STATEMENT OF WORK

Tsunami Modeling in Support of the USGS Science Application for Risk Reduction (SAFRR) Project and in support of PCMSC research project “Probabilistic Forecasting of Earthquakes and Earthquake Effects” and its task “Science Application for Risk Reduction (SAFRR) Tsunami Scenario Coordination”

Background:

The USGS Science Application for Risk Reduction Project (SAFRR) and its predecessor the Multi Hazards Demonstration Project (MHDP) use hazards science to improve a community's resiliency to natural disasters including earthquakes, tsunamis, wildfires, landslides, floods and coastal erosion. The project engages the user community in setting research goals and directs efforts towards research products that can be applied to loss reduction and improved resiliency. The first public product of the MHDP was the ShakeOut Earthquake Scenario published in May 2008. The magnitude 7.8 earthquake scenario served as the scientifically credible basis of the largest earthquake drill in United States history involving over 5,000 emergency responders and the participation of over 5.5 million citizens. Its second major project was a storm scenario, ARkStorm, a next-generation winter storm scenario.

The current scenario is a tsunami scenario. This scenario is defining in some detail a large, hypothetical, but realistic event generated by a magnitude 9.1 earthquake in the eastern Aleutian Islands. The USGS is partnering with a variety of agencies to explore the most important implications of disasters and opportunities to better prepare for them and reduce their impacts. Some of the goals include developing the best models of currents and inundation for the event; spurring research related to Alaskan earthquake sources; understanding the economic impacts to local, regional and national economy in both the short and long term; understanding the environmental impacts of coastal inundation; and creating enhanced decision-making resources relating to an alert and/or event.

Engineers are using the current and inundation modelers’ information to estimate the tsunami’s impact in terms of physical damage, repair costs, and restoration time for buildings and other infrastructure such as water supply systems, electric power, transportation, and telecommunication. Disaster social scientists are quantifying human impacts (casualties, evacuees, sheltering needs) and emergency response activities. Economists are quantifying the tsunami’s impact in terms of direct and contingent business interruption. In each portion of the study, the researchers will attempt to identify opportunities to mitigate the negative impacts of the tsunami.

Like other MHDP/SAFRR scenarios, this one will serve as a long-lasting tool to teach preparedness and inform decision makers. A remotely generated tsunami resulting from a M>9 earthquake on the Aleutian megathrust has a higher probability of affecting Los Angeles than one that is locally generated owing to the long recurrence intervals between local offshore events. As an emergency management exercise, a remotely-generated event would offer unique challenges as managers will have 4-6 hr warning to decide which actions are prudent (such as evacuating boats from harbors and keeping people off beaches).

The first major release of results related to impacts in California is planned for August 25-28, 2013 at the COPRI (Coasts, Oceans, Ports and Rivers Institute) conference in Seattle. To handle the surge of work needed to complete the tsunami modeling efforts for the scenario and for follow-on work timed for the 50th anniversary of the 1964 Great Alaska Earthquake in 2014, the USGS is seeking to contract with a contractor that has sufficient regional, technical, and engineering expertise in tsunami hydrodynamics, with a primary focus on understanding the effects in southern California ports, harbors, and developed coastal areas. In FY11, the Southern California Earthquake Center (SCEC) provided coordinated tsunami
modeling with hydrodynamic results from several areas in southern California. In FY12, SCEC provided additional coordinated tsunami modeling, both applying the same techniques to additional geographic areas and coupling the FY11 results and techniques with additional techniques to provide estimations of tsunami erosion and scour, and forcing on submerged and floating objects. Meetings with stakeholders highlighted the need for further modeling, both applying the original techniques to additional geographic areas, and applying the sediment transport model developed in FY12 to identify areas where contaminated sediment would be suspended.