Measuring tidal displacement using GPS

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GPS is making possible high-precision, high-resolution measurements of tidal displacement that could not be achieved with other methods. Earth's surface deforms due to both body tides-the deformation of the solid Earth due to the pull of the Sun and the Moon-and ocean tides-the redistribution of water mass loading over Earth's surface. Body tides and ocean tides both have components that vary on semidiurnal, diurnal, and longer periods.

Yuan et al. used data from 456 globally distributed continuous GPS stations covering the period from 1996 through 2011 to determine the 3-dimensional crustal displacements for semidiurnal and diurnal tides.

They examined the accuracy and possible sources of error in the GPS-based estimates of tidal displacements, and were able to achieve sub-millimeter precision for the first time.

They also compared the GPS-based estimates with model accuracies of both body tides and ocean tides and demonstrated that the GPS-based tidal displacements are more accurate than the modeled displacements, hence providing observations that could be useful for improving the models.

More information: The tidal displacement field at Earth's surface determined using global GPS observations, *Journal of Geophysical Research-Earth Surface*, doi:10.1002/jgrb.50159, 2013
onlinelibrary.wiley.com/doi/10 … /jgrb.50159/abstract

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