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Forecast atmospheric surface fields versus in-situ and remote observations from Agulhas region to 57°S in 2008

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The region south of South Africa, encompassing the Agulhas Current and Retroflection, and part of the Southern Ocean, is known for its severe meteorological conditions. The in-situ observations are thus rare. Consequently, remote-sensing satellite observations and high-resolution weather forecasts at the ocean surface are difficult to assess. However, atmospheric data collected in the southern hemisphere summer of 2008 during the International Polar Year-BONUS-Good Hope cruise were used to validate two satellite data sets: the twice daily QuikSCAT winds and the daily OA flux data set of latent and sensible heat fluxes. The surface winds and heat fluxes forecasts produced by a regional atmospheric model were also assessed along the ship track. The two remote data sets exhibited a very good accordance with daily in-situ observations for wind speed and direction as well as for latent and sensible heat fluxes. Large differences in heat fluxes in both OAflux and the atmospheric model were observed when crossing the Subtropical Front and a warm eddy, as well as during a storm, when gale force winds reached more than 20 m/s. The two remote data sets were then used to assess the regional model forecasts over a larger area south of South Africa, not limited to the ship track. It was found that most of the model errors were located in a region north of the Subtropical Front, where the sea surface temperature used by the model was not accurate enough to reproduce the relevant mesoscale oceanic features. Finally, compared to in-situ and remote sensing observations, the numerical modelling weather forecast produced realistic atmospheric conditions over the sea south of the subtropical front.