Geophysical Research Abstracts
Vol. 16, EGU2014-4866, 2014
EGU General Assembly 2014

A high-frequency Earth rotation model based on empirical ocean tide models: re-examination of the corresponding Euler-Liouville equation

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Within the SPOT (Short Period Ocean Tidal variations in Earth rotation) project we want to develop a new high-frequency Earth rotation model based on empirical ocean tide models. A general overview of the project and the recent state is presented in (EGU Abstract Madzak et al., 2014). The focus of this investigation is on the theoretical description, i.e. the Euler-Liouville equation and the related effective angular momentum function (EAMF). The conventional model is based on theory published nearly 20 years ago (see Gross, GRL 20, 1993; Brzezinski, manus. geodae. 19, 1994). A special set of coefficients, reflecting the considered elastic Earth model, the decoupling of the Earth mantle from the liquid core, and the free-core nutation, is used since this time.

In a first step, we re-examine the theoretical description by the Euler-Liouville equation, the related EAMF and the applied simplification (linearisation etc.). Moreover, we investigate the influence of the chosen Earth model parameters on the resulting Earth rotation parameters within a realistic parameter space. Throughout the whole study the consistency of the applied set of parameters is checked carefully.