Onset, evolution and effects of the Mediterranean Outflow: Preliminary Results of IODP Expedition 339 in the Gulf of Cadiz

F. J. Hernández-Molina (1), D. Stow (2), C. Alvarez-Zarikian (3), A. H. L. Voelker (4), Expedition IODP 339 Scientists (5)

(1) Departmento Geociencias Marinas, Universidad de Vigo, Facultad de Ciencias del Mar, Vigo, Spain.
(2) Institute of Petroleum Engineering, Heriot-Watt University, Edinburgh, Scotland, United Kingdom.
(3) Integrated Ocean Drilling Program, Texas A&M University, College Station, Texas, USA.
(4) IPMA, Division for Climate and Climate Change, 1749-077 Lisbon, Portugal. antje.voelker@lneg.pt
(5) Acton, G., Bahr, A., Balestra, B., Ducassou. E., Flood, R., Flores, J-A., Furota, S., Grunert, P., Hodell, D., Jimenez-Espejo, F., Kim, J. K., Krissek, L., Kuroda, J., Li, B., Llave, E., Lofi, J., Lourens, L., Miller, M., Nanayama, F., Nishida, N., Richter, C., Pereira, H., Sanchez-Goñi, M., Sierro Sanchez, F., Singh, A., Sloss, C., Takashimizu, Y., Tzanova, A., Williams, T., Xuan, C.

IODP Expedition 339 drilled 5 sites in the Gulf of Cadiz and 2 off the west Iberian margin (November 2011 to January 2012), and recovered 5.5 km of core. The Gulf of Cadiz was targeted for drilling as a key location for the investigation of Mediterranean Outflow Water (MOW) through the Gibraltar Gateway and its influence on global circulation and climate. It is also a prime area for understanding the effects of tectonic activity on evolution of the Gibraltar Gateway and on margin sedimentation. We penetrated into the Miocene at two different sites and established a strong signal of MOW in the sedimentary record of the Gulf of Cadiz following opening of the Gibraltar Gateway. Preliminary results show contourite deposition from 4.2-4.5 Ma, although subsequent research will establish whether this dates from the first onset of MOW. The Pliocene succession shows low bottom current activity linked with a weak MOW. Significant widespread unconformities are interpreted as a signal of intensified MOW. The Quaternary succession shows a much more pronounced phase of contourite drift development, with two periods of MOW intensification separated by a widespread unconformity. Following this, the final phase of drift evolution established the CDS architecture we see today. Following examination of over 4.5 km of contourite cores, the existing models for contourite deposition are found to be in good working order. Preliminary work has shown a remarkable record of orbital-scale variation in bulk sediment properties. Further work will determine the nature of controls at the millennial scale.

***Keywords**: IODP Exp. 339, Gulf of Cadiz, Mediterranean Outflow Water, contourites.*

Influence of upwelling events on the chlorophyll concentration variability along the northwestern coast of Iberian Peninsula

Influência dos eventos de afloramento na variabilidade da concentração de clorofila ao longo da costa noroeste da Península Ibérica

A. Picado (1), M. C. Sousa (1), I. Alvarez (1,2), N. Vaz (1), J. M. Dias (1)

(1) NMEC, CESAM, Universidade de Aveiro, Departamento de Física, Aveiro, Portugal. ana.picado@ua.pt
(2) EPhysLab (Environmental Physics Laboratory), Universidade de Vigo, Facultade de Ciencias, Ourense, España.

The knowledge of physical processes at global or regional scales in the ocean is fundamental to study the oceanic biogeochemical processes, particularly those linked to primary production. Climate change can affect these processes as chlorophyll (Chl a) levels are highly sensitive to sea surface temperatures (SST). Thus, the known global warming trend in the ocean may have negative impacts along coastal areas with an important primary production, as the Northwestern coast of the Iberian Peninsula. Therefore, the knowledge of marine biology and physical oceanography of coastal upwelling areas become extremely important. Taking advantage of satellite remote sensing, the aim of this work is to investigate the seasonal variability in Chl a concentration, SST and Ekman transport along the northwestern Iberian Peninsula coast from 1998 to 2007. Thus, monthly means of these parameters were computed at several control points located along the coast. Surface model currents were additionally analyzed in order to better characterize the upwelling phenomenon. The most important Chl a blooms occur during spring-summer months, i.e., under upwelling favorable conditions. These favorable conditions are related to the presence of cold nutrient-rich water which is advected towards the surface layers enhancing the primary production. Otherwise, during winter, Chl a blooms could also occur and are related to the nutrients input from land or to the winter upwelling events.

***Keywords**: chlorophyll, SST, upwelling, Mohid, Iberian Peninsula.*