Geophysical Research Abstracts
Vol. 18, EGU2016-18459, 2016
EGU General Assembly 2016

Deep oceanic currents and sea floor interactions offshore SE Africa

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The Pamela Research program, which involves Total and Ifremer and their associated partners (French Universities, CNRS, IFPEN), is currently working to acquire new multidisciplinary data in the Mozambique Channel, in order to improve our knowledge and use this area as "laboratory" for comprehension of sedimentary/stratigraphical/geodynamical/structural and biological processes.
The area comprised between the austral ocean and the southern tip of the African continent is a major place for Atlantic and Indian waters exchange, with high impact on the global climate (de Rujiter et al., 1999, Beal et al., 2011). Its prolongation toward the Mozambique Channel is a great playground to study effects of bottom currents on the sea floor.
In this synthesis, we compile information about the major oceanic currents that occur at different water depth in the area, and we started listing the main published or ongoing studies, some of them in the scope of the Pamela project, related to sea floor interactions with bottom currents.
These interactions are characterized by erosional features: submarine erosions, truncations, stratigraphic hiatuses, associated to depositional features: various types of contouritic drifts, sediment waves, asymmetric turbiditic levees etc. (Simpson et al., 1974, Uenzelmann-Neben et al., 2007, Uenzelmann-Neben & Huhn, 2009, Palermo et al., 2014).
Movements of the main water masses in the Mozambique basin are strongly driven by thermohaline circulation but also sea floor topography and coast configuration: the Mozambique Current is not a persistent current but composed by southward moving anticyclonic eddies (De Rujiter et al., 2002, Ridderinkhof & de Rujiter, 2003, Swart et al., 2010, Halo et al., 2014). Deep currents flow northward along the western edge of the Mozambique basin: the North Atlantic Deep Waters (NADW) and the Antarctic Intermediate Waters (AAIW) flow along the Mozambican continental slope and form the Mozambique Undercurrent. A portion of it continues North through the Mozambique Channel while the remaining body returns South along the eastern border of the basin (de Ruijter et al. 2002).
Even deeper, the Antarctic bottom Waters (AABW) are blocked to the North due to the shallowing bathymetry of the Mozambique Channel, and deflected eastward and southward (Wiles, 2009, Breitzke et al., 2013).
These currents and their retroflections seem to impact deeply the sea floor aspect by digging furrows and channels, reworking sediments and building contouritic drifts, which locally reach very impressive size, and call for a better comprehension of their building and migration processes.