

AIR, SPACE, AND CYBERSPACE POWER IN THE 21ST CENTURY
38th IFPA-Fletcher Conference on National Security Strategy and Policy

January 20 – 21, 2010

DAY ONE

OPENING KEYNOTE ADDRESS

7:45 A.M. TO 8:45 A.M.

General Norton A. Schwartz

ROBERT L. PFALTZGRAFF, JR.: Ladies and gentlemen, please rise as we present the Colors.

[Presentation of Colors]

ROBERT L. PFALTZGRAFF, JR.: Please be seated. Welcome to the 38th Fletcher IFPA Conference on National Security Strategy and Policy. This is the latest in a series of conferences organized over many years by the Institute for Foreign Policy Analysis and the International Security Studies Program of The Fletcher School of Law and Diplomacy, Tufts University.

We have done this together with an official co-sponsor each time, one of the military services or a major command. In each of these IFPA Fletcher Conferences, our primary goal has been the identification and discussion of timely national security issues. This year, we are focusing on the role of air, space and cyberspace power in the unfolding security setting, and U.S. National Security Strategy.

It is obvious that no vision of U.S. 21st Century National Security can be complete without air and space, as well as cyberspace, being taken fully into a consideration. Please permit me a very basic lesson in geography, as we think about the basic themes of this conference. The surface of the globe consists entirely of land and the seas. Before the advent of air power, all armed conflicts were fought on land by land forces, or at sea by maritime forces.

Since the earth in its entirety, land and sea, is surrounded by air space, only air and space afford the fullest and most rapid mobility with truly global range, capable of operating above any part of the earth's surface, land or sea, unconstrained by the barriers of the seas or land, by narrow straits or high mountains. Only air power can move unfettered by geography.

It was only with the coming of manned flight, and then the space age, that such global reach and rapid mobility became fully possible. No nation has succeeded more fully than the United States in incorporating such a vision, together with a supporting aerospace strategy into its military capabilities.

As so many of us here today can personally attest, air power led us out of the Cold War and into the successive Desert Storm. Air power proved indispensable in Kosovo and again in Iraq and now in Afghanistan. Air power stands guard as we meet today's Homeland Security challenges. Air power is vital to humanitarian operations as we see, now so vividly, in Haiti.

As Alexander P. De Seversky, one of the great strategists of air power in its formative years, pointed out in a seminal article in the August, 1955 issue of *Air Force Magazine*, and I quote, "Air power is the ability of a nation to assert its will via the air medium. Freedom of air navigation, when maintained by one side through successful, sustained combat, is known as air superiority. It is this basic principle that has informed our vision of air power for more than half a century."

How this fundamental tenet is adapted to 21st century challenges is the focus, of course, of this conference. With these goals in mind, we have designed this conference to provide, first, an overview of the 21st century security setting, with a focus on the broad spectrum of threats against which aerospace power must be developed, from the high to the low end, from peer competitors to irregular warfare. We then address dissuasion and deterrence requirements, which differ dramatically today from the Cold War era, encompassing nuclear and conventional components, as well as states and non-state actors.

Next, in our afternoon sessions today, we will examine operational level issues such as force structure and modernization priorities across the spectrum of contingencies. Then, we will consider the challenges of balancing capabilities with modernization priorities and devising a necessary acquisition strategy in light of such challenges, as maintaining critical skills and addressing budgetary shortfalls, and operating within a shrinking R & D community and technological industrial base.

Tomorrow, we will turn our attention to international perspectives and the role of U.S. allies and coalition partners, as we and they work to leverage our respective capabilities and to maximize resulting synergisms. Then, we will have an opportunity to benefit from regional and combatant command perspectives on the issues that frame this conference.

We have an unusual opportunity to break free of our intellectual binders, of our isolation and possible group think, to explore new ideas, and to connect the dots, and to think outside the box. I say this because all of us here are hostage to our experience, education and mindset, sometimes mistaking the trees for the forest.

For each of the sessions, as you will see, we have brought together a broad range of expertise, from the civilian and military communities, from the government and private sector, from the United States and abroad. We have much to learn from the various speakers and from each other, as we address the many agenda topics that lie before

us. And, of course, in this audience we have a vast array of expertise, knowledge and experience from which we expect to benefit as well.

