Updated U.S. West Coast Coastal Relief Model

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Overview

CIRES and National Centers for Environmental Information (NCEI) scientists on the Coastal DEM Team have finalized an update to the northern portion of the NCEI U.S. West Coast - Central Pacific Coastal Relief Model (CRM; Fig. 1). The update includes 225, 1 arc-second, quarter-degree tiles located between 123.25 - 127 degrees W longitude and 40.25 - 44 degrees N latitude. The spatial extents of the CRM were determined based on the current NCEI U.S. Coastal Relief Model Vol.7 - Central Pacific (Fig. 2) and significant bathymetric features such as the Mendocino Ridge. These extents were divided into northern and southern halves to improve data download and processing efficiency. Concurrently, Coastal DEM Team scientists are updating the southern portion of the CRM, which spans from 120.75 - 127 degrees W longitude and 37 - 40.25 degrees N latitude and includes 203, 1 arc-second, quarter-degree tiles.

Data Sources

Data downloaded and processed for the CRM includes bathymetric and topographic data from the NOAA NCEI Multibeam Bathymetry Database, NOAA ENC Charts, NOAA NOS Hydrographic Surveys and BAGs, NOAA OCM Sea-Level Rise Viewer DEMs, USACE eHydro, NCEI CUDEMs, USGS CoNED, and FABDEM. After being downloaded, the bathymetric data were processed and vertically transformed to NAVD88 for consistency with the topographic data.

Data Filtering

To facilitate the CRM generation, CIRES and NCEI scientists developed new code functionality in the CUDEM Github Repository to programmatically filter anomalous values from bathymetric datasets which enabled scientists to incorporate bathymetric data that may otherwise be discarded in the final CRM generation (Fig. 3). As a result, the Northern CRM has nearly complete data coverage and incorporates nearly every bathymetric multibeam survey in NCEI's repository available within the CRM region. See https://github.com/ciresdem/cudem for more information.
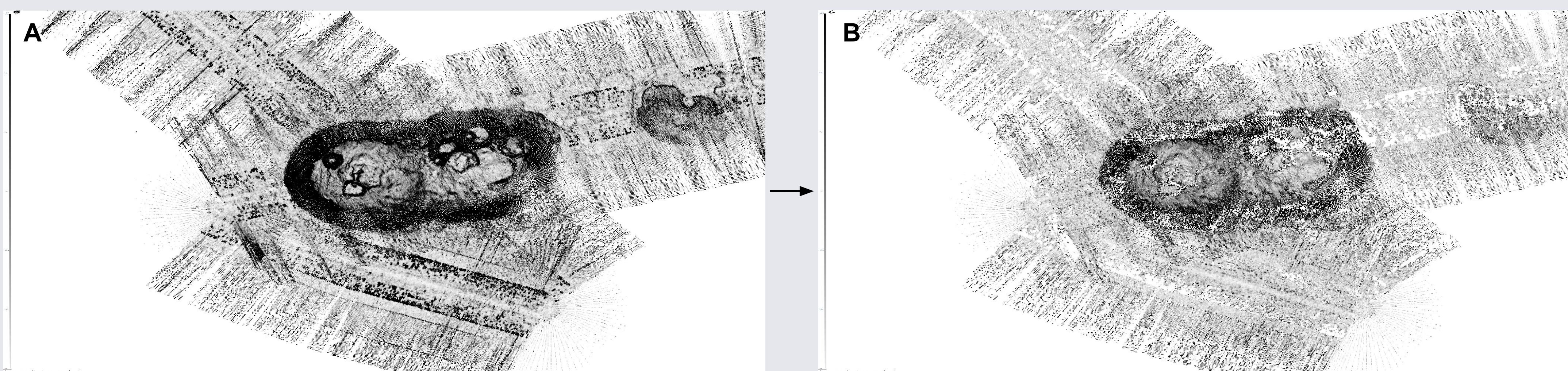

Figure 3: A: Noisy bathymetric multibeam data pre-filter
B: Bathymetric multibeam data post-filter

DEM Validation

To quantify the accuracy of these DEMs, CIRES scientists recently developed the ICESat-2 Validation of Elevations Reporting Tool (IVERT) using photon-counting point cloud data from the National Aeronautics and Space Administration (NASA)'s Ice, Cloud, and Land Elevation Satellite 2 (ICESat-2). The Coastal DEM Team includes results from IVERT in quality-assessment reports and distributes them publicly along with the DEMs through NOAA NCEI. For more information, see Michael MacFerrin's poster titled, "IVERT: The ICESat-2 Validation of Elevations Reporting Tool"

