



Mean Albedo Model of the Earth: Estimation and Validation from the GRACE Mission Satellites.

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This talk will be providing the final comparison results of this study we began a couple of years ago, and focusing on the albedo effects induced on the motion of the GRACE mission spacecraft. Generally speaking, the emissivity of the Earth, split into a part in the visible domain (albedo) and the infrared domain (thermic emissivity), is at the origin of non gravitational perturbations on artificial satellite trajectories. Even if small, the amplitudes (and even periods) of these perturbations can be investigated with orbits precise enough. When led over a long period of time, such an approach enables to quantify the variations of the global radiation budget of the Earth.

In this paper, three data sets are used to quantify the mean effects of the Earth albedo on the orbits of the GRACE mission: Stephens tables (Stephens, 1980), ECMWF and CERES data sets. The two latter are used to derive mean models made up a series of monthly grids, that will be presented. The differences between these sets with time (causing seasonal differences) and space (causing differences mainly depending upon the latitude) are analyzed. Following the approach by (Stephens, 1980), we then draw an assessment of the validity of this mean models, from GRACE orbits seen as a references: provided by CNES, they are based on accelerometric data, GPS and SLR measurements. Over the the full GRACE period (2004-2017), we compute daily orbits by using the different new mean models for the albedo, and we analyse the differences with respect to the reference. As expected, it appears that the tangential and normal direction differences are negligible with respect to the order of magnitude of the differences induced on the radial component. We will be showing that over the period of investigation, the mean model derived from ECMWF data sets is the one providing the closest results to the reference. As a result, we show that, based on GRACE orbits, our mean model derived from ECMWF data sets can be seen as an improvement of (Stephens, 1980).