For this year's conference, we are very pleased to have as our official co-sponsor the Chief of Staff of the Air Force's Strategic Studies Group and the support of the Defense Threat Reduction Agency. Both have made indispensable contributions to this conference by their sponsorship and support and by their active participation and encouragement throughout the planning and organizational stages and process.

On behalf of IFPA and the International Security Studies Program of the Fletcher School, again, I welcome you. We will be preparing a report and other outputs whose purpose will be to contribute to 21st century air, space and cyberspace strategy, and therefore, to give broader dissemination to the various topics on our agenda.

I now have the honor to welcome General Norton A. Schwartz for his opening keynote address, The United States as an Aerospace Nation, Challenges and Opportunities. General Schwartz became Chief of Staff of the Air Force in August, 2008. He is a command pilot. And, prior to becoming Chief of Staff, had many assignments, including service as Commander, U.S. Transportation Command, Director of the Joint Staff, Commander, Alaska Command, and Deputy Commander in Chief, U.S. Special Operations Command.

He is a 1973 graduate of the Air Force Academy and earned an MBA from Central Michigan University. He has spoken at previous IFPA Fletcher Conferences in this series and, I might add, in this very room. So, General Schwartz, welcome. And, thanks for your support.

[applause]

GENERAL NORTON A. SCHWARTZ: Bob, thanks for the introduction. I've known Dr. Pfaltzgraff for a good many years. And, what a treasure he is to the nation's security.

Thanks very much for making this possible with your organization. Likewise, welcome, in addition to those in the uniform that I wear, to those in other uniforms, including suits. We welcome you, and we appreciate your presence and your contribution to the discussions that will follow.

I would like to thank the Institute for foreign policy analysis and, importantly, the International Security Studies Program of the Fletcher School, one of the premiere programs in this area for, obviously, organizing the conference. And, I certainly commend our own Strategic Studies Group for their tremendous efforts in pulling this all together.

As well, as Bob indicated, the Defense Threat Reduction Agency was instrumental in helping us put this very, very important conference on. And so, it is my distinct pleasure to be amongst such a group as this, and to share some thoughts on the future of our United States Air Force.

In this room, we have a wide array of leaders and thinkers who have contributed to the nation's worldwide leadership and prominence in air, space and cyberspace, the result of many bold visionaries and pioneers in U.S. history. And we, as professionals in this dynamic field, have an obligation to protect and uphold that legacy of leadership and innovation, and to continue considering how we can best leverage and integrate air, space and cyberspace power, to protect our nation against current and future security threats.

Our intent, at this conference, therefore, should be to embrace that same boldness and ambition that our forebears exemplified. And, as we attempt to further hone our strategic edge, ideas that are generated here, perhaps, should be as controversial as they are novel. For debate is effectively the whetstone upon which we all sharpen our thoughts on strategic design.

Debate is a sign of a healthy enterprise, within a particular institution, or even within a broader community. And, it is the hallmark of any significant progress in evolution. As we engage in discussion here in the next couple of days, on how these three operating domains of air, space and cyberspace, we'll continue to serve the national security. We must embrace this professional obligation. Spirited but respectful discussions truly are the essential elements of assuring our vitality, our vitality in the years ahead.

In the 20th century, air power and its inherent characteristics of speed, range and flexibility forever changed warfare. As these advantages evolved with greater lethality and precision, a revolution, in the truest sense, shook the foundation of military affairs. Make effective use of air power or be left behind.

Billy Mitchell's sinking of the *Ostfriesland* on the 21st of July, 1921 demonstrated that navies could no longer ignore the range of air power. During the early stages of World War Two, the concept of *blitzkrieg* again made warfare more lethal. Hitler's ...(inaudible) showed how to enable close integration of land and air power, and how it could provide a synergistic effect. And yet, it was allied air powers, it turned out, that proved pivotal in ending the *blitzkrieg's* reign of terror.

In the late 1950s, the deployment of intercontinental ballistic missiles forever altered the strategic landscape. The march into space in the 1960s brought about the feeling of the first Corona Satellites and began to revolutionize intelligence, surveillance and reconnaissance. These are but a few early examples.

