



Aspects of the greater Agulhas Current system

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The ocean circulation in the South-west Indian Ocean is dominated by what may be called the greater Agulhas Current. Its complex flow patterns and behaviour have significant implications for the local biological provinces, bottom deposits and sediment dispersion. We present a survey of the main components of the system, how these are influenced by the bottom topography and their possible influence on the bottom sediments.

The Agulhas Current proper is fed by three sources: the circulation in a South-west Indian subgyre, intermittently from the Mozambique Channel and similarly from south of Madagascar. It has recently been shown that the flow in the Mozambique Channel consists of a train of eddies and that the miniature western boundary current, the southern branch of the East Madagascar Current, retroflects south of Madagascar. The exact location where the Agulhas Current starts along the east coast of southern Africa is not known. Once established, the trajectory of the Agulhas Current is largely determined by the bottom topography. Its northern part is very stable, following the shelf edge closely, interrupted only by an occasional Natal Pulse. At the Natal Bight the Current causes an intense and persistent upwelling cell. The depth of the Current can change markedly and is underlain by a countercurrent at about 1 000 m depth. By contrast the southern Agulhas Current meanders quite widely at the shelf edge, but also stimulates a coastal upwelling cell, at Port Alfred. This feature introduces deep water onto the Agulhas Bank, south of Africa, which moves slowly westward. The flow on the western side of the Agulhas Bank is complicated by the intermittent presence of a cyclonic lee eddy and the passing of Agulhas filaments. The flow in the Cape Basin of the South-east Atlantic Ocean is dominated by the passing of large Agulhas rings that have been shed from the Agulhas retroflexion. These have been observed to extend to the sea floor and may interact with offshore filaments of the

Benguela upwelling system as well as with the Walvis Ridge. The eastward flow of the Agulhas Return Current is strongly influenced by the Agulhas Bank. This feature of the seafloor topography may even on occasion cause an upstream retroflexion in the Agulhas Current.