# Evidence of Meditarranean Outflow immediately after the Miocene-Pliocene boundary

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The onset of the earliest analogue of Mediterranean Outflow Water (MOW) is thought to start immediately after the extraordinary event of the Messinian Salinity Crisis at 5.33 Ma. Indirect evidence from the Mediterranean basin suggests onset of water exchange through the corridor within a few precession cycles after the opening of the Strait of Gibraltar. However, previous studies dated the first evidence of bottom water current flow to ca. 4.2-4.5 Ma in the Gulf of Cádiz [1] [2], postdating the suggested onset of exchange by several 100 ka. As a result, timing of the onset and properties of the MOW are largely unknown during the Earliest Pliocene.

Sediments over the tentatively defined Miocene-Pliocene (M-P) boundary, from recent IODP Site U1387C, show an immediate change from a quiet depositional environment characterised by precession-induced climate variations to sedimentation dominated by the presence of active bottom water flows. Winnowing and grain-size sorting of particles is evident in contouritic successions and bulk sediment Zr/Al ratios. Increasing down slope and along slope processes suggest flow strength enhancement about ten precession cycles after the M-P boundary.

Authigenic Fe-Mn oxyhydroxide-derived Pb isotopic ratios ($^{207}Pb/^{206}Pb$ and $^{208}Pb/^{206}Pb$) extracted from bulk sediments suggest that the observed bottom water flows are related to MOW during the Early Pliocene. Isotopic compositions of North East (NE) Atlantic and Mediterranean water masses derived from Fe-Mn crusts are used for comparison to our new record [3,4]. The distinction between Mediterranean and NE Atlantic waters in this study indicates restricted exchanges through the Strait of Gibraltar just after the M-P boundary.

[1] Stow *et al* (2012) *IODP Prelim. Rep* **339**. [2] Iaccarino *et al* (1999) *Mem. Soc. Geol. Ital* **54**, 109-131. [3] Abouchami *et al* (1999) *GCA* **63**, 1489-1505. [4] Muiños *et al* (2008) *G*$^3$, **9**.