



Current topic for a Master's Thesis

Coastal sea level variability in the Agulhas current system

The dynamics of the coastal ocean along the southeastern coast of Africa is dominated by a strong and intense western boundary current, the Agulhas Current. The Agulhas Current is one of the fastest-flowing Western Boundary Currents in the world and plays a key role in the local weather patterns of southern Africa and the global climate. The position of the Agulhas current core has been found to influence the variability of the coastal sea level (Nhantumbo et al., 2020). The variability of coastal sea levels in this region is also apparently influenced by coastal trapped waves (Bailey et al. 2020). New insight into the interplay of these phenomena can be achieved thanks to the recently launched Surface Water and Ocean Topography satellite (SWOT), which provides a 2D swath (~2*50 km) observation of the sea surface height. This has advanced the study of open ocean and coastal processes.

The objective of the thesis is to use SWOT wide-swath altimetry, both along-track and Level-4 gridded data, to investigate the influence of the position of the Agulhas Current core on the coastal sea level variability along the southeastern coast of Africa. The supervision will be provided in collaboration with colleagues at Deltares (**Netherlands**), the Nansen Environmental Remote Sensing Centre (**Norway**) and the Nansen-Tutu Centre (**South Africa**).

Main tasks of this thesis:

- Detect the core of the Agulhas Current from along-track SWOT wide-swath satellite altimetry and Level-4 gridded products
- Investigate the impact the cores' position has on coastal sea level variability from SWOT
- Investigate to what extent coastal trapped waves can be observed in state-of-the-art altimetry products for the study region

References:

Bailey, D. et al. (2022): An investigation of sea level and circulation response during a coastal trapped wave event on the Eastern Agulhas Bank, South Africa. DOI: [10.1016/j.csr.2022.104698](https://doi.org/10.1016/j.csr.2022.104698)
Nhantumbo, B., et al. (2020): The relationship between coastal sea level variability in South Africa and the Agulhas Current. DOI : [10.1016/j.jmarsys.2020.103422](https://doi.org/10.1016/j.jmarsys.2020.103422)

Institute: Deutsches Geodätisches Forschungsinstitut der TUM (DGFI-TUM)
Supervisors: Dr Michael Hart-Davis, Dr Marcello Passaro
Contact: michael.hart-davis@tum.de

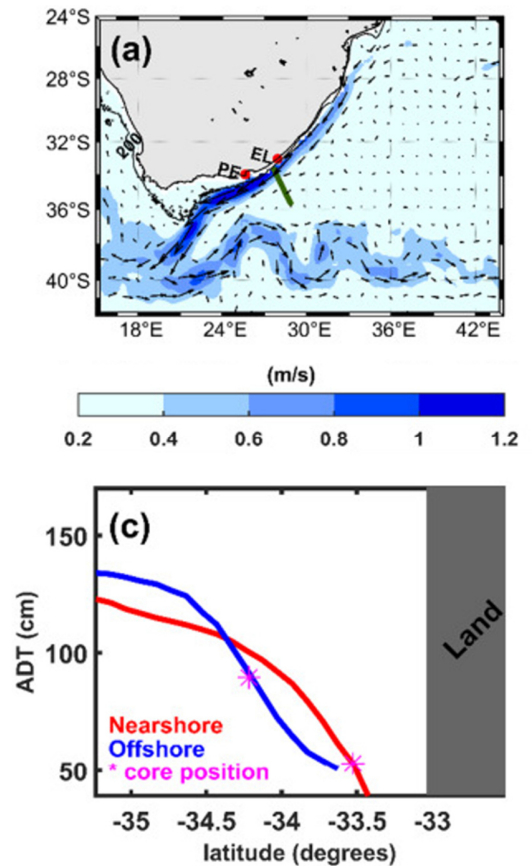


Figure (a) Mean surface velocity in the Agulhas Current and (c) profile of Absolute Dynamic Topography (ADT) towards the coast from along-track Jason-3 observations (Nhantumbo et al 2020).