A study on the combination of terrestrial and satellite gravity field data - spectral and space domain interpretation

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Refined studies on Earth gravity field today have a number of new driving impulses, which are intimately associated with an unprecedented progress in data obtained through space missions, but also in data coming from terrestrial and airborne measurements. These advances open problems of theoretical as well as practical nature. The purpose of this paper is to give a space domain interpretation of the optimization concepts and studies in the spectral domain, as discussed by Holota and Kern (2005) and Holota (2005) in combining terrestrial, airborne and satellite gravity field data. Methods typical for the solution of boundary-value problems are combined with an optimization approach, since by nature the problems under study are overdetermined within the combinations considered. Subsequently, for the results reached in the spectral domain the use of series summation techniques is investigated in order to find an interpretation of the results in terms of Green's functions related to the particular combination scheme. This is also used as a tool showing the tie between the global and local modelling of the gravity field.