Benchmark data for verifying background model implementations in orbit and gravity field determination software

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In the framework of the COMbination Service of Time-variable Gravity fields (COST-G) gravity field solutions from different analysis centres are combined to provide a consolidated solution of improved quality to the user. As in many other satellite-related sciences, the correct application of background models plays a crucial role in gravity field determination. Therefore, we publish a set of data of various commonly used forces in orbit and gravity field modelling (gravity field, tides etc.) evaluated along a one day orbit arc of GRACE, together with some additional data to enable easy comparisons. The benchmark data is compiled with the GROOPS software by the Institute of Geodesy (IfG) at Graz University of Technology. It is intended to be used as a reference and provides the opportunity to test the implementation of these models at various analysis centres. In view of the COST-G GRACE (-FO) gravity field combinations, we show the outcome of such a background force field software validation for the GRACE-SIGMA software of the Leibniz University of Hannover (LUH), the GRGS GINS software, EPOS of the German Research Centre for Geosciences (GFZ) and the Bernese GNSS software from AIUB (Astronomical Institute, University of Bern). We consider differences in the force modelling for GRACE (-FO) of one order of magnitude less than the accelerometer noise to be negligible, and make an attempt to quantify and explain differences exceeding this threshold.