

Oceanographic progress in the Western Indian Ocean: contributions by the RV Dr Fridtjof Nansen

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The physical processes of the ocean influence productivity on spatial and temporal scales, and thus determine the distribution and abundance of fisheries resources. Data on the hydrographic structure and ocean processes have been collected since the early RV Dr Fridtjof Nansen surveys in the Western Indian Ocean. Nansen surveys between 1975 and 1990 focused on fisheries monitoring, with complementary hydrographic observations made with analogue thermographs and water bottle sampling. Recent surveys (post-2007) used the modern observational instruments – such as CTD, ADCP and used the resulting observations to resolve the ocean structures in combination with satellite-derived ocean color and altimetry data. The later surveys followed the ecosystem approach in fisheries concept frame, in which the collection and analysis of oceanographic information received more attention. This paper reviews the Nansen's contributions to oceanographic discoveries in the Western Indian Ocean, with a focus on the Somali Coast and East Africa Coastal Current subregions (surveys in 1975–1984), Mozambique and Madagascar (1977–2014), and the Mascarene subregion (1978–2010). Whereas many of the early observations were inconclusive at the time, more recent studies during the "satellite era" have corroborated earlier findings. For instance, Nansen data contributed to the first identification of eddies in the Gulf of Aden, and in the Mozambique Channel. Nansen data from a 2008 survey described the flow structure of the Southeast Madagascar Current. Upwelling events were observed near Angoche in Mozambique and off southeast Madagascar. Surveys to the Mascarene Plateau in 2008 and 2010 suggested sub-surface (approximately 60–100 m depth) maximum phytoplankton densities – a major factor in explaining the functioning of local marine ecosystems. In retrospect, the Nansen played an important role in describing the physical oceanographic processes of the Western Indian Ocean – from a perspective of how they would affect fish distribution and abundance patterns, in particular.