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Earth System Science Data Discussions

Interactive comment on "Simulation of the time-variable gravity field by means of coupled geophysical models" *by* Th. Gruber et al.

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Item 1: A paragraph and a figure have been added to the manuscript showing spatial resolution and time variability of time variable gravity field sources. The figure is explained in the new paragraph and includes also the estimated observation capabiliies of GRACE. Amplitudes of time variable gravity field sources are identified in Figure 13 (Figure 14 in new numbering scheme)for the different sources taken into account in this study.

Item 2: Apart from incompressible vs. compressible models, it is not so much a matter of calculating (elastic) Love numbers exactly or not (so I would not dub them "errors"); it is rather a matter of how good the seismic models (i.e., radial density profile, ridigidity and compressibility) are from which Love numbers are derived. Farrell used the

Gutenberg Bullen A earth model; at Dziewonkski & Anderson's 1981 Preliminary Reference Earth Model PREM is the "standard" model ... by the way, so this year we are celebrating the fact that the most used reference Earth model is already 30 years preliminary ...! Rather than trying to improve upon a kind of standard radial-profile Reference Earth Model or discussing the ins and outs of calculating elastic Love number "exactly" or not, in our opinion lateral variations in Earth structure and properties would be far more important to concentrate upon. Densities and elastic structures of the shallow Earth underneath the oceans differ considerably from those under continental cratons, for example. The Love numbers applied in this study are products of these Earth models. We don't generate our own Love numbers. It shall also be noted that for the long-wavelength deformation that we consider (1-100 deg), the differences in kn from PREM and GB-A will be pretty small. In conclusion in section 7.2 a reference was made to Farrell, 1972.

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