GNSS Reflectometry for estimation of ocean dynamic topography at the coast

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The greatest direct impact of sea level is at the coast, but measurements of dynamic topography precisely at the coast are difficult to make, and are presently limited to the relatively small number of tide gauges for which precise GPS vertical coordinates are known. Using recent geoid estimates, dynamic topography estimates are consistent with ocean model analyses at the 5-8 cm level. In order to expand the available dataset, we investigate the use of GNSS Reflectometry to measure sea level that is naturally in a modern vertical reference frame that can be used to study mean dynamic topography, validate geoid models and help to define a world height system. We show the results from multiple GNSS sites with wildly varying environments and equipment; including some with over 10 years of data. We find that in order to get an accuracy of around 5 cm requires the application of both the wet and dry tropospheric correction to the data. We also discuss the use of L5 SNR data where we find precisions of around 3-5 cm and the use of GNSS reflectometry at the coast to also measure or detect the onset of sea ice.