



**DEPARTMENT OF THE AIR FORCE
HEADQUARTERS AIR FORCE
WASHINGTON DC**

**Scalable Approaches to Resilient Air Operations
Abstract**

The U.S. Air Force (USAF) Scientific Advisory Board (SAB) study on Scalable Approaches to Resilient Air Operations (RAO) addresses the threat to fixed forward bases from theater ballistic missiles, cruise missiles, and other adversary capabilities. These fixed forward bases enable RAO through Agile Combat Employment (ACE) concepts to quickly establish a base to at least a minimal operational capability, under the threat of sustained attacks, with a potential need to relocate on short notice.

The Study Panel first reviewed the threat and operational environment in the INDOPACOM, EUCOM and CENTCOM Areas of Responsibility (AORs). As China represents the most challenging threat, the Panel focused its research on the Pacific. Next, background information was gathered on current ACE practices, related historical examples, the results from relevant modeling and simulation, and observations from recent exercises. Lastly, the study identified near, mid, and far-term science and technology efforts to guide USAF research and investments in support of RAO. The Panel used evidence gathered from multiple briefings from sources across the Department of Defense, private industry and academia to determine several recommendations. The SAB recommends the USAF:

- Require terminal defense at INDOPACOM spokes, as well as the second island chain (Northern Marianas) and locations near the first island chain (Japan and Philippines). Ensure the promise of the Hypervelocity Gun Weapon System (HGWS) potential via a near-term dedicated risk reduction effort with a focus on effectiveness and suitability for deployment to INDOPACOM spokes. Accelerate HGWS efforts to support the stand-up of second island chain spokes.
- Enhance strategic partnerships with Japan by conducting joint analyses to develop a common understanding of ACE needs in Japan, establish interoperable Command and Control with continuous exercises, and identify co-production opportunities with Japan and execute co-production of needed weapon systems and components.
- Establish HAF organization akin to J39 to drive Information Warfare capabilities and integration of Camouflage, Concealment, and Deception (CC&D) with the purpose of increasing adversary uncertainty and aircraft survivability on the ground.
- Develop, and produce internationally, palletized weapons in order to leverage allied transport aircraft as de facto bombers.
- Ensure the future Collaborative Combat Aircraft will become less runway dependent in order to expand the number of runways available for operations.