



## **The Agulhas circulation simulated by the global OGCM FESOM.**

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The Agulhas Current system, comprising of various components, is of relevance for global and regional climate on all timescales. Work undertaken in this area over the last few years have highlighted that this region is sensitive to changes of the global overturning circulation. In particular, an increase in the amount of the Indian Ocean waters entering the Atlantic has been attributed to the changes in the wind pattern in the Southern Hemisphere. Such intrusion of additional heat and salt into the Atlantic may potentially impact the stability of the meridional overturning circulation and the heat transport into the North Atlantic. We identify critical questions of both global and regional importance and aim to address them using a numerical modelling approach. The models employed are a next generation finite-element model (FESOM) developed in AWI and a state-of-the-art nested model (INALT01) developed in GEOMAR. Both models have approximately 8 km resolution in the Agulhas region. In addition the global FESOM resolution is adjusted to the sea surface height (SSH) variance obtained from the satellite observations (AVISO), i.e. the higher is the SSH variance, the higher is the FESOM resolution, varying from 6 to 100 km. The results obtained by FESOM are validated against observations, as well as against INATL01. We investigate the FESOM ability to simulate the Agulhas system, the influence of the locally eddy-permitting resolution on the general Atlantic Ocean circulation, in particular Atlantic Meridional Overturning, and the interaction of the Agulhas system with Antarctic Circumpolar Current.