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Development and evaluation of the xGEOID20 Digital Elevation Model at NGS

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The U.S. National Geodetic Survey (NGS), an office of the National Oceanic and Atmospheric Administration (NOAA), is preparing for the release of a new vertical datum, the North American-Pacific Geopotential Datum of 2022 (NAPGD2022). This new datum will be based on a high degree spherical harmonic model of the Earth's gravitational potential, and will yield a geoid undulation model (GEOID2022) to calculate orthometric heights from GNSS-derived ellipsoid heights.

As part of the preparation for the new vertical datum, NGS has computed annual experimental geoid models (xGEOID) since 2014. The xGEOID model released in 2020 (xGEOID20) uses an updated digital elevation model (DEM) composed of TanDEM-X, MERIT, and USGS 3DEP data. The DEMs are merged together to create a seamless elevation model across the extent of the xGEOID20 model. The accuracy of the merged DEM is tested using independent datasets such as GPS observations on leveled bench marks and ground elevations from ICESat-2. The effect of the updated DEM on the geoid model is also determined by comparing geoid models computed with previous DEMs to the new xGEOID20 model, and with comparisons to the NGS Geoid Slope Validation Survey lines.