Tidal Planes and MSL Errors

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SUMMARY

The Australian tidal error model is the first attempt to define uncertainties in Mean Sea Level (MSL) around the Australian coastline. Tide gauge observations for the Australian coast span from less than 1 month to greater than 100 years. The high quality, decade and longer observation tide gauges are used in the production of the frequency dependant error surface. The observed hourly data are analysed using the National Tidal Centre TANS analysis package, to estimate harmonic constituents (used for prediction), a MSL determination, a fitted linear trend and a residual. The power spectrum of the residual is then separated into a predefined set of frequency bins, representing the noise levels of the sea surface proportional to frequency. The longer span observations fill more of this predefined spectrum, specifically the lower frequency errors, which contribute a significant proportion to the error. Spatial interpolation around Australia is performed individually for each frequency bin. This method allows regions with shorter spans of observations to have lower frequency error added, creating a synthetic spectrum at the interpolation point. These synthetic spectrums are then used to determine confidence intervals of MSL around the coastline of Australia. The understanding of these errors is an important step for combining bathymetry and topography datasets, ultimately creating a seamless national digital elevation model.

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