Upwelling cells on the South-East coast of South Africa

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The Transkei shelf, located on the east coast of South Africa and is one of the few shelf systems globally, that is flanked by a major western boundary current. This region, dominated by the warm and fast-flowing Agulhas Current, is described as having a moderately productive ecosystem. It has been theorised that perturbations along the inshore edge of the Current, as well as the interaction of the Current with the underlying topography, influence the occurrence of localised upwelling cells along the shelf. During upwelling events, pockets of relatively fresh and cold nutrient rich water are upwelled, dispersing the overlying warm sea surface water. During January 2017, a research cruise was undertaken between Cape St Francis and Port Shepstone to identify and characterise these upwelling centres and determine the influence of the Agulhas Current on the Transkei shelf ecosystem. In situ data indicated the occurrence of cold (<12 °C) surface water off Cape Recife and 14-15 °C water in the vicinity of Port Alfred. The upwelling off Cape Recife appeared to be wind-driven whereas the Port Alfred upwelling was due to the divergence of the Agulhas Current from the coast. The Cape Recife upwelling cell was associated with near-zero chlorophyll a indicating very low phytoplankton biomass in the newly upwelled water. In contrast, the cool water off Port Alfred had slightly higher chlorophyll a biomass (< 0.6 mg m-3). These upwelling cells may be important for stimulating phytoplankton growth and supporting ecosystem functioning on the moderately productive shelf along the South-East coast.