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Products and Services Available from U.S. NOAA NCEI Archive of Water Level Data

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The U.S. National Oceanic and Atmospheric Administration (NOAA) National Centers for Environmental Information (NCEI) archives analog and digital coastal water level data and ocean-bottom pressure data, digitizes select analog data, and performs quality-control and tidal analysis of these data. The analog tide gauge records (marigrams) cover selected tsunami events between 1854 and 1981 observed at stations across the globe. There are 3,486 high-resolution scanned marigrams in the archive. The digital tide gauge data, primarily U.S. stations, have been collected at 1-minute sampling since 2008. The ocean-bottom pressure data have been collected since 1983. These time-series data are complementary to the maximum wave heights recorded in the NCEI/World Data Service Global Historical Tsunami Database. With the introduction of visual timeline inventories, our NOAA partners have helped us identify, recover, and backfill gaps in our archive. All water level data and products are converted to standardized file formats to reduce barriers to re-use. We provide quality-controlled water level data, computed astronomical tides, details on the harmonic tidal analysis results, and spectra to assess the quality of the de-tiding. Researchers use the quality-controlled data to validate tsunami propagation and storm surge models. Select scanned marigram images are digitized into numerical time-series data by hand-selecting data points along the inked tidal curves. Though automated data point selection capabilities exist, when tested, they did not accurately detect faint traces and consistently failed to correctly select the peak and trough values. Hand-selection ensured that the maximum and minimum values important across water level research would be accurately recorded. From 2016 to 2019, we have digitized 48 of these images, across ten tsunami events, into ready-to-use, digital time-series data. In the event of a tsunami, we augment our holdings by collecting and processing data from the National Hydrographic Services in the affected regions and from the United Nations Education, Scientific and Cultural Organization Intergovernmental Oceanographic Commission (UNESCO IOC) Sea Level Stations Monitoring Facility. Currently, UNESCO IOC does not process these data. These data products are then made available via Tsunami Event Pages.