Collaborative Research Centre (CRC) TRR 181 “Energy Transfers in Atmosphere and Ocean”, subprojects:
T2 “Surface Layer Energetics - The route to Mixing” and
L3 “Meso- to Submesoscale Turbulence in the Ocean”

Current climate models feature severe biases in simulating the present climate. These biases are primarily generated by energetically inconsistent parameterisations of unresolved processes and the model’s numerics, and limit the model’s ability to predict climate-relevant processes. The CRC TRR181 project aims to improve the accuracy of climate models by advancing our understanding of the energy transfers in the atmosphere and ocean and by developing energetically consistent models and innovative numerical algorithms. In this project, we plan to combine existing observational data with realistic, high-resolution ICON-SMT simulations to enhance our understanding of submesoscale dynamics - a recently discovered dynamical regime that, based on the latest findings, may be a key component of the Earth’s climate. We will use the ICON ocean model, configured with a SubMesoscale Telescope (SMT) focusing on the Walvis Ridge Region in the South Atlantic, which has been the target region for the main TRR181 research cruises. We plan to perform sensitivity experiments to investigate the complex interactions between submesoscales and Langmuir turbulence, along with seasonality experiments to explore both the inverse and the forward energy cascades.