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**UNIVERSITÄT
BERN**

Universität Bern

Astronomisches Institut

Bern, 7. December 2016

Bachelor/Master Thesis

Reduction of Background Model Errors by using most recent Ocean Tide Models for GRACE Data Analysis

MOTIVATION

The determination of large-scale mass variations in the system Earth from inter-satellite K-Band ranging with micrometer-precision from NASA's GRACE mission requires a proper modeling of various forces acting on the GRACE twin satellites. Besides non-gravitational forces, which may be directly measured with high precision by the onboard accelerometers, short-term mass variations need to be modeled that are occurring in the system Earth with periods shorter than one month. This includes in particular the mass variations due to ocean tides. Ever improving models, especially in shelf seas and in polar regions, are available from satellite altimetry and shall be used for the GRACE Data Analysis performed at the Astronomical Institute of the University of Bern. Shallow tides that are not included in the ocean-tide models can be interpolated from the main tides and twice daily atmosphere tides are taken into account by the use of dedicated models.

DESCRIPTION

- Tide models are either given in the form of global grids or in spectral representation by spherical harmonic coefficients. For use with the in-house developed Celestial Mechanics Approach the latter is needed and a tool for the conversion from grids to spectral representation has to be developed.
- The interpolation of shallow tides has to be adapted to the set of available main tides of an ocean-tide model. The existing set of interpolation coefficients has to be revised and eventually complemented and the resulting shallow tides from different tide-models validated by intercomparison.
- An atmosphere tide model has to be implemented and checked for plausibility. It has to be tested in conjunction with existing models for de-aliasing of short-periodic (non-tidal) atmosphere and ocean variability.

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