The common thread is that traditional forms of terrestrial warfare became subject to the effects of air and space power, insofar as land and sea forces were inherently vulnerable to attack from above. And that each step in the evolution of air, space and cyber power has significantly changed warfare and our understanding of it.

Today, the United States Air Force provides the nation with global vigilance, reach and power, and establishes and maintains control of the air, where friendly forces must

operate, providing the ability to maneuver and operate, free from enemy air attack. It leverages, on a global scale, the advantages of air and space, and provides and is among those on the leading edge, as well, of cyberspace.

The control of these fundamental inter-dependent domains provides for the unique capabilities that are among the Air Force's most significant and enduring contributions to national defense, global mobility, long-range strike, intelligence, surveillance and reconnaissance capabilities.

But, vigilance, reach and power cannot be taken for granted. They require stewardship so that they may be applied to today's challenges, even as we develop them for employment in the future security environment. We, therefore, must take note of our strategic context. The challenge of our times, ladies and gentlemen, is to succeed in protracted and a regular global struggle against elements of violent extremism and irreconcilable actors, near peer rivals and others who cannot be readily influenced or coerced.

We must be able to operate across the spectrum of conflict. That, to be sure, has its so-called "high" and "low" ends. But, in reality, is more accurately characterized as a highly complex hybrid. Equally complicated are the tools and tactics of warfare which cannot be separated into an orderly taxonomy. Instead, we find that they also take on a hybrid quality, especially with the proliferation of advanced technology and in the myriad ways that our adversaries will use them.

As threats continue to emerge, these methods of warfare will further evolve, thus creating new unmet requirements for our nation to fulfill. And, as our adversaries further exploit the growing speed of long-range cruise and ballistic missiles and advanced conventional weapons, they will have more means at their disposal to contest our access to the global commons, which this nation requires to effectively operate within our strategic environment.

As a nation, therefore, we must be prepared to respond with a military instrument that is capable of producing the desired effects, and a whole of government approach which is carefully developed, and balance of all the national instruments of power that are appropriate to the particular circumstances. This demands that the United States Air Force, us, set a clear vision of how it will move to meet emerging threats and fulfill evolving requirements, and establish clear priorities for investment and, yes, divestment, in ways that correspond with strategic and fiscal realities.

Against the backdrop of leveled or even shrinking purchasing power, the Air Force must still remain agile and able to act according to the current state of affairs, while being ready and able to respond to any number of potential contingencies, high, low, hybrid, or irregular.

At the high end of conflict, the Air Force must continue to provide the nation with global strike capability, but nuclear and conventional. As it has for over 50 years, the Air Force will continue to ensure the vitality of two of our nation's three arms of nuclear deterrence, so that, in the event of an existential threat to our national survival, it remains a credible option for our leadership. And, to do this, our nuclear posture must be properly sustained and resourced. And, our nuclear operations and logistics must continue to be uncompromising in its precision and reliability, enabled by dedicated professionals who are well trained and equipped and unwavering in their capacity for self assessment and commitment to excellence.

For the last 70 years, the Air Force has, through its ability to penetrate denied airspace, has met the national strategic imperative of holding adversary targets at risk. This remains a priority, although the evolving nature of the threat forces us to re-evaluate our ways and means. Future systems must be versatile, particularly in two dimensions: in terms of their function, such as strike or intelligence, surveillance and reconnaissance, and in their ability to flex between various methods of employment, such as manned versus unmanned, or penetrating versus standoff.

Existing in future operational requirements, for example, the ever-increasing demand for a persistent intelligence surveillance and reconnaissance capabilities call for an ability to gain access to, and then loiter in, potentially denied or contested airspace, in order to find, fix and track high value targets. These targets, sometimes mobile, sometimes bunkered deeply underground, otherwise would be difficult to locate without penetrating systems.

And, while unmanned platforms likely serve this required persistence better from a physiological perspective, current technology does not allow for the type of fully autonomous and dynamic systems that are required in an opposed and degraded network environment.

Therefore, contemplating a family of systems that are capable of multiple methods of employment and capabilities will help ensure future systems with maximum versatility for our platforms and our concepts of operation. It is true that some systems will likely remain and be single-purpose. But, by and large, the majority of our systems must be able to address the myriad hybrid and our regular warfare threats.

