Master project at Geodetic Observatory Wettzell

Tidal analysis of tiltmeter time series

Project description/Projektbeschreibung:
The "G" ring laser operated at the Geodetic Observatory Wettzell is currently the only instrument which is able to monitor the variations of Earth rotation absolutely, i.e. without taking external objects like cosmic radio sources or satellites as a reference. In order to account for local tilt changes, which are noise for our purpose and should be removed, the orientation of the ring laser platform is monitored by a set of high accuracy tiltmeters. While the ring laser is sensitive to geometrical tilts only, the tiltmeters are also affected by horizontal attractional forces. For that reason, the attractional component of tidal tilts has to be removed before applying the tilts as a correction to the ring laser time series.

Aims of the project/Projektziele:
The aim of the project is to derive specific tiltmeter factors for different tidal frequencies. These factors describes local deviations from the nominal deformation due to the tidal potential plus the additional potential due to the shifted masses, which is expressed as the Love number k. This additional component has to be identified and removed from the tiltmeter data.
Time series from different tiltmeters over several years are provided. The series has to be cleaned for spikes, offsets and gaps, resampled to a uniform sample rate, and analysed using the Earth tide analysis software Eterna. The determined tiltmeter factors are then used to create model time series to correct the tiltmeters for the total tidal attraction and, finally, to apply the series to the G ring laser data.

Skills/Kenntnisse:
Knowledge in geodesy, geophysics or physics and analysis of time series, basic knowledge in Linux and MatLab (optional)

Questions are appreciated! Please ask:

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Hinweis:
Dieser Projektvorschlag wird in Englisch veröffentlicht, um deutsche und internationale Studierende anzusprechen. Die Arbeit kann, wenn die Bedingungen der Prüfungsordnung es zu lassen, in Deutsch oder Englisch verfasst werden. Auch am Observatorium wird hauptsächlich deutsch gesprochen.