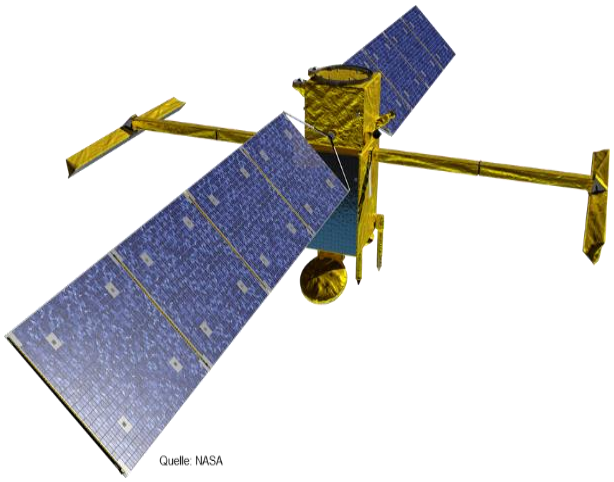
Current topic for a Master's Thesis

Time-Variable River Surface Slopes from SWOT

The recently launched Surface Water and Ocean Topography (SWOT) mission will provide the first-ever comprehensive view of Earth's freshwater bodies from space. It enables to determine the changing volumes of freshwater over the globe with unprecedented resolution. SWOT is the first altimetry mission that carries a radar interferometer. It provides synchronous water surface elevation, area, and slope measurements of rivers. Particularly, the ability to obtain high-resolution time-variable water surface slopes (WSS) is highly innovative. This variable could previously only be measured with a low temporal and spatial resolution using radar or lidar altimetry.


Quelle: NASA

In this thesis, the pre-processed time-variable SWOT river WSS shall be studied. The goal is to analyse their accuracy by comparing them with other data sets and by using them for the calculation of river discharge. Moreover, the data should be exploited to derive water level-slope-discharge relationships. That will help to better understand river flow and can also be used to extract slope information for periods where only elevation data from classical satellite altimetry are available.

This thesis requires proficiency in data analysis and Python. A background in remote sensing and/or hydrological modeling and experience with satellite data and GIS software are advantageous.

Main tasks:

- Analyze SWOT data to extract time-variable river slope measurements from Level-2 products
- Compare and contrast SWOT WSS with existing measurements from altimetry and gauges
- Develop and validate a method for parameterizing the water level-slope-discharge relationship, investigate its transferability to other periods, and test its application for classical mission data
- Analyze the impact of using high resolution time variable SWOT river slopes on discharge estimation and its uncertainties (using existing methods and software)

References:

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