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The influence of the Mediterranean Outflow Water on the Late Miocene Gulf of Cádiz

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Tectonic forcing plays an important role on the opening and closure of ocean gateways. The tectonically-induced opening of the Gibraltar Strait 5.23 Ma ago allowed the re-filling of the Mediterranean Sea and subsequently led to the formation of the Mediterranean Outflow Water (MOW). It became an important component of North Atlantic circulation as warmer and more saline water mass after its exit through the strait contributing to the alteration of the deep water circulation and the global heat transport. The early history of MOW is not well known yet, and this project, funded by the Austrian Science Fund (FWF), takes part of the research goals of Expedition 339 of the Integrated Ocean Drilling Program (IODP), focused on a better understanding of the environmental significance of the MOW and its role in global climate since the Pliocene.

Quantitative analyses of benthic foraminifera from IODP Site U1387C have been completed on the Late Miocene in order to reconstruct paleoceanographic changes in the Gulf of Cádiz. The studied interval spans from 625 to 865 mbsf (meters below sea-floor) and is dominated by hemipelagic deposits. The first results from this interval show assemblages with a high species diversity of autochthonous taxa (i.e. Cibicidoides spp., Globobulimina spp., Uvigerina spp.) and the presence of some shelf dwelling taxa (Ammonia spp., Elphidium spp. and Asterigerinata spp.). The latter come from intervals with coarser sediments indicating downslope transport with shallower water sediments, likely related to tectonic activity. The restriction of the Gibraltar Strait and the disruption of exchange between the Mediterranean and the North Atlantic during the Late Messinian is reflected in the rare abundance of epibenthic taxa. Furthermore, benthic foraminifera are generally proved to be excellent indicators of variations in the oxygen content of bottom waters. In our samples, the obtained results will be used in combination with XRF records (S, Ba, Br) to detect changes in bottom water oxygenation and export productivity. An improved age model will provide the accurate timeline to place the Miocene events from IODP Site U1387C.