



## **GRACE-derived surface mass anomalies by energy balance approach**

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Since March 2002, the Gravity Recovery and Climate Experiment (GRACE) mission has provided a global mapping of the time variations of the Earth's gravity field at an unprecedented accuracy ( $\sim 1$  cm of geoid height) and spatial resolution of  $\sim 400$  km. 10-day/monthly global models of the geo potential developed in spherical harmonics are regularly updated and made available by several groups. These solutions are corrected from the known gravity contributions (i.e., atmosphere, oceans, polar movements), so that the residuals correspond to gravity signals which are not modelled, thus mainly continental hydrology. However, they still suffer from important high-frequency noise and leakage effects that limit further geophysical exploitation. We propose an alternative approach based on the energy balance to recover regionally surface water mass variations at higher spatial resolutions ( $\sim 200$  km). Once along-track differences of gravitational potential between the two GRACE satellites are estimated from GINS software-processed orbit data, we use efficient matrix regularization techniques to invert these anomalies of potential to estimate surface equivalent-water thickness changes. For validation, our regional solutions are numerically compared with reference global geoids.