



Direct observations of the southern termination of the East Madagascar Current.

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The Agulhas Current forms a vital part of the global thermohaline circulation. This overturning of the oceans has in turn an inextricable link to world climate. Although this current is so important, relatively little is known on its sources. One of the proposed tributaries to the Agulhas Current is the southern limb of the East Madagascar Current (EMC). In an attempt to increase the understanding of this possible source region a first dedicated cruise was organised for the southern termination of the EMC. The cruise took place in March 2001 and was called the Agulhas Current Sources Experiment 2 (ACSEX 2). The hydrographic and other data from the cruise have the potential to describe the EMC termination in a seminal way.

As a first result it was demonstrated unequivocally that there is an upwelling cell inshore of the EMC. This relatively weak cell lies at the southeastern tip of Madagascar and was first noticed in satellite imagery. The upwelling in this cold cell was confirmed for the first time with hydrographic observations during the ACSEX 2 cruise. Analysis of the data has shown that the temperature at the surface of the upwelling cell was 25.5 °C, three degrees below that of ambient water masses. The water at the surface of the cell had a chlorophyll concentration of 0.45 mgChla/m², the nitrate concentration at 100 m was 6.6 mmol/kg, phosphate 0.53 mmol/kg and silicate 5.7 mmol/kg. A significant maximum in fluorescence was found at a depth of 50 m. ADCP measurements showed a 0.41 m/s movement of water away from the shelf in the top 20-80 m of the water column.

The EMC was found to have an expression down to 1500 m. The maximum speed of the current was 0.97 m/s and the width of the current was about 100 km. Apart from the expected water masses the current also carried Red Sea Water with salinities of greater

than 34.5 psu and temperatures from 4-6 °C at depths of 800-1200 m. Previously it was proposed that the EMC executes an eastward retroflection at the southern termination of the current. No retroflection of the EMC emerges from the ACSEX 2 data. An analysis of sea surface height suggests that this situation of non-retroflection appears to be representative.