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Behaviour of the low degree terms of the Earth gravity field over the last 30 years

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The GRACE mission has revealed since 2002 the recent evolution of the Earth's gravity field with a resolution down to 400 km, equivalent to degree and order 50 in spherical harmonics. Precise orbit computation for altimetric satellites can obviously gain by applying these variations, which are classically given, as in recent EIGEN models, as drifts and periodic terms (yearly and semi-yearly).
However extrapolating these variations to pre-GRACE periods, mainly the drifts, can be problematic for orbit computation performances on former altimetric satellites. One option is to analyse older satellite data, in particular SLR data on geodetic satellites, in order to assess the very low degree variations of the gravity field and compare it to the GRACE determination. This can be done over the last 30 years, using for instance the Lageos and Lageos-2, Starlette and Stella satellites. The spherical harmonic degrees that can be accessed in this way are degrees 2 to 4.
Additional information on degree 2 can be derived from the analysis of the Earth orientation parameters, pole coordinates and length of day (LOD), which have been observed over a long period with great accuracy by astrometric, satellite geodetic and extra-galactic means. Once corrected for atmospheric and oceanic load and velocity variations, the pole coordinates will principally bring information on the C(2,1) and S(2,1) coefficients, while the LOD will principally be connected with the C(2,0).
Combining these two approaches allows a better observation of the temporal evolution of the gravity field over a long time span and a more realistic modelling of it for the precise orbit computation of past altimeter missions.