Such flexibility to task and to retask will be essential to our Air Force's ability to maximize its contribution to the joint team and to help ensure its success. While this is a conference on air, space and cyber power, we must remember that national defense is a total team effort. And, air, naval or ground victory, alone, is insignificant to the overall achievement of national political objectives.

In the end, only the combined success of the military instrument, in concert with other national levers of military power, is truly meaningful. Therefore, further joint integration and inter-service cooperation toward enhanced air-land and air-sea inter-operability remains a strategic imperative.

Common issues: Irrespective of whether on terra firma or the oceans or in air or space, or emerging as a result of proliferating technologies, and the result in rapidly advancing

adversary capabilities, these are not confined to any single domain. Therefore, only a coordinated response by all of the services, working to resolve such issues as joint command and control, the growing demand on ISR, our collective dependence on cyberspace and strike operations, will develop the integrated and balanced response that is required for our national security.

As we further integrate, the benefits are not limited to a single domain. Air power makes surface warfare better. And, land and sea power enhance the effectiveness of Air Forces. The U.S. Air Force and the Navy, for example, are working on new ways to integrate maritime interdiction operations, anti-submarine warfare and missile defense.

In the area of land warfare, the Air Force must continue evaluating how we can enhance joint counter-land capabilities, perhaps by effectively reducing opposing ground forces to dismounted infantry, thus allowing lighter, more rapidly deployable, friendly ground forces to effectively maneuver and operate in conventional and hybrid conflict environments.

Also, the Air Force must maintain its capability to conduct precise, timely and effective operations across the full spectrum of counter-land operations, to include close air support and air interdiction. A wide array of improved capabilities, such as infrared, electro-optical, and laser enhanced sensors improve signals intelligence capabilities.

Advanced radars and directed energy weapons will enable advanced capabilities such as high fidelity target discrimination down to the level of being able to find, track and target individuals, individual combatants within a crowd. These types of advances represent new territory into which we will venture, to provide battlefield commanders with greater capabilities, especially in regular warfare environments.

Indeed, in this ever-increasingly complex landscape, we must leverage every bit of capability we have and that we will develop. The joint team has long recognized the exploitation of space as enormously beneficial to our nation. But, its near-peers and

potential rivals advance into space, commercially, civilly, militarily, we must consider that our advantages will not be unmatched or asymmetric for a definite period.

Space must be completely accessible for our nation. And, our systems must be more agile and responsive to combatant commander needs. Space control, assuring our freedom of action to and in space remains a national priority. As a subset, space situation awareness allows us to evaluate and attribute threats to our assets. And, I would argue, as an aside, that it is very difficult to deter if one cannot attribute.

We must be able to begin planning for any number of contingencies in the event of an outbreak of hostilities in which space systems, communications, global positioning, missile warning, reconnaissance and others, surely, will be major players. In all of these areas of national security space, the Air Force bears a special responsibility, as it has for over 60 years.

And, as the vanguard into military space in the 20th century, the Air Force must continue to propel that effort and keep our commitment to national security space, in equal measure to our national ambitions in space, and as high as the ultimate high ground itself.

To ensure the continued viability of our air and space operations, we must pay considerable attention to evaluating options for multi-tiered concepts of operating from distributed bases around the globe. By delivering balanced capabilities through smaller tailored forces that are specific to the task, we receive the accompanying benefit of fostering international engagement and building key overseas partnerships, all of these forward locations and cooperative security operations.

However, the problem is, the proliferation of precision, both in cruise missiles and ballistic missiles, and with precision mortars, rockets and artillery, which put our forces and those of our partners increasingly at risk. While we have enjoyed relative security at

these forward locations over the last 20 years or so, our adversaries are actively seeking advance weaponry to threaten this current advantage.

These increasing threats and demanding logistical requirements in the face of rising costs and flat budgets force us to consider how we will harden our bases and fortify them with active defenses, and how we will balance them with an increasing array of softer, softer bases.