Availability and Future Work

The Updated U.S. West Coast CRM is anticipated to be available to the public in the Fall of 2024. Scientists are currently working on refining the Southern portion of the CRM, DEM validation, and data filtering techniques.
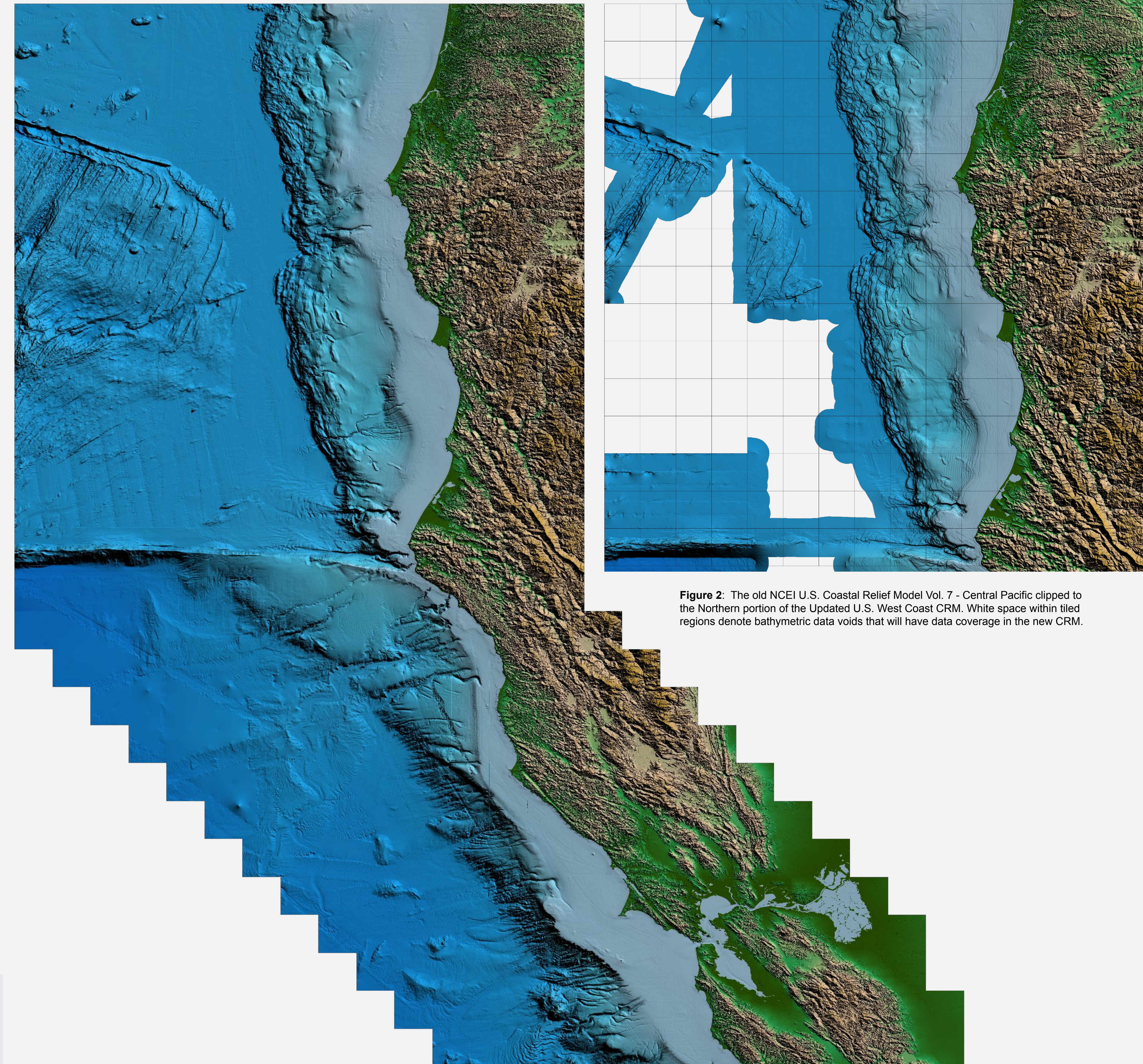

Figure 2: The old NCEI U.S. Coastal Relief Model Vol. 7 - Central Pacific clipped to the Northern portion of the Updated U.S. West Coast CRM. White space within tiled regions denote bathymetric data voids that will have data coverage in the new CRM.

Figure 1: The full extent of the Updated U.S. West Coast CRM. A total of 428, 1 arc-second, quarter-degree tiles located between 120.75 - 127 degrees W longitude and 37 - 44 degrees N latitude comprise the Updated U.S. West Coast CRM, which is split into a Northern and Southern section at 40.25 degrees N latitude.

CUDEM Github

The code and tools utilized to create the CRM is publicly available on the CIRES DEM GitHub repository at https://github.com/ciresdem/cudem

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COASTAL DEMs