Examining the sub-meso and mesoscale variability across the Crossroad Transect

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Flowing southwest of the continental shelf of Africa is a strong western boundary current comprising of three interdependent components known as the Agulhas Current, Agulhas Retroflection and Agulhas Return Current. Altogether these predominant features strongly influence the oceanic conditions south of Africa. The Agulhas Current, along with its return flow, intersects the Crossroad Transect; a monitoring line established in 2013 to sample both the Agulhas and Return Currents and determine inter-ocean fluxes, as well as the influence of the Agulhas Current on the Agulhas Bank shelf. The key objective of this study was to examine both sub-meso and mesoscale features that attribute to the dynamic and variant nature of the Agulhas system. Methods employed in this study make use of oceanographic instruments such as the Ship board Acoustic Doppler Current Profiler (SADCP), Conductivity Temperature and Depth (CTD), Thermosalinograph (TSG) and satellite Sea Surface Height data. The presentation shows that surface waters on the shelf are relatively cooler (18-21 °C) and less saline (34.7-35.38 psu) compared to both the Agulhas and return currents (22-23 °C; 34.73-35.58 psu), and (15-19 °C; 35.5-35.72 psu) respectively. In addition, the interannual variability was defined on both spatial and temporal scales. A key finding of this study is the abundance of both the sub-meso and mesoscale features in the Thermo-Salino graph dataset, which are present in the CTD data but are often overlooked. A noticeable trend in current speed variability was observed, where velocity measurements ranging from (2-2.5 m/s) represented the Agulhas Current and (1.4-1.7 m/s) Agulhas Return Current. In examining the Agulhas Current, the ability to delineate water properties and their geographical distribution was achieved successfully, concluding on their differences. Monitoring the effect of the Agulhas Current on the Agulhas Bank is therefore essential for the comprehension of nutrient content that has the potential to influence primary activity along the shelf.