As we move forward, the Air Force must actively protect itself against these emerging vulnerabilities. Our operations cannot grind to a halt for one of a degraded or a denied system or a scarce resource. Our reliance on information technologies, for example, is very well known. IT enables an entire universe of command and control capabilities, which underpins all aspects of joint operations.

To be sure, this has enhanced our ability to maintain unprecedented situation awareness, at all levels of operations. But, our reliance on information technologies has also created vulnerabilities that we must address and mitigate. In future warfare, we must maintain our ability to exploit cyberspace. And, with growing sophistication of electronic warfare methods and techniques, protecting our communications and data links from degradation, and even denial, will remain a strategic priority.

Realistically, in a hostile environment, we will experience some degree of degraded communications. Reasserting ourselves in electronic warfare is a step toward ensuring that such degradation is minimized. We must identify our vulnerabilities, refine our tactics and procedures, and build more resilient systems, including next generation-protected space communications, and air breathing or terrestrial alternatives and complements for a variety of space-based capabilities. In the near term, however, we must ensure that our forces are trained and configured for a realistic network degraded environments.

Another widely-known dependence that creates an exploitable vulnerability is that of GPS. From efficient mission planning to lethal precision munitions, global positioning has transformed an entire universe of warfare(?) incapability. Our dependence on precision navigation and timing will continue to grow.

So, physicists, at the Air Force Research Laboratory, are exploring promising new technologies like cold atoms, whatever those are, pseudolites, and imaged(?) inertial navigation systems that use laser radar, which move us toward achieving ultra-accurate, less GPS-dependent navigation systems. It seems critical, to me, that the Joint Force should reduce its dependence on GPS-aided precision navigation and timing, allowing it to ultimately become less vulnerable, yet equally precise, and more resilient.

Still, another area of over-dependence and vulnerability is petroleum. The Air Force consumes more petroleum each year than any other agency of the United States government. And thus, is also susceptible to energy price volatility and disruption of logistic lines.

The global energy market will likely continue to exert significant influence on the Air Force's budget. Each \$10 dollar increase in the price of a barrel of oil equates to \$600 million dollar increase in fuel costs to our Air Force. In order to reduce its reliance on oil, the Air Force will continue to field innovative technologies to provide energy to its bases, reduce its logistical footprint, and energy-intensive base infrastructure in the continental United States and elsewhere, and invest in research and development for transformative propulsion systems for future platforms.

Indeed, I encourage you to address these challenges head-on during this conference and beyond. As your thoughts will help ensure that we continue to optimize our contributions to the Joint Team, in addition to the enduring contributions that I've already covered, we must also continue to address the growing demand for a new real-

time intelligence surveillance and reconnaissance from our remotely piloted systems, as well as continued requirement for timely air lift and air refueling.

Approximately 75% of our predator class unmanned aircraft are currently deployed. And, we continue to surge more into Afghanistan and Iraq, to remain on track to our 50 combat air patrols by the end of 2011, adding another 300,000 flying hours to the 600,000 that we have already accumulated.

Our best shooters on the ground, our very best shooters on the ground have come to rely on remotely piloted aircraft for the unprecedented and unmatched situation awareness that these remotely piloted systems provide. And, what better, more current example of rapid air mobility is there than the ongoing humanitarian operations in Haiti?

As the President has unambiguously stated, the United States will continue to be steadfast in its disaster response. I am extremely proud of our airmen who immediately lent their substantial expertise to helping the Haitians regain air traffic control and manage air field operations at Port-au-Prince and elsewhere, enabling U.S. C-17s and C-130s and aircraft from a host of other nations to rapidly deliver lifesaving and life-sustaining emergency supplies, some by aerial delivery of much needed water and rations.

Yet again, in critical moments, American air power has made and will continue to make a significant difference. This I am certain will be a recurring and appropriate theme throughout this conference.

As you listen to the impressive lineup of speakers at this conference, I would ask that you frame their contributions as I have framed them here. Our Air Force has followed and has the following overriding imperatives to increase our capabilities, to decrease our vulnerabilities, and to enhance our integration with our joint and coalition partners. Those are three. Increase our capabilities, reduce our vulnerabilities, and enhance our integration with our joint and coalition partners.

