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Separation and Estimation of oceanic and hydrological Model Parameters from simulated Gravity Observations

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Mass variations within the Earth's subsytems atmosphere, oceans and continental hydrosphere are comprised in geodetic observations and can be monitored by observations of the GRACE satellite gravity mission. These time-dependent multi-dimensional signals with individual spectral behaviour have to be separated. Basically separation can be performed in the spatial or in the time domain, but also in the spectral domain or by introducing prior information.

In this contribution we investigate the joint gravity effect of the oceans and the continental hydrology, i.e. we study a spatial separation. To be more specific we apply principle component analysis (PCA) to specific geophysical models for the non-overlapping regions oceans and continents. The set of all empirical orthogonal functions (EOFs) from both PCAs establishes the vector space for a joint estimation of the unknown parameters of a functional model, i.e. the principle components.

To check our procedure we simulate gravity field observations from the applied geophysical models and try to recover the principle components from parameter estimation procedures. Note, that in this study atmospheric effects are masked out due to the vertical integration of the model data from the European Centre for Medium-range Weather Forecast (ECMWF).