DEPARTMENT OF DEFENSE PACIFIC ISLAND INSTALLATIONS:
IMPACTS OF AND ADAPTIVE RESPONSES TO CLIMATE CHANGE

1. Objective of Proposed Work

The objective of this Statement of Need (SON) is to improve our understanding of potential climate change impacts on Pacific Island biotic and abiotic resources of relevance to Department of Defense (DoD) fixed installations in the region. Research proposals are sought that improve our understanding of: (1) the potential impacts of climate change and climate variability, including extreme events, on Pacific Island coastal processes and infrastructure, coastal and terrestrial ecosystems, and water resources and (2) the adaptive capacity or resilience of the preceding and strategies to minimize adverse impacts.

Research needs include but are not limited to improvements in our understanding of the following:

1. Potential impacts of climate change on military infrastructure that result from coastal flooding and erosion, as well as loss of protective wetlands and other coastal ecosystems serving that function.
2. Potential impacts of climate change, in the context of other anthropogenic stressors, on near-shore marine, coastal, and terrestrial ecosystems of management concern to DoD resource managers.
3. Potential impacts of climate change on water resources, including the effects of saline intrusion into freshwater lenses, reduced precipitation and recharge, and seawater inundation.

Proposals submitted in response to this SON may address one or more of the research needs listed above and may address one or more islands containing a DoD installation. The influence of the geophysical setting of islands chosen for study is of interest when addressing the above research needs. Islands immediately adjacent to the western coast of the continental United States are not eligible for consideration under this solicitation. Proposals should include appropriate rationale regarding the use of climate models, emission or other scenarios used as a basis for initiating the models, and parameter settings for climate variables and physical drivers that are used for purposes of vulnerability and impact assessment, whether or not they are directly derived from the climate models.
2. Expected Benefits of Proposed Work

The desired outcome is knowledge that: (1) improves our understanding of the types of potential impacts from climate change and climate variability on coastal processes, coastal and terrestrial ecosystems, water resources, and infrastructure related to military installations located on Pacific Islands; (2) identifies installations that are potentially vulnerable to the impacts of climate change and climate variability and assesses the adaptive capacity/resilience of infrastructure of Pacific Island military installations; and (3) provides new or enhanced tools and models that can be used for vulnerability assessments and detailed impact assessments at appropriate spatial and temporal resolution.

3. Background

The fourth Assessment Report of the Intergovernmental Panel on Climate Change identifies small islands, including those in the Pacific, as being especially vulnerable to the impacts of climate change. DoD has numerous strategic assets that occur throughout the Pacific on such islands. Susceptibility to the impacts of climate change may pose significant challenges to military readiness and stewardship requirements. Ecosystems associated with these islands already are under stress because of invasive species, pollution, and development.

Vulnerability to climate change is dependent on exposure (describes the climate-related stressors, such as extreme aridity, precipitation, or sea level rise, to which a system is subjected), sensitivity (degree to which a system is modified or affected by climate-related stressors), and adaptive capacity (measure of a system’s ability to reduce the impact of the climate-related stressor). Adaptive capacity can be an inherent property of the system (whether natural or human), a planned action to improve capacity, or a post-impact action to restore capacity. Understanding the impacts of climate change and climate variability is first dependent on resolving for any particular system the components of vulnerability described above. With that knowledge and appropriate use of climate models/scenarios, environmental/biophysical process models, and infrastructure-specific impact assessment models, estimates can be made of how assets of concern to DoD and the associated military mission may be affected by climate change.

Pacific Islands are vulnerable to coastal flooding and reductions in the extent of coastal vegetated wetlands as a result of climate change. Low-lying islands are likely to experience higher levels of inundation from sea level rise, which in association with storm surge will lead to increased flooding, coastal erosion, and salinization. Relative sea level in the western tropical Pacific has been rising more rapidly than the global mean sea level rise since the 1990s, possibly due to wind stress phenomena. Protective and key ecosystems from a compliance perspective, such as mangroves and coral reefs, are sensitive to inundation and temperature changes. The vulnerability of water resources is of particular concern, due in part to their already limited size relative to demand. In addition to the effects of inundation and salinization on water supplies, future potential changes in the distribution of rainfall may have profound effects on water availability, not only in terms of availability for human use but also to support native ecosystems.

Complementary SERDP-Funded Projects: SERDP is supporting several projects relating to improving our understanding of the impacts of climate change and climate variability on built and natural infrastructure on military installations. A brief description of these ongoing projects...
can be found at the SERDP web site (www.serdp-estcp.org/Program-Areas/Resource-Conservation-and-Climate-Change/Climate-Change).

4. Cost and Duration of Proposed Work

The cost and time to meet the requirements of this SON are at the discretion of the proposer. Two options are available:

**Standard Proposals:** These proposals describe a complete research effort. The proposer should incorporate the appropriate time, schedule, and cost requirements to accomplish the scope of work proposed. SERDP projects normally run from two to five years in length and vary considerably in cost consistent with the scope of the effort. It is expected that most proposals will fall into this category.

**Limited Scope Proposals:** Proposers with innovative approaches to the SON that entail high technical risk or have minimal supporting data may submit a Limited Scope Proposal for funding up to $150,000 and approximately one year in duration. Such proposals may be eligible for follow-on funding if they result in a successful initial project. The objective of these proposals should be to acquire the data necessary to demonstrate proof-of-concept or reduction of risk that will lead to development of a future Standard Proposal. Proposers should submit Limited Scope Proposals in accordance with the SERDP Core Solicitation instructions and deadlines.

5. Point of Contact

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For Core proposal submission due dates, instructions, and additional solicitation information, visit the SERDP web site at www.serdp-estcp.org/Funding-Opportunities/SERDP-Solicitations.