NOAA's Tide Gauge Network

Tide Station Operation

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Project Summary

The National Oceanic and Atmospheric Administration (NOAA) Center for Operational Oceanographic Products and Services (CO-OPS) operates and maintains a network of 210 long-term, continuously operating coastal water level stations on all U.S. coasts and in the Great Lakes. This National Water Level Observation Network (NWLON) also includes stations on Pacific and Caribbean ocean islands, U.S. territories, and possessions. Many of these stations have now been in operation for over 100 years, with a few having been in operation for over 150 years. NOAA, through CO-OPS, has the national legal authority for coastal tides, tidal currents, and water levels, and is the U.S. leader on relative sea level information for all parts of the U.S. The operation of these stations, and their long period of record, is critical to understanding sea level rise and climate variability, both on a global and local scale. Tide gauge records provide relative sea level trends critical for coastal zone management, engineering, and long-term planning and decision-making on a local and national scale. They also provide calibration for satellite altimeters to better understand and measure global sea level changes caused by thermal expansion and changes in freshwater input. While the period of record for satellite altimeters is relatively short, tide gauge records exist for several decades, giving us a better understanding of what changes we have seen, and how that reflects future variability in sea level due to climate change. All NWLON stations are multi-purpose, providing both long-term and real-time water level information to support multiple user communities, including navigation, hazard warning and mitigation, and coastal zone management. In the climate community alone, immediate users of this data include climate researchers, NOAA and federal partners who use the information to develop climate mitigation strategies for coastal communities or for management decisions, coastal managers responsible for implementing climate change response and mitigation strategies, the general public, climate modelers requiring local information to downscale global models and develop local projections, and many others. All CO-OPS data are available real-time, and products, including long-term trends and monthly and annual means, are available through the CO-OPS *Sea Levels Online* web site, and are archived at all three Global Sea Level Observing System (GLOSS) archive centers. The data are also available through the Permanent Service for Mean Sea Level. Twenty-seven NWLON stations currently comprise the U.S. contribution to the GLOSS Core Network, and forty-five are part of the GLOSS-Long Term Trend (LTT) network. CO-OPS also supports the Global Earth Observation System of Systems (GEOSS) by operating and maintaining the GLOSS-ALT tide gauges at Oil Platform Harvest for satellite altimeter calibration and evaluation, and by maintaining the long-term tide station at

Bermuda. These efforts directly support the NOAA Climate Program Office (CPO) deliverable with respect to sea level: to identify changes resulting from trends and variability in climate. Continuous operation of CO-OPS' observing systems and updates to long-term time series on a national and global scale ensure coverage in the Global Ocean Observing System for Climate and directly impact understanding of both local and global sea level changes as an indicator of climate change. Additionally, these data are used more frequently by coastal planners and decision makers as policy is beginning to reflect better climate science. Access to these data and products resulting from them allow coastal managers to make informed decisions through detailed planning rather than generalizations made at the expense and risk of the general public through poor planning on non-data based assumptions.

Failure to continue operation of CO-OPS' observing systems, update long-term time series, and analyze sea level trends on a national and global scale would cause a large gap in the Global Ocean Observing System for Climate and negatively impact understanding of both local and global sea level changes as an indicator of climate change. Additionally, local sea level trend information is being used more frequently by coastal planners and decision makers as policy is beginning to reflect better climate science. Hindering access to that information through lack of support for *Sea Levels Online* and associated products would force managers to go back to making generalizations, often at the expense and risk of the general public through poor planning.