



## **Pathways and variability of the off-equatorial undercurrents in the tropical Atlantic Ocean**

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The cold upwelling waters of the eastern tropical oceans not only interact with the atmospheric circulation via changing the sea surface temperatures but also influence the biological activity via affecting the nutrient and oxygen contents. While the sources of the equatorial upwelling associated with the Equatorial Undercurrent (EUC) appear well understood, the relevance of the northern and southern off-equatorial undercurrents (NEUC, SEUC) for the off-equatorial upwelling regions has remained unclear. In this study we use output from a high-resolution,  $1/12^\circ$  model (FLAME) to investigate the mean pathways and variability of the off-equatorial undercurrents (OEUCs) in the Atlantic. In particular, a calculation of Lagrangian trajectories helps to gain insight into the source waters of the OEUCs and their connection to the upwelling regions in the eastern tropical Atlantic. In the model solution the sources of both OEUCs belong almost exclusively to the southern hemisphere. The pathways of the source waters are found to be governed by strong recirculations between the different eastward and westward zonal currents, due to intense eddy motions associated with the tropical instability wave activity. Whereas these recirculations in the ocean interior represent the sole source of the SEUC, the NEUC is also fed by a weak inflow from the western boundary current, but with the interior recirculation pathway still dominating. Investigation of the fate of the NEUC shows only a weak supply to the upwelling in the Guinea Dome and along the African coast, but a significant contribution to the equatorial upwelling.