

# National Security Use Case



## Jupiter FloodScore™ Enhances Resiliency Planning for Climate-Vulnerable, Strategically Crucial Defense Facilities

### Storm Surges, Sea-Level Rise, and Other Flood-Related Perils Threaten Military Installations at Home and Overseas

Extreme weather caused by climate change spares nothing in its destructive path, including critical defense infrastructure.

Hurricane Michael's October 10 assault on Florida's Tyndall Air Force Base—in which the Category 5 storm destroyed or damaged 5 percent of its built structures, inflicted billions of dollars in losses, and put the base's F-35s and their mission at risk—is the most visible and dramatic example of climate change's threat to national security assets, but it's far from the only one. The [report on a Changing Climate to the Department of Defense](#) (2018) identified "mission-assurance priority installations" at risk of flooding over the next two decades.

Way from the North American mainland, strategic U.S. Navy, U.S. Air Force, and U.S. Marine Corps facilities in the Pacific and Indian Oceans, and on the islands of Japan, will be severely impacted by climate-change-induced coastal flooding. These include installations at Sasebo and Yokosuka, in Japan; bases in the Pacific Ocean, including at Pearl Harbor and on Okinawa and Wake Island; and the installation on Diego Garcia in the Indian Ocean. In addition, inland bases, such as Iwakuni Marine Corps Air Station, Yokota Air Base, Misawa Air Base, and Tsugitani Air Base, all in Japan, are located in regions where terrain-induced flooding is an important physical risk factor.

These installations do not have uniform risk profiles, but their diversity in both physical and human attributes, and their response to climate-related drivers, mean that impacts, vulnerability, and adaptation will vary from one region to another, as well as among countries within the same region. This diversity in potential response has not always been adequately integrated in military construction and adaptation planning.



Hurricane Michael ripped through Tyndall Air Force Base in Florida and the surrounding area leaving severe damage through its path. The storm sustained winds up to 160 mph which significantly damaged every structure throughout the base.

*U.S. Air Force photo by Tech. Sgt. Liliana Moreno*

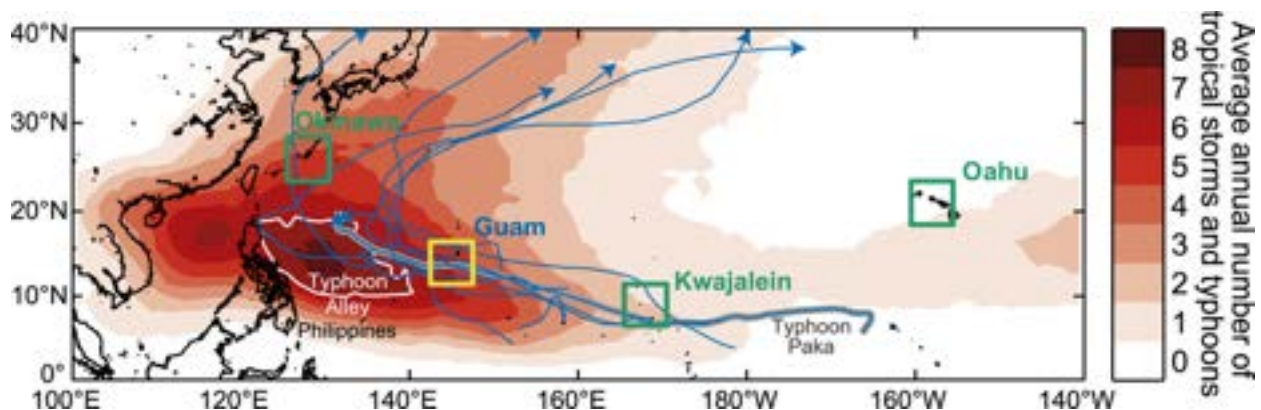
## Climate Change: A High-Probability, High-Impact Threat

The United States' strategic military presence in the Pacific is a bulwark against threats to regional stability and homeland defense. The Pacific, in particular, is highly exposed to climate change impacts. The installations that host the U.S. defense network, though sprinkled across a massive expanse of ocean, share geographic characteristics and overlapping vulnerabilities to climate change's environmental impacts.

