



## **Combining Jason-1 altimetry and GRACE time-variable gravity to study steric sea level**

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Previously, we have demonstrated that one can obtain a reasonable estimate of steric sea level (SSL) by combining total sea level (SL) maps from Jason-1 altimetry and equivalent water level maps from GRACE. However, this has been limited to spatial resolutions (half-wavelength) of 1000 km or more because of systematic errors in the GRACE gravity coefficients. Recently, a new set of GRACE coefficients has been released by the processing centers. A new method of filtering the coefficients has also recently been demonstrated to be effective in reducing the systematic errors.

Here, we re-examine 21-months of the GRACE data produced by the University of Texas Center for Space Research from February 2003 to March 2005. After applying the new filter to the coefficients, we find that we can obtain significant ocean mass variations at a half-wavelength of 500 km. This is impossible to do without the filter. At a resolution of 500 km resolution, the error variance is reduced by nearly 60%. With the previous GRACE data, we estimated the error to be about 2 cm RMS at 1000 km smoothing. Using the new data and filtering, we now estimate the error in the GRACE equivalent water level to be 2 cm RMS or less at 750 km, and 2.5 cm RMS or less at 500 km.

Using these new GRACE maps, we compute SSL at 500 km and 750 km resolution and study the variations using Empirical Orthogonal Functions (EOFs). The seasonal modes are compared to the SSL derived from World Ocean Atlas 2001, and show improvements over previous comparisons. In addition, some intriguing interannual variations are observed and discussed.