

Taking Technologies to New Heights (and Depths)

The landâ€“water interface in the coastal zone depends on water level change and vertical land movement in space and time. To combine or compare coastal elevations (land heights and water depths) from diverse sources, they must be referenced to the same vertical datum in a common framework. Using inconsistent datums can cause artificial discontinuities that become problematic when producing maps at the accuracy that is needed to make informed decisions. A vertical datum transformation tool being developed by the NOAA will enable any user to integrate bathymetric and topographic coastal data from different sources and different reference datums for US coastal regions.

To gather their data, many agencies and institutions use new technologies, often using kinematic GPS positioning with the resulting elevation data vertically referenced to an ellipsoid datum. However, in the products derived from these data, the elevations must usually be referenced to an orthometric datum such as the North American Vertical Datum of 1988 (NAVD 88) or a tidal datum such as mean lower low water (MLLW), often for legal purposes. Therefore, for effective use of these technologies, some transformation must occur to reference the data to the correct datum.

A vertical transformation tool, VDatum, is being developed to address this issue. VDatum translates geospatial data between 36 different vertical reference systems and removes the most serious impediments to data integration, allowing enhanced interoperability between the maritime- and land-based components of national spatial data infrastructures. Geospatial data can thus be seamlessly integrated for a wide range of applications in the coastal zone.

VDatum will contribute to the US Integrated Ocean and Coastal Mapping (IOCM) concept of 'mapping once and using many times' by removing a major obstacle to data sharing, resulting in data that can serve more than one purpose and reducing redundant data collection. It will also help the NOAA acquire hydrographic and shoreline data more efficiently, and improve the accuracy of surveys and maps by eliminating the need for time-consuming water-level corrections and post-processing.

With the completion of the VDatum tool along all coastal regions of the US, including the Great Lakes, advancements in the 'awareness' of electronic charting systems and ECDIS for the ENC will be possible. Vessels' exact orientation in the water can be accurately determined using differential GPS. This information can then be incorporated into the charting system along with real-time display of water depths corrected for tides for the entire body of water. Danger areas can be displayed, automatically adjusting for the vessel's draft and water level as a vessel transits through areas of concern.

VDatum is already available in a number of coastal regions of the US, and will be available for other regions over the next two years. Estimates of vertical uncertainties are available to users on a region-by-region basis. As regional projects begin to overlap, a seamless national VDatum will emerge to cover all US coastal areas, holding the promise of improved efficiency and accuracy in data gathering operations.

The VDatum tool is available for download from 81.

1. vdatum.noaa.gov