Sea-Based Aviation National Naval Responsibility

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At a Glance

What is it?

- Many research areas – uniquely important to the DoN – are not addressed by research investments from the other Services.
- On behalf of the Department of the Navy, the Office of Naval Research (ONR) must ensure continuing U.S. leadership in these vitally important scientific and technical disciplines.

How does it work?

- In consultation with experts drawn from the National Academies and elsewhere, ONR identifies National Naval Responsibilities. ONR looks at various scientific fields and assesses:
  - The scope of naval responsibility
  - Funding and funding trends
  - The scope, degree, stability, and trend of non-Naval funding
  - The scientific and technological performer base in academia, government, and industry
  - The scientific and technological infrastructure
  - The scientific and technological knowledge-base, including graduate and post-doctoral programs in the area
  - The prospects of integration with and transition to engineering development and acquisition programs

What will it accomplish?

- Above all, SBA NNR seeks to keep the fields healthy by giving them stability.
- It keeps key areas of basic and applied research strong, and it balances theoretical, empirical, and field work to sustain a research infrastructure.

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Sea-Based Aviation (SBA) is the operation of aircraft to, from and on sea-based platforms. SBA, while traditionally thought of in terms of operations from aircraft carriers, can be more broadly associated with many sea-based platforms and concepts to include:

1. Operations from large deck ships (e.g., aircraft carriers, Landing Platform Docks, Landing Helicopter Docks) with substantial deck space for extensive large-scale air operations.
2. Operations from small deck ships (e.g., Guided Missile Destroyers, Littoral Combat Ships, etc.) normally configured to handle only rotary-wing aircraft.
3. Operations from ships without dedicated takeoff/landing platforms for manned aircraft. Such operations include ships that could support Unmanned Aerial Vehicles launched by catapults, launch tubes, etc.
4. Self-deployed, sea-based aircraft concepts (e.g., seaplanes, flying boats, wing-in-ground-effect aircraft, submersible aircraft concepts and other hybrid air/sea concepts).
5. Operations from other sea-based platforms, e.g., submarines, submersible and semi-submersible platforms or unmanned vehicles, mobile offshore base concepts, buoys with air vehicle components and unmanned sea-based platforms.

The technical challenges of SBA have been broadly categorized under the following categories:

- Structures
- Propulsion
- Propulsion Integration
- Ship Interfaces & Operations
- Avionics/Electronics
- Air Refueling
- Aerodynamics
- Guidance, Navigation & Control (GNC)
- Design Tools
- UAV launch and recovery; autonomy, high tempo operations
- UAV operations from non-aviation ships

The maritime role of the naval aircraft is complex, demanding, and unique. The ship has a dominant influence on the design of the aircraft. The dynamic interface between aircraft and ship requires a high degree of precision maneuvering to land on the moving ship deck in adverse weather and wind. The materials must resist a highly corrosive environment. The structure and configuration must be large enough to perform the mission and then have the ability to fold into a small footprint to be stored into small hangars leaving enough room for critical maintenance. The air vehicle must be multi-mission capable for a diverse set of mission tasks.

Research Challenges and Opportunities (discussed over the next few pages):

- Airframe Structures and Materials
- Air Vehicle Technology
- Propulsion