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Mediterranean Outflow Water during the late Pliocene: New stratigraphic constraints from micropaleontology and XRF core-scanning (IODP Expedition 339, Hole U1389E)

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IODP Hole U1389E, at present located in the lower core of the Mediterranean Outflow Water (MOW) at 640m water depth in the northern Gulf of Cadiz, represents a key-site for the understanding of changes in MOW contribution to the North Atlantic during the late Pliocene thermal optimum and the transition into the Pleistocene ice house climate. Zr/Al ratios of the recovered sediments as well as δ^{18}O and Mg/Ca of benthic foraminifera imply major changes in MOW strength in the studied interval. However, to consider these data in a broader paleoceanographic and paleoclimatic context, a well-constrained age model is essential. New data from calcareous nannoplankton and XRF core-scanning suggest that the shipboard age model for the site has to be reconsidered as major changes in sedimentation rates have not been recognized in the original comparably low resolution data-sets.

While the new, higher-resolution biostratigraphic data confirm the overall time frame of 2.6 to 3.6 Myrs, they also imply a potential sedimentary hiatus within the Pliocene thermal optimum and a significant increase in sedimentation rates thereafter. A distinct cyclic pattern is recognized in the $CaCO_3$ and TOC contents as well as Ca/Ti ratios. Based on the estimated sedimentation rates these cycles are most likely linked to precessional forcing, resembling cyclic changes in riverine input from southern Spain recognized at several drill-sites at the northern shelf break. A detailed cyclostratigraphic analysis is currently in progress to confirm the precessional signal and to further constrain the duration of the sedimentary hiatus during the Pliocene thermal optimum.

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