INTRODUCTION

The National Centers for Environmental Information (NCEI) provides stewardship for the world’s largest collection of data enabling communities to ensure preparedness and resilience to coastal hazards. In this unique collection, NCEI has the responsibility to ensure access to high-resolution coastal tide gauge data, coastal bathymetry and topography data, global geologic hazards data (tsunamis, earthquakes, and volcanic eruptions) as part of the World Data Center for Geophysics, and are expanding the archive to support other coastal data streams, such as coastal current velocity data important for safety in ports and harbors. Such data are all housed and stewarded at NCEI. The paper will discuss the wide variety of coastal data maintained and stewarded at NCEI, some of the uses, and future plans to expand the collection to address the most pressing needs.

THE DATA

COASTAL TIDE-GAUGE DATA

Water level data along the U.S. coasts and in the deep ocean are critical for early warnings and forecasting of tsunami inundation. These data support informed decision making to minimize risk to life and property along the coasts. NCEI is working with the Center for Operational Oceanographic Products and Services, National Data Buoy Center (NDBC), the NOAA’s Tsunami Warning Centers, and NOAA’s PMEL to produce research-quality data to isolate seismic waves and the tsunami signal (Fig 1). The coastal tide-gauge data for U.S. sites (Fig 2 & 3) and data from the network of U.S.-operated deep-ocean stations are processed and archived at NCEI. These data are also essential to coastal hazard assessment and sea level change research.

COASTAL BATHYMETRY AND TOPOGRAPHY DATA

NCEI compiles, archives, and distributes bathymetric data from coastal and open ocean areas, including acting as the long-term archive for NOAA National Ocean Service (NOS) data (Fig 4) collected in support of charting and navigation. Data can be accessed through integrated viewers. (For more information on data distribution of marine geophysical data visit poster: MG44A-1963 on Thursday)

Coastal lidar data are archived at NCEI and distributed publicly through the NOAA Office for Coastal Management’s Digital Coast (Fig 5). The collection includes data from both topographic and bathymetric lidar sensors. Data are available for all coastal states and include multiple U.S. territories. Over 15 TB have been archived since 2007 (Fig 6).

GLOBAL GEOLOGIC HAZARDS DATA

The first step in understanding coastal vulnerability is to examine the past record of natural hazard occurrences (Fig 7). Long-term data from these events, including photographs of damage (Fig 8), provide clues to what might happen in the future. NCEI catalogs information on global historical tsunamis and uses these data to produce qualitative tsunami hazard assessments at regional levels. The database includes reliable economic impacts, number of deaths, and extent of damages (Fig 9).

TSUNAMI EVENTS

Since the 15th century, tsunami events have caused more than 700 deaths and nearly $500 million in economic loss ($2 billion when inflation-adjusted for 2014) to the U.S coastal states and territories.

PRODUCT GENERATION

These data, collected by partners from academia, federal and state governments, support a wide variety of uses. Ensuring accurate, high quality metadata for these data are essential for their proper use. In addition to providing easy access to partner data to extend the use of these data, NCEI also develops scientifically-validated derived products. Such as the building of high-resolution coastal digital elevation models (DEMs) and U.S. Tsunami Hazard Assessments.

DIGITAL ELEVATION MODELS (DEMS)

The coastal digital elevation models (DEMs) integrate ocean bathymetry and land topography to support NOAA’s mission to understand and predict changes in Earth’s environment, and conserve and manage coastal and marine resources to meet our Nation’s economic, social, and environmental needs. These DEMs, available online (Fig 11), can be used for modeling of coastal processes (tsunami inundation, storm surge, sea-level rise, contaminant dispersal, etc.), ecosystems management and habitat research, coastal and marine spatial planning, and hazard mitigation and community preparedness.

HAZARD ASSESSMENTS

The historical tsunami event information archived at NCEI is used to produce qualitative tsunami hazard assessments at state and regional levels (Fig 12). These assessments are based on the distribution and frequency of runups (maximum wave height) and deaths due to tsunamis (Fig 13). These data are important for coastal planning, responding, and mitigating future events, and they are used by Tsunami Warning Centers, NOAA’s Pacific Marine Environmental Laboratory (PMEL), NOAA Outreach, and the International Tsunami Information Center. An updated U.S. Tsunami Hazard Assessment was just completed (Dunbar and Weaver, 2015). This assessment is one step toward a comprehensive national tsunami risk assessment, as has been done in certain local communities (Fig 14).

FUTURE

We are working with partners across NOAA and beyond to identify the most pressing needs and gaps where data are at risk for being lost or new research has made the data critical for determining coastal hazard and building resiliency. A few such examples are:

- High Frequency radar – being examined for tsunami signals (Fig 15)
- All coastal tide gauge data, including 6-minute resolution and high-low tide – to support nuisance flooding and fill a critical gap (Fig 16)
- NOS Hydrodynamic model output and other Operational Forecast System models
- Expand DEM development

COLLABORATION AND PARTNERSHIPS

DEMs are developed from a variety of source data. Partners include:

- National Ocean Service
- U.S. Geological Survey, Forest Service, and Fish and Wildlife Service
- State, County, and City agencies
- U.S. Army Corps of Engineers
- University-National Oceanographic Laboratory System and Academic Fleet
- FEMA