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Characteristics of the Atlantic Subtropical Cells inferred from observations

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The Atlantic Subtropical Cells (STCs) connect the equatorial upwelling to the subtropical subduction regions. In both hemispheres they are characterized by equatorward transport at thermocline level and poleward Ekman transport at the surface.
This analysis uses recent ARGO float data, repeated ship sections and ASCAT wind stress to estimate the transports of the different branches and to investigate the vertical and horizontal structure of the STCs from an observational perspective. We find that equatorward transports related to the northern hemisphere STC are mostly confined to the western boundary, while integrated interior transports are close to zero. This is in contrast to observations in the southern hemisphere, where in addition to a stronger western boundary transport an interior transport is identified. Most of the equatorward transport in both hemispheres is distributed within the shallower part of the thermocline layer between 23.5 to 24 kg m-3.
Compared to the asymmetric thermocline convergence, the wind-driven Ekman divergence at the surface is almost symmetric. This can be explained by the fact that thermocline and surface transports are superimposed by the northward return flow of the thermohaline circulation, which is partly upwelled in the tropical Atlantic.