

# An Integrated Approach to Probabilistic National Multi-Hazard Coastal Risk Maps

## Genesis:

- May 2015: Expert meeting at the **Rockefeller foundation**  
=> Brainstorm ideas, involve NAS
- May 2015: **NAS meeting of experts on coastal resilience**  
(NOAA, USACE, (FEMA), (DHS))
- October 2015: **OSB meeting** => presentation of concept ideas for a NAS focused study to the board and some potential sponsors (USGS, NOAA, USACE, FEMA)

## Rationale:

- Improving coastal **resiliency** depends on **effective** coastal (flood) **hazard assessment and mapping**
- Coastal (flood) hazard can be **caused and/or enhanced by multiple phenomena** usually studied in isolation (storms, extreme tides, heavy rain, tsunamis, earthquakes, wildfires,...) by different agencies (e.g., FEMA, NOAA, USGS, USACE,...)
- Most current (flood) hazard maps **do not consider time-dependent contributions** such as related to climatic changes (sea level rise, land subsidence, changes in storm characteristics/frequency, morphologic response,...) and **do not quantify uncertainty**
- Most current (flood) hazard maps **do not consider combinations and interactions** between multiple statistically independent hazards
- Effects of **existing flood protection**, their reliability and weakening by prior events are not considered

# NAS Focused Study Project: Multi-Hazard Coastal Risk

## Problem Statement:

Existing efforts that address multiple hazards can be difficult to interpret and confusing for coastal communities because different agencies address different hazards and use different approaches to develop flood maps. In the absence of a unifying framework that can place efforts in context, the disparate maps can invite confusion, hinder an accurate public understanding of flood risks, and inhibit the evaluation of adaptation strategies.

## Objective:

Layout the roadmap **for developing consistent, probabilistic multi-hazard coastal (flood) maps**, based on the best available science, consensus-based, regularly updated, on which **uncertainty** associated with coastal hazard/models is quantified

# Multi-Hazard Coastal Risk - Tasks

- **Review and summarize existing coastal hazard assessment** activities including, among others, flood mapping efforts, vulnerability assessments, and coastal change hazard assessments and inundation modeling.
- **Formulate a probabilistic multi-hazard framework** that accounts for interactions between hazards, effects of climate change, and long-term coastal change that places existing efforts into context and that can be used for scenario development by local governments and communities to enable planning for adaptation strategies.
- **Identify research needs**, including needed advances to the coastal, nearshore and estuarine sciences, modeling of combined threats, and methods for combined threat risk analysis.
- **Identify mitigation and adaptation strategies** to reduce the risk and increase the resilience of coastal areas to multi-hazard events and a strategy for the evaluation of different strategies.

# Committee expertise

- Nearshore Oceanographers/modelers (waves, circulation)
- Estuary/Riverine flood modeler
- Coastal change (coastal geomorphologist)
- Coastal Engineer (knowledge about remediation strategies)
- Climate modeler
- Joint-probability/scaling expert(s)
- Social scientist/risk communication?
- Tsunami hazard (modeling and mapping)
- Earthquake hazard (modeling and mapping)
- Urban architecture (?)

# Partnerships

Ocean Studies Board

Marine Board

Resilient America Roundtable

Board on Earth Sciences and Resources

Water Science and Technology Board