The combined thermal and salinity fronts and fisheries distribution pattern in a tropical shelf: the case study of Sofala Bank, Mozambique

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Sofala Bank is the largest and most productive shelf in East-southern Africa, characterized by dual salinity and thermal fronts, due to fresh water from Zambezi and upwelling along the slope, in the inner and outer shelf, respectively. The combine fronts confer distinctive hydrodynamics and ecological features to the shelf. The present study examines the influence of the observed fronts in fisheries distributions patterns in the shelf. Historical CTD data from IIP cruises from the period 2001-2007; catch species composition and oceanographic data obtained on R/V Fritdjof Nansen cruises, undertaken in Sofala Bank, during the years: 1980, 1982, 1983, 1990 and 2007, all undertaken in Sofala Bank were used. The water masses and fronts were mapped using the potential energy anomaly of the water column. The distribution of fish species and of water masses and fronts were matched. Three eco-fisheries regions, with distinctive fish species, matching water masses, were identified, as follows: (i) the coastal region, influenced by freshwater, dominated by the brackish water species (Indian Pellona (Pellona ditchela), orangemouth thryssa (Thryssa sp), and Sardinella sp, Dussumiera acuta); (ii) the outer shelf, fringing the slope, characterized by open sea water, dominated by open sea species (scad (Decapterus sp.), mackerel (Rastrelliger sp.) and (iii) an intermediate zone, mostly stratified, dominated by anchovies. Two fronts separated the three regions, being a freshwater front, located between the coastal and the intermediate zone and a thermal front, located between the intermediate and the outer shelf zones. The study confirmed the influence of water masses and fronts in fish species distribution over the shelf. This result could contribute to improve fisheries management measures, which currently consider Sofala Bank as a unique and homogeneous fisheries zone, with a risk to overlooking the intricacies within the region.