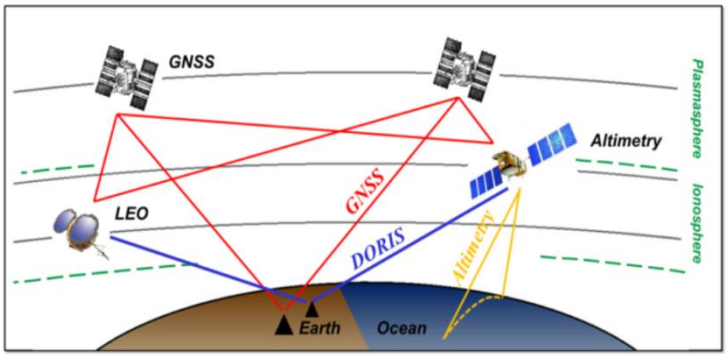
Current topic for a Master's Thesis

DORIS-based ionospheric corrections for single - frequency radar altimetry

The Earth's ionosphere is a dispersive medium, i.e. its influence on electromagnetic waves is frequency-dependent. Thus, dual-frequency geodetic space-based measurement techniques such as GNSS or DORIS can be used to compute ionospheric delays of radio waves. One can also use these measurements in order to model the total electron content (TEC) and take these models to correct observations form different techniques.



Different space-geodetic techniques influenced by the Earth's ionosphere.

Ionospheric effects are an important errors source for altimeter systems measuring sea surface heights. Not all altimeter missions are equipped with dual-frequency altimeters. Some, e.g. Cryosat-2, need external models to correct their measurements for ionospheric delays. Nowadays, this is mostly done by using GNSS-based global ionosphere models (GIM). However, DORIS observations are also usable. Nearly all altimeter missions are equipped with DORIS for precise orbit determination. That enhances the applicability of DORIS for providing reliable ionospheric corrections for altimetry since the measurements are directly taken on the same platform.

Within the Master Thesis, a local approach for vertical TEC (VTEC) modelling around the altimeter's ground tracks should be developed based on the DORIS slant TEC measurements, including reliable error estimates. A validation should be performed using dual-frequency VTEC observations from Jason-3 radar altimeter. The solution should be compared to results from GNSS models (e.g. IGS GIM).

Reference:

- Dettmering D., Limberger M., Schmidt M.: Using DORIS measurements for modeling the vertical total electron content of the Earth's ionosphere. Journal of Geodesy 88(12): 1131-1143, 10.1007/s00190-014-0748-2, 2014

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