



Center for a
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on Seapower and Power Projection Forces
“Ensuring the Future of Naval Power Projection:
The Role of Carrier Aviation”

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Thank you Chairman Forbes, Ranking Member Courtney, other members of the subcommittee, and staff, for the invitation to testify before you today. It is an honor to speak about the vital importance of the carrier air wing, the challenges it faces, and ways to sustain carrier-based airpower into the middle part of the 21st century. The opinions expressed in this statement are mine alone and should not be interpreted as representing the University of Pennsylvania or any other organization with which I am affiliated.

America’s global reach relies in no small part on naval aviation and the carrier air wing. The ability of the United States to use the aircraft carrier as a mobile airfield is a necessary component of projecting power over great distances, helping give the United States military global reach. Ensuring that carrier aviation is an integral part of the future of US military power, however, will require forethought. Due to growing missile threats to the carrier and other issues arising from an antiaccess/area denial (A2/AD) environment, as well as the long procurement timelines to build new systems, the decisions made over the next several years will be critical in determining the future trajectory of carrier aviation. In what follows, I briefly describe the rising threat to the carrier, along with three ways the United States Navy can help sustain the carrier air wing’s role in global power projection: focusing on munitions, investing in uninhabited systems, and diversifying risk.

Growing Threats to the Carrier Air Wing

As is well known, America’s aircraft carriers are increasingly vulnerable. The spread of anti-ship cruise missiles such as the SS-N-22 Sunburn, along with the development of China’s anti-ship ballistic missile, the DF-21D, place US aircraft carriers at greater risk of being sunk than at any point since arguably the end of the Second World War. China’s YJ-18 supersonic anti-ship cruise missile further illustrates the way long-range, fast threats to the carrier are growing. Moreover, China’s air-to-air missiles such as the PL-15 could place the carrier air wing itself at risk even after it launches from the carrier.

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The threat to the carrier is not only a matter of China's growing capabilities. Iran also possesses the SS-N-22, and others around the world have been modernizing their cruise missile arsenals over the last decade.¹ Add swarming drone boats, sea mines, and submarines to the mix, and the carrier faces an array of threats. Even given the substantial investment and expertise that the U.S. Navy has in protecting the carrier, these threats are likely to grow.

A more vulnerable aircraft carrier could push it (and the associated strike group) further and further away from the shores of potential adversaries, placing naval power projection at risk and also reducing the ability of the carrier, through its mere presence, to reassure allies. The United States should not take the future of the carrier, and the ability of carrier aviation to serve as the basis of global power projection, for granted.

The history of military innovation demonstrates that established powers, using established technologies, must continually innovate to keep up with new challenges. The example of the British, who struggled to view the aircraft carrier as more than a spotter for the battleship, demonstrates the kind of failure of imagination that it is crucial for the United States Navy to avoid. By taking seriously these threats to the carrier itself, and the carrier air wing, Congress and the Navy can work together to preserve the role of carrier aviation in U.S. power projection capabilities.

Invest In Munitions

One way to ensure the continued strength of carrier aviation, in the face of growing threats to the carrier, is extending its range. Range in this case could mean two things: increasing the range of the airplanes launching from the carrier, or increasing the range of the munitions that those planes carry. For a variety of bureaucratic and budgetary reasons, however, it is often easy to under-invest in munitions R&D and the purchase of munitions in sufficient quantity. The recent announcement that the US Navy is developing an anti-ship version of the SM-6 is great news for naval power projection.² Combined with prior reports of a new anti-ship Tomahawk,³ these systems should dramatically expand the range of the Navy's surface-to-surface anti-ship missile capabilities.

These recent developments in surface-to-surface missiles are not a substitute, however, for innovation in air-launched munitions. In the air, the deployment of the Long Range Anti-Ship Missile (LRASM), a long-range, low-visibility, munition, will be significant for giving US carrier-based aviation the ability to rapidly strike adversary ships at long range. Along with the Joint Air-to-Surface Standoff Missile-Extended Range (JASSM-ER), LRASM represents the type of range-extending investment in munitions that will give the carrier air wing new striking power. Extending the range of the weapons launched from carrier aircraft allows the carrier itself to stand off further from the fight, decreasing its vulnerability.

It is vital that budgetary constraints do not lead to the reduction in funding for the generation of munitions currently coming online, along with research and development in next-generation

¹ Dennis M. Gormley, *Missile Contagion: Cruise Missile Proliferation and the Threat to International Security* (Santa Barbara, CA: Praeger, 2008).

