

The RV Dr Fridtjof Nansen in the Western Indian Ocean: Ocean Productivity

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Plankton forms the base of the marine food web, providing nourishment to higher trophic levels from fish, shellfish and squid to whales and seabirds. Scientists aboard the RV Dr Fridtjof Nansen have endeavoured to measure ocean productivity within the Western Indian Ocean since 1975, by assessing nutrient concentrations as well as plankton biomass and production. Ecosystem-focused surveys since 2007 have provided important baseline data and yielded new insights into this largely oligotrophic and under-studied region. The monsoon-influenced Somali Current system north of the Equator exhibits the highest productivity of all, with high nutrient concentrations driven by strong upwelling. The most productive areas over the Mozambique shelf are Delagoa Bight in the south, the central Sofala Bank, influenced by seasonal nutrient input from the Zambezi delta, and Angoche in the north. All are influenced to some extent by the southward passage of mesoscale eddies through the Mozambique Channel, which may induce upwelling on the shelf, enhancing local production, or entrain coastal production offshore. These eddies strongly influence the distribution of mesozooplankton biomass in the Mozambique Channel, with significantly greater biomass found in cyclonic eddies compared to anticyclonic eddies. Off Madagascar, both satellite and in situ data indicate enhanced productivity over the southern shelf, particularly around the south-eastern corner, an area characterised by regular blooms of nitrogen-fixing bacteria. Smaller productivity hotspots were observed off the west coast, and at the northern tip of Madagascar. A survey along the axis of the Mascarene Plateau showed the northern sector (N of 12 °S) to be most productive. Sampling at six seamounts showed a latitudinal gradient in phytoplankton biomass (highest at the southernmost seamount) and composition (more dinoflagellates in the tropics, more diatoms in the south). A coordinated, regional plankton monitoring programme for the Western Indian Ocean is recommended to provide indices of ecosystem change.