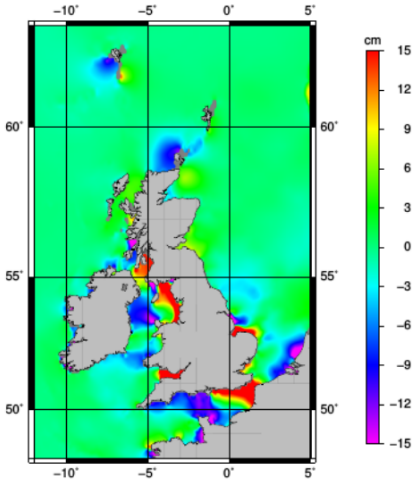
Current topic for a Master's Thesis

Ocean Tide Modelling in Coastal Areas: Can we improve tidal predictions by using dedicated geophysical range corrections?

Ocean tides, resulting from the gravitational attractions of Moon and Sun, cause about 80% of the ocean surface topography variability. Their reliable prediction is crucial for various applications, among them forecast of extreme flooding events in coastal regions. DGFI-TUM has been using satellite altimetry observations for many years to generate different global empirical ocean tide models, the latest one called EOT11a. The long time series of precise and nearly global altimeter measurements of missions with different sampling characteristics allow for a precise empirical modelling of ocean tides. But even if ocean tide models have been improved dramatically in the last years, issues are still found for areas of great interest for climate impact studies: the coastal regions.

DGFI-TUM works on the improvement of empirical ocean tide models in coastal areas. The impact of dedicated coastal retracking of radar echoes has recently been demonstrated. Other quantities influencing the model performance are the geophysical range corrections applied to the altimetry measurements. Among them are atmospheric corrections. This thesis shall access the impact of using different wet tropospheric corrections on the quality of ocean tide modelling in coastal regions. At least three different correction types should be investigated: radiometer measurements, a standard correction model (ECMWF), and an advanced model (GPD+). All results shall be carefully validated by using data of coastal tide gauges and shallow water bottom pressure sensors.



Differences between EOT11a and FES2012 (M2 amplitude)

Main tasks:

- Estimation of amplitudes and phases of main ocean tidal constituents in different coastal areas based on satellite altimetry observations.
- Application of different geophysical corrections to the altimeter ranges and investigation of their impact on the model quality.
- Investigation of the model performance by different validation procedures, e.g. by analysing the along-track precision, by comparison with other ocean tide models, or by using data from in-situ stations.

References:

Piccioni G., Dettmering D., Passaro M., Schwatke C., Bosch W., Seitz F.: Coastal Improvements for Tide Models: The Impact of ALES Retracker. *Remote Sensing*, 10(5), 10.3390/rs10050700, 2018

Savcenko R., Bosch W.: EOT11a - Empirical Ocean Tide Model from multi-mission satellite altimetry. DGFI Report No. 89, 2012.

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