More frequent or more intense extreme weather, sea-level rise, and other climate impacts create a range of threats to the well-being and security of military assets in the Pacific, many of which are already imperiled by natural-disaster vulnerability and increasingly complex security tensions. Extreme weather events that lead to intense flooding from storm surges and waves—even remotely generated thousands of miles away—can cause severe damage to infrastructure, impair critical military operations, and put human lives at risk.

Climate change is a high-probability, high-impact threat, but one that we can foresee. Defense communities across the Pacific are compelled to comprehensively address the risks created by climate change to achieve their mission in coming years. Quantifying the physical impacts of climate change is critical to U.S. national security, with initiatives underway to improve the resilience of defense installations.

In addition, considering climate security consequences with a broad aperture—including how they affect current and future drivers of societal fragility and geopolitical instability, and exacerbate existing security threats—can inform civilian and military plans, promote coordinated responses, and shift DoD resources to a proactive, preventive posture.



Climatology (1979–2012) of observed tropical cyclones (red shading) and storm tracks (blue lines) passing near Guam (yellow box) during 1997.

## High-Resolution Climate Risk Analysis and Its Strategic Mission

[Jupiter Intelligence™](#) is the global market, science, and technology leader in physical climate analytics for risk management and resiliency planning. Jupiter provides solutions to Department of Defense installations around the globe to improve resilience and harden assets, prevent and control damages and losses, and save.

For example, Jupiter FloodScore™ has been adapted by the Department of Defense to provide localized, very-high-resolution projections of potential storm surge and sea-level rise impacts to global installations and their assets. Jupiter is suited to this type of assignment for multiple reasons. The company is grounded in

exceptional climate, oceanographic, and data science, with extensive experience in providing its technology and expertise to help DoD installations and others like it:

- **Identify** likely extreme weather events, and improve prediction of intense flooding from storm surges and waves that cause severe damage to infrastructure, impair essential military operations, and put human life at risk, particularly in theaters of operation.
- **Evaluate and identify** preferred location(s) for new infrastructure construction and identify assets in need of protection within the existing infrastructure over the next 50 years; produce an engineering resiliency plan supported by a predictive hydrometeorological model coupled to a wave runup model.
- **Assess** how extreme weather events affect current and future drivers of regional instability and impact strategic issues such as great power competition, counterterrorism, alliances, forward basing, aerial and sea ports, and infrastructure investment; in addition, improve the ability of civil and military institutions to coordinate comprehensive responses and adopt a more preventive posture.

Climate change is likely to alter the local physical and strategic environment profoundly and, potentially, catastrophically. Climate science is capable of providing some of the most accurate information available to policymakers about future impacts of extreme weather. It presents a deeply concerning risk picture for the Pacific.

Taking a preventive and precautionary approach to addressing the significant climate security challenges in the region will help ensure it remains a zone of stability and prosperity, despite the unprecedented challenges that lie ahead.

## About Jupiter FloodScore

Jupiter is adapting FloodScore expressly for the federal government. [Jupiter FloodScore](#) probabilistically predicts long-term flood hazard from six months to 50-plus-years in advance. Jupiter's proprietary models capture the complex interaction among flood-generating factors and quantify asset-level risks from weather in a changing climate around the world.

FloodScore is designed to support long-term infrastructure planning, and engineering and investment decisions for critical assets. Flood levels are predicted on a probabilistic basis and presented for different climate scenarios. It supports "what-if" analyses to evaluate potential protection measures and investment decisions over time. FloodScore is a member of Jupiter's peril-specific, very-high-resolution ClimateScore Planning applications family, which also includes WindScore,<sup>™</sup> HeatScore,<sup>™</sup> and FireScore.<sup>™</sup>

For more information, please visit <https://jupiterintel.com> or email us at [info@jupiterintel.com](mailto:info@jupiterintel.com).