A. **Background**: Global climate models project an increasing rate of sea-level rise over the next 100 years and there is evidence that future hurricanes will be stronger over this period. As a result, Eglin Air Force Base and similarly situated coastal facilities will likely experience significant changes to environmental resources and man-made infrastructure due to shoreline retreat, increased flooding and erosion, changes in groundwater flow, and greater wind loads and storm surge.

B. **Objective**: The objective of the proposed project is to systematically characterize the responses of system components to sea level rise and to advance an existing large-scale numerical model for quantifying the hazard risk to coastal facilities. The model will be used to predict the extent of increased risk under near-future scenarios of sea-level change and greater storminess. It will provide a unified method to compare the positive and negative changes of the components in a common set of cost-units. This will allow prioritization of mitigation responses. The study is specifically designed to make projections for Eglin Air Force Base. However the result will be a methodology for predicting the effects of sea-level change that can be applied to any coastal DoD facilities. Such predictions can be used for assessing the cost-effectiveness of mitigation and adaptation strategies. The predictive tools will be made available to DoD decision-makers in a format that is readily available to use and to apply to management decisions related to coastal installations at risk for future sea-level change. The innovation in this project comes from a single coherent approach and a proper accounting of uncertainty associated with hypothesis generation, data collection, model parameterization, and forecasts.

C. **Summary of Process/Technology**: In part as a result of intense developments following the disastrous 2004 and 2005 U.S. hurricane seasons, the methods for predicting and evaluating coastal storm surge flooding and damage have been substantially advanced. Advances have also been made in studies of long-term responses of natural systems such as beach systems (e.g., Cowell et al., 2003a and 2003b; deVriend et al., 1993; Niedoroda et al., 2001 and 2003), tide ranges (e.g., van Goor et al., 2001) river systems (Fagherazzi et al., 2004b) and salt marshes (e.g,. Morris et al., 2002; Mudd et al., 2004). Process-oriented numerical models have resulted from these and other similar studies. There is a growing movement to harness the developments within multi-disciplinary studies of natural systems (Capobianco et al., 1999; deVriend, 2001). We propose to make maximum use of these developments to produce a comprehensive analysis of the effects of sea level rise on natural and infrastructure element of the coastal system at Eglin Air Force Base. By applying existing knowledge and numerical models to these systems we plan to produce reliable predictions for a variety of features. These then will be represented in a unified numerical model containing all of the component systems so that predictions of the impacts of sea level rise are made for the system acting as a whole to specific sea level rise scenarios.

D. **Benefits**: Despite large uncertainties in climate projections, near-future climate change is expected to have a significant impact on coastal environments. The methodology developed in this project will provide a set of unique tools to DoD decision-makers and the scientific community for predicting, mitigating and adapting to the effects of sea-level change and associated phenomena (including storm surge) on coastal infrastructures. These predictive tools will be in a format that is readily available to use and to apply to management decisions related to any coastal installations at risk for future sea-level change.