

## Current topic for a Master's Thesis

# Studying the ocean dynamics of the Agulhas Plateau and its interaction with 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 as well as the global climate. The Agulhas Plateau is located south of South Africa in the South-West Indian Ocean and rises about 2,500 m from the surrounding deeper ocean of 4,700 m.

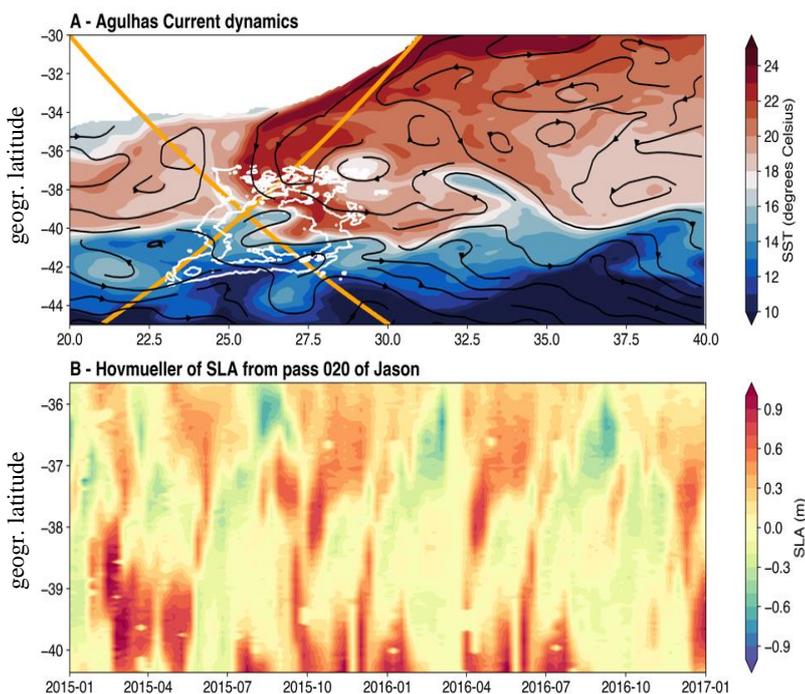


Figure. (A) The region of interest, with the position of the Agulhas Plateau shown in white. The black lines show a snapshot taken at the time of an Early Agulhas Retroflection of the surface current velocities, with the colours showing a snapshot of the sea-surface temperature (SST). The orange lines are the tracks of Jason-2 passing over the Agulhas Plateau. (B) shows two years of the sea level anomaly (SLA) derived from Jason-2 data.

A cyclonic-like meander around the Agulhas Plateau can be depicted in satellite altimetry, passive microwave sea surface temperature fields and numerical model simulations as well as in surface drifter observations.

The presence of this meander is thought to be crucial, particularly in the formation of early Agulhas Retroflection (i.e. turning back of the current) based on the interaction of this meander with the Agulhas Current like the Natal Pulse<sup>1</sup>.

The objective of the Thesis is to evaluate both along-track and gridded satellite altimetry products to describe the variable modes of the Agulhas Plateau as well as the importance of these modes in determining the formation of an early Retroflection. The Thesis will include **collaboration** with colleagues at Deltares (**Netherlands**), Nansen Environmental Remote Sensing Centre (**Norway**) and the Nansen-Tutu Centre (**South Africa**).

### Main tasks:

- Analyse time-series of along-track and gridded altimetry products in the Agulhas Plateau region
- Describe the variable ocean dynamics that occur on the Agulhas Plateau
- Evaluate the importance of these dynamical processes on the greater Agulhas Current, particularly in the context of early Agulhas Retroflection.

### Prerequisites:

- Experience in Python programming
- Basic knowledge of satellite altimetry and time-series analysis is an advantage

Institute: Deutsches Geodätisches Forschungsinstitut (DGFI-TUM), [www.dgfi.tum.de](http://www.dgfi.tum.de)  
Supervisors: M.Sc. Michael Hart-Davis / Prof. Dr. Florian Seitz  
Contact: [michael.hart-davis@tum.de](mailto:michael.hart-davis@tum.de)

<sup>1</sup> Lutjeharms, J. & Roberts, H., 1988. The Natal pulse: An extreme transient on the Agulhas Current. *Journal of Geophysical Research: Oceans*, doi: [10.1029/JC093iC01p00631](https://doi.org/10.1029/JC093iC01p00631)