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Steric and Mass-Induced Sea Level Variations in the Mediterranean Sea, Revisited

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Observed by radar altimetry satellites such as TOPEX/Poseidon (T/P) and Jason-1/2, the total Sea Level Variations (SLV) are produced by a combination of the steric and mass-induced components. The steric SLV can be computed from in situ measurements of temperature and salinity profiles, or from Ocean General Circulation Models (OGCM) that can assimilate those measurements. Mass-induced SLV can be estimated, since 2002, from Time-Variable Gravity (TVG) measurements by the GRACE satellite mission. This methodology has been successfully applied in estimation of the global ocean mass-induced SLV. However, some difficulties arise when studying semi-enclosed basins due to land aliasing of the GRACE TVG signal. The problem is specially complicated in the Mediterranean Sea as reported in previous studies. We revisit this problem analyzing release 4 of the GRACE data set, which represents a time series 3 times longer than in previous studies, by means of new and more efficient filters to reduce the noise in the high degree and order spherical harmonics coefficients. The seasonal and non-seasonal signals are analyzed. From the comparison of GRACE with altimetry data a general underestimation of the steric term is observed in the OGCMs used.