In the area of increasing capabilities, I need ideas about how we can better guarantee the credibility and viability of our components of the nation's nuclear forces. Passing inspections is not good enough. We need to explore how these forces can best be postured for a very different, highly complex term environment in the coming years.

We should also carefully consider the way ahead for the next generation of long-range persistent strike and ISR platforms, to include the many tradeoffs associated with such platforms. Is there a better way to acquire the next generation of these systems? What are the key tradeoffs between manned and unmanned? And, how do we expand our low absorbable advantage?

Additionally, we must explore how we can better prepare ourselves to operate in an opposed network environment, where communications and data links will certainly be challenged. We have spent the last two decades optimizing our network systems for maximum information flow. Perhaps we need to explore how to command and control now, in bandwidth-constrained environments.

And, what might we be missing in counter-land operations? Is it likely that we will need to move to the next level of targeting discrimination, where the risk of collateral damage is high, or to explore how to best better disable mechanized formations, effectively dismounting enemy formations, or even high-value targets and making them more vulnerable?

Finally, we must carefully consider how we can better posture our forces and basing structure around the world, to ensure that we have access. That is the life blood of the United States power projection.

In the wider area of decreasing our vulnerabilities, we should reflect on how we can reduce our reliance on global positioning system and petroleum. The global value of

GPS will certainly endure. But, our forces must be able to operate in GPS-denied environments in the future.

You can help us realize that vision. Likewise, the logistical and operational vulnerabilities posed by our petroleum dependence must be mitigated. That certainly will be a long-term project. But, our Air Force must continue to squarely address this issue rather than wait for someone else to provide the answer. While these are two examples, we must ensure that no one system or commodity becomes a single point of failure, and that we are adequately diversified.

Last, we must consider all the ways in which we can better our partnerships with our joint and coalition partners, and provide more synergistic effects for our national security. Our new cooperation with the United States Navy, called Air-Sea Battle will be a model for addressing the challenges posed by increasing inter-dependence of global commons, of air, sea, space and cyberspace.

Admiral Rothhead(?) and I are committed to making our organizations face the tough issues and for forging a new kind of integration that overcomes decades of inertia. You can help us take that effort to a whole new level. And, I am grateful that you committed your time to be here with us for these next two days.

We commissioned this conference to jumpstart, to jumpstart our look to the future, and to re-energize this service with a proud heritage of innovation. We cannot do that without the active participation of those who understand the critical importance of the United States Air Force to the future of our common defense.

I want to thank you, again, for the opportunity to share these views with each and every one of you, and for your efforts, at this conference, and beyond. Your contributions are critical and vital to our national security. And, I am personally honored and humbled to partner with you in singular and dedicated service to our nation.

GENERAL NORTON A. SCHWARTZ: Mainly, I think it starts at a higher level. And that is that influencers, key influencers in the country need to remind our youngsters of, as you did, of the importance of public service. And, public service can play out in multiple different ways, some in uniform, some in not, some in academia, some in research. I mean-- But, the fundamental here is that public service is a noble undertaking. And, that needs to be communicated.

A quick vignette: When I was in New York before the holidays, with a largely Wall Street crowd, you know, I challenged them, frankly. I mean, you know, they do something important for our country, no question about it. But, my question to them was, are you encouraging America's talent to do public service? Or, only to achieve excellence on Wall Street, however they define it? I think that's an important aspect of this.

With respect to cyber, that is a particular concern. The reality is, is that we will probably never have enough cyber experts to fill the need, both in government and out of government. But, what we and government need to do is to provide opportunities for folks to serve. Some will serve longer than others. And, some might look like you and me, and some might not. And, we need to figure out a way to make sure that we don't let any talent move by. You know, it is a fair question if, does the best programmer in America have to wear a uniform. I'd say probably not, okay.

ROBERT L. PFALTZGRAFF, JR.: I would like, on behalf of the audience and the participants at this meeting, to thank you, General Schwartz, for your service to the nation and also for giving us such a wonderful overview of the issues that are of importance to you and to the Air Force. And I guarantee that we will do everything we can to try to come up with some very interesting ideas for you. So, we thank you very much for being with us and for supporting this endeavor.

GENERAL NORTON A. SCHWARTZ: Thank you, sir.

[applause]

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