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Mixed layer heat budget south of Africa

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The region south of Africa is a global ocean circulation choke point where the waters of the Antarctic Circumpolar Current meet waters originating from the Indian and South Atlantic Ocean. We analyze the ocean mixed layer heat budget south of Africa using in situ observations from Argo floats (many of them were released during the GOODHOPE project) combined with remote sensing measurements of sea surface temperature and wind stress. Air-sea heat fluxes are provided by reanalysis outputs and satellite products. Lateral eddy diffusion coefficients are obtained from a study of surface drifter dispersion. Using five years of the measurements, we focus on the seasonal cycle of the budget in separate domains defined by the fronts of the Southern Ocean (subtropical zone, subantarctic zone, polar frontal zone). The Antarctic Circumpolar Current fronts are defined by preset values of dynamic height (relative to 1500 m) as measured by the Argo floats. We find that the mechanisms controlling the heat budget include air-sea fluxes, Ekman transport and lateral eddy fluxes. Our results show that the mesoscale turbulence contribution to the heat budget is significant in the Agulhas retroflexion area and in the subantarctic zone where strong eddies are generated. We also assess the sensitivity of the budget to the choice of the air-sea turbulent heat flux (latent and sensible) data products.