² Bryan McGrath, "The U.S. Navy's Surface Force Just Got a Lot Deadlier," *War On The Rocks*, February 4 2016, <http://warontherocks.com/2016/2002/the-u-s-navys-surface-force-just-got-a-lot-deadlier/>.

³ Sam LaGrone, "Bob Work Calls Navy's Anti-Surface Tomahawk Test 'Game Changing'," *USNI News*, February 10 2015, <http://news.usni.org/2015/2002/2010/west-bob-work-calls-navys-anti-surface-tomahawk-test-game-changing>.

weapons. That being said, the current generation of advanced munitions are expensive. For example, one estimate suggests LRASM may cost \$2 million dollars per missile.⁴ This is money well spent, but unless the fiscal environment changes, and even if it does, Congress and the Navy should think about ways to reduce the unit cost of advanced munitions.

One way to reduce costs is through larger buys that produce economies of scale, but another way is to consider next generation systems that might employ more off-the-shelf commercial technology to take advantage of growth in robotics and related fields. The Navy could consider harnessing developments in swarming technology,⁵ to give just one example, to develop lower cost munitions where the target is destroyed not by a single munition that escapes detection, but through overwhelming adversary defenses through mass. Another advantage of such an approach is that it reduces the risk of mission failure in the case that an adversary does find a way to defeat one advanced munition in particular. Investing in munitions as one way to extend the effective range of the carrier air wing is also consistent, broadly, with Secretary Carter's emphasis on arsenal planes as a future element of U.S. military power.⁶

Focus On Next-Generation Uninhabited Systems

If reports are accurate, the Navy will now be converting its Unmanned Carrier Launched Airborne Surveillance and Strike (UCLASS) program into an aerial refueling tanker. The logic behind what some news sources say will be called the Carrier Based Aerial Refueling System (CBARS) is to extend the range of the F-35.⁷ Details about this program and what it means for the Navy's overall approach to uninhabited systems remain unclear, however.

One of the most significant challenges when adopting new technologies is developing the organizational capacity to utilize those technologies effectively.⁸ To the extent that the new CBARS program gives the Navy a testbed for incorporating uninhabited systems on the carrier, this could serve as a gateway towards next-generation, armed systems. By using more proven technologies at a relatively low cost, CBARS could operationally pave the way for more advanced uninhabited systems. This would be a good news story.

After all, an armed, uninhabited aircraft able to operate in contested airspace could offer advantages for the Navy, presuming the relevant technologies continue maturing. Uninhabited aircraft could operate for longer, have other advantages from not being limited by human endurance, and potentially execute more dangerous missions since U.S. forces would not be at risk. Another way to

⁴ David Axe, "Look out, China! America Is Getting New Ship-Killing Missiles," *The Week - From War Is Boring*, August 28 2015, <http://theweek.com/articles/573963/look-china-america-getting-new-shipkilling-missiles>.

⁵ Paul Scharre, "Robotics on the Battlefield Part Ii: The Coming Swarm," *Center for a New American Security*, October 2014, http://www.cnas.org/sites/default/files/publications-pdf/CNAS_TheComingSwarm_Scharre.pdf.

⁶ Ash Carter, "Remarks Previewing the Fy 2017 Defense Budget as Delivered by Secretary of Defense Ash Carter, Washington DC, February 2, 2016," *Secretary of Defense Speech at the Economic Club of Washington*, February 2 2016, <http://www.defense.gov/News/Speeches/Speech-View/Article/648466/remarks-prev%648420iewing-the-fy-642017-defense-budget>.

⁷ Dave Majumdar, "The U.S. Navy's Bold Plan to Unite F-35s with Refueling Drones," *The National Interest (Online)*, February 5 2016, <http://nationalinterest.org/blog/the-buzz/the-us-navys-bold-plan-unite-f-35s-refueling-drones-15125>.

⁸ Michael C. Horowitz, *The Diffusion of Military Power: Causes and Consequences for International Politics* (Princeton, NJ: Princeton University Press, 2010).

incorporate uninhabited aircraft might be through retooling existing systems, such as 4th generation aircraft, to serve as uninhabited “arsenal planes” coordinated by 5th generation aircraft.

Alternatively, there is always the risk that, rather than being a bridge to the next generation, CBARS represents a shift away from thinking about using uninhabited systems for carrier-based deep strike missions. If that is the case, and the Navy lacks the internal appetite to invest heavily in next-generation systems, it could increase the risk to carrier aviation over the medium term, due to the range-based threats to the carrier I previously described.

