the NDAA is signed by the President, it will be the AF plan to move forward with the GH. The plan proposed to execute this is the HAT, which runs from FY16 through FY20. The HAT will cost 3.2 billion dollars, if you include the FY09-FY12 investments that initially attempted to reach parity with the U-2, to convert the RQ-4 to be "U-2 like."[43] $1.8 billion of

that 3.2 is for the projected upgrade. This sizeable cost will allow the RQ-4 to carry fielded U-2 sensors. It will retain the benefit of dwell and gain sensor fidelity, but little else. It will not solve the concerns with line of sight, see and avoid, or weather. Taken from a proposed savings of $2.2 billion for closing the U-2 program, the savings may reach $430 million for a single year.[44] With the U-2 departing, the mission set for the RQ-4 will expand, as capable, but the total budget for RQ-4 will, by FY20,[45] return to FY09-12 levels, or nearly double the current U-2 budget to sustain operations.

Concerns for ISR

"The politics of it say, 'Nope, you're going to buy the Global Hawk, [retire the U-2], and we're not going to give you any more money to do ISR…The Combatant Commanders are going to suffer for eight years and the best they're going to get is 90 percent."

--General Mike Hostage, USAF, Former Commander, Air Combat Command, Sept 2014[46]

The HAT brings several concerns as it is implemented. If the IPA works as advertised it will still miss those sensors that are above the payload level, as the RQ-4 can carry only 40% of the U-2 payload. It also flies 25% slower which, coupled with other factors, results in a 53% less production rate of ISR products per hour than the U-2.[47] These concerns directly address the report regarding H. R. 1735 in loss of capability to the Combatant Commanders[48], but the loss of the U-2 RISNO mission, which the RQ-4 cannot accomplish, is in direct opposition to both the NSS and the number one priority of the NMS.

"In my particular case as the operational commander in Korea, the U-2 provides some unique capability that at least presently the Global Hawk won't…

it will be a loss in intelligence that's very important to our indicators and warnings."

--General Curtis Scaparrotti, USA, Commander, US Forces Korea,

In Testimony to Senate Armed Services Committee, March 2014[49]

Assuming that the cyber threat never materializes, or is degraded sufficiently to be ineffective, the non-permissive IADS threat will remain a high concern as the IPA will not allow RQ-4 to utilize the BAE AN/ALQ-221 defensive suite. On the permissive front weather, namely icing, will continue to present a pervasive concern for the GH. For the reasons listed above it is certain that unless the AF finds another way forward, the AF and the US will lose considerable ISR capability[50] and reliability for present and future operations.

Recommendations

The Future: TR-X? Something else?

Be it the Office of Personnel Management (China), Sony (North Korea), or Stuxnet[51] malicious code and cyber war are becoming the reality of tomorrow. Further, it is likely that if nations gain an edge in this fight it is unlikely that they will play their hand until they feel they need to do so. Much as the F-117 did not experience its debut until the 1991 Gulf War, it is unlikely that an adversary holding a cyber offset would use it to down a fleet of aircraft until they felt they needed to do so. Hopefully, that day will never come; but, hope is not an effective course of action.

The short term answer to the problem of the future would be to consider that true success only comes after multiple failures. No project should be "too big to fail," perhaps the Nunn-

McCurdy breaches of GH in 2005 and 2011 were that moment, in the world of warfare. It is possible that the next step is optionally piloted aircraft. This would provide all of the benefits of long dwell, when necessary, and also the ability to directly pilot the aircraft as needed. In effect, the pilot would be the key to cyber-security. A potential solution to this lies in the form of Lockheed's TR-X. Though this solution would be costly, $15 billion by some estimates, it could provide a lasting way forward.

Another, less costly near-term option, is to keep the existing GH and provide updates for the U-2 that would undoubtedly move it past its current performance. Based on a current Headquarters Air Force report that combined various numbers from the Secretary of the Air Force's Financial Management office this would cost the same as the planned HAT upgrade and leave enough money for 21 F-35s (at present cost levels). [See *Figure 1*, below]

Option taken by AF	**Cost**	**Return**	**Second order impact**
Execute HAT upgrade	$2.4-3.2B	32 'U-2 like' RQ-4s	$5-15B in FY20-25
Upgrade U-2	$2.4-3.2B	32 RQ-4s in current configuration 32 U-2s with upgrades 21 F-35s	$5-15B in FY35-50 Timeline based on U-2 wing life to FY50
Do Nothing	Zero in FY16	Nothing	$5-15B in FY20-25

Figure 1

The final concern regarding divesture of the U-2 in favor of GH is one of loss in adaptability. If moving proven sensors from one craft to the next requires billions due to design constraints, what happens when new technology comes on-line? The past example is ASIP, delays in the GH lead to initial testing being performed on the U-2 to attempt to get the GH back

on timeline.[52] Part of the U-2 adaptability is in its design. A sheet metal exterior makes modular conversions easier, unlike the composite GH. This is important for two reasons. First, Lockheed Martin's Project Missouri has shown promise in linking Fourth and Fifth generation fighters[53], and suggests that a HAISR asset could use Open Mission Systems to be a force multiplier for a mixed fleet.[54] Second, the European Space Agency launched the European Data Relay System, which uses optical technology for a beyond line of sight data link, with suggested ISR solutions. Should this zero emission, jam resistant technology become applicable to HAISR it will need to be matched to platforms in use. In both of these cases, the AF needs an adaptable weapon system to be able to quickly field emergent technologies, to keep its edge.

Conclusion

The reality is that near-term NDAAs will continue to embrace austerity in order to make bi-partisan budgets pass. The military will have to continue to do more with less. The trick is to avoid situations that will force it to do less with less or exacerbate existing problems. Future leaders need a force capable of supporting the full range of military operations. Just as stability operations remain most likely, large scale peer-on-peer nation state warfare will be the most concerning. If an adversary uses CDO in conjunction with an A2/AD strategy leaders will need a clear picture to prevail. HAISR must be able to overcome CDO in order to ensure the best intelligence for those leaders. If their adversary is one like China, who can handily carry out CDO, the ISR piece in defeating an A2/AD strategy must not be one that can be eliminated with a keystroke. If HAISR cannot overcome the US may not have an ally, as the UK did in the Falklands war, capable of filling an ISR gap. This is something that must not be allowed to happen. There are many good ways forward, but the path we're on is not one of them.

Endnotes

1 I wish to thank Major Goens, Lt Cdr Osborn, Maj Wroten, Maj Kwek, and Maj Psilos for their thoughtful comments and suggestions. All errors found herein are my own.
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