Geophysical Research Abstracts
Vol. 16, EGU2014-5576, 2014
EGU General Assembly 2014

Structure and Variability of Mediterranean Outflow Water Flow Recorded in Contourite Layers in the Gulf of Cadiz and west of Portugal

Roger Flood (1) and Emmanuelle Ducassou (2)

(1) Stony Brook University, School of Marine and Atmospheric Sciences, Stony Brook, NY, United States (roger.flood@stonybrook.edu), (2) UMR CNRS, 5850 EPOC, Université de Bordeaux, Talence, France (e.ducassou@epoc.u-bordeaux1.fr)

Water exchange between the Atlantic Ocean and the Mediterranean Sea has important effects on world hydrography, and the exchange varies on both shorter and longer time scales in response to climate change, sea-level change and tectonic land movements. The modern exchange can be studied with instrumental and observational records, but the longer-term variability of climate and water exchange requires the analysis of sedimentary records. Mediterranean Outflow Water (MOW) has influenced global circulation and climate and created a number of sediment drifts along the continental slope of Iberia. MOW history has been particularly important since the reconnection of the Mediterranean and the Atlantic about 5.3 Ma ago. New information about water exchange comes through study of cores collected from Iberian margin drift deposits during IODP Exp. 339. These cores contain sediments from the last 6.2 Ma in an array of sites. Drift deposits are thick sediment accumulations formed where and when currents flow along the seabed. Drift sediments are primarily muddy but they often include coarser layers which include some silt and sand-sized material which are often termed silty or sandy contourites. Several coarser layers are being studied in detail using high-resolution grain size and CAT scanning techniques, along with the analysis of the sand fraction and to be supplemented using thin section, X-ray and XRF techniques to characterize the beds and the events which created them. Initial results suggest that many beds are formed of a mixture of finer sediment, often (but not always) similar in grain size to the sediment deposited before and/or after the silty or sandy contourite, and coarser sediment which often (but not always) overlaps in grain size with the finer sediment in the contourite layer. The coarser sediments may have been deposited during short episodes of higher-speed flow while the finer sediments may have been deposited when flow speeds were reduced. Bioturbation during and after the flow events has mixed the two or more grain size populations. Grain-size grading patterns within, and sharp contacts associated with, the coarser contourite layers appear to retain some characteristics of the flow events which formed them. At most sites, two or three drill holes 10 to 100 m apart were collected, and sediments in adjacent drill holes are correlated based on downcore proxies. While the nature and sequence of contourite layers in adjacent holes are often quite similar, correlated beds can have somewhat different thickness, grain sizes and layering patterns. This lateral variability may be due to the presence of larger bed forms or other larger-scale depositional and erosional process. While the grain size patterns and other bed characteristics suggest that these silty and sandy contourites provide important information about the both the short-term and long-term history of MOW events, we need to distinguish between bed variations related to current flow history and those related to bed forms or other local sedimentary processes to fully characterize the nature and effects of these deep currents.