To be clear, uninhabited systems are not without their risks. The technology is not yet mature, as debates about the UCLASS system and the technological range of the possible demonstrate. At present, a human in the cockpit offers situational awareness for operations in contested airspace that we do not know if uninhabited systems could match. Uninhabited systems will also always face the risk of hacking, jamming, and other network access issues – making the Navy even dependent on its data links. The information yielded from experiments with the X47-B, however, show that there is great potential if uninhabited capabilities are made a priority investment area.

Fortunately, there is evidence suggesting the senior leadership of the Pentagon fundamentally recognizes the importance of uninhabited systems. Deputy Secretary Work consistently emphasizes the importance of military robotics in the 3rd Offset,⁹ and Secretary Carter’s preview of the FY17 budget called out the potential of micro-drones and swarms.¹⁰ Moreover, Secretary of the Navy Ray Mabus said in 2015 that the F-35 “should be, and almost certainly will be, the last manned strike fighter aircraft the Department of the Navy will ever buy or fly.”¹¹ As the shape of the upcoming F/A XX 6th generation fighter comes more into view, the Navy must take the potential of uninhabited systems seriously as platforms potentially capable of deep strike missions in contested airspace.

Consider Ways to Distribute Risk

For the last generation, the United States Navy has emphasized building small numbers of extremely capable carriers, the Ford Class, that can launch larger numbers of sorties than their predecessor, the Nimitz class.¹² A small number of large carriers seemed optimal in a world where the threats to the carrier were minimal, in a relative sense, meaning the Navy could be confident in its ability to deploy carriers to hot spots around the globe.

Given the changes in the threat environment, it is worth at least thinking about whether this should remain the optimal path for the United States Navy over the next generation. The old aphorism about not putting all of your eggs in one basket is potentially appropriate here; it may make sense to

⁹ Robert O. Work, “As Delivered by Deputy Secretary of Defense Bob Work, Jw Marriott, Washington, D.C., December 14, 2015,” *Deputy Secretary of Defense Speech at CNAS Defense Forum*, December 14 2015, <http://www.defense.gov/News/Speeches/Speech-View/Article/634214/cnas-defense-forum>.

¹⁰ Carter, “Remarks Previewing the FY 2017 Defense Budget as Delivered by Secretary of Defense Ash Carter, Washington DC, February 2, 2016.”

¹¹ Ray Mabus, “SECNAV’s Prepared Remarks at Sea-Air-Space 2015,” April 15 2015, <http://navylive.dodlive.mil/2015/2004/2015/secnavs-prepared-remarks-at-sea-air-space-2015/>.

¹² Jerry Hendrix, “Retreat from Range: The Rise and Fall of Carrier Aviation,” *Center for a New American Security*, October 2015, <http://www.cnas.org/sites/default/files/publications-pdf/CNASReport-CarrierAirWing-151016.pdf>.

diversify risk. The Navy needs to avoid the problem of self-deterrence, where fear of the risk to the carrier means the Navy – and thus the United States military – is unwilling or unable to deploy to potential hot spots and either prevent a conflict from starting or decisively intervene.

One path forward to diversify risk, for example, might involve investing in some number of smaller aircraft carriers. Though the air wing of each carrier would be smaller in numbers than the Ford Class, it might be possible to extend the capabilities of such platforms by leveraging uninhabited systems. More generally, to meet the naval power projection challenges of the middle part of the 21st century, the U.S. Navy needs to be ready for a world where other countries have the ability to place the aircraft carrier at risk. Whether or not the Navy considers pursuing smaller carriers, creative thinking on how to diversify risk should be part of how the Navy contemplates the future of the carrier air wing. This will require real effort. One of the things that makes the United States Navy the best in the world is its carriers and the carrier air wing. But as the Navy's original investment in naval aviation and the aircraft carrier in the Interwar Period shows, the United States Navy can serve as one of the greatest innovation incubators in the world.

Implications

These issues are far from the only issues relevant for the future of carrier aviation. This testimony does not discuss, for example, the oft-debated issues surrounding the F-35. Needless to say, the effective and timely deployment of the F-35 is necessary for the maintenance of the carrier air wing in the short-term and medium-term. The newly described CBARS program could extend the range of the F-35, giving it greater ability to conduct longer patrols and then deploy into adversary airspace. The F-35 is not a substitute, however, for any of the issues raised above.

In short, by investing in next-generation munitions, working to realize the promise of uninhabited aircraft, and thinking imaginatively about new ways to distribute risk, the carrier air wing will remain one of the most important elements of U.S. military power projection into the middle part of the 21st century.

Thank you for your time, and I look forward to your questions.