



A major change in Pliocene Mediterranean hydrology, 3.55 – 3.35 Ma

Nabil Khélifi (1,2), Michael Sarnthein (1), Nils Andersen (3), Martin Frank (2), and Dieter Garbe-Schönberg (1)

(1) Institut für Geowissenschaften, University of Kiel, D-24118 Kiel, Germany (nkhelifi@ifm-geomar.de / +494316002925),

(2) Leibniz Institute of Marine Sciences (IFM-GEOMAR), University of Kiel, D-24148 Kiel, Germany, (3) Leibniz Laboratory for Radiometric Dating and Stable Isotope Research, University of Kiel, D-24118 Kiel, Germany

ODP Site 978 (1930 m w.d.) provides a highly resolved record of surface waters and West Mediterranean Deep Water in the Alboran Sea for the period 3.62–2.72 Ma (Khélifi et al., 2009; Khélifi, 2010). We found a ~4 psu increase in sea surface salinity from ~3.6 to 3.55 Ma, an event that occurred 100 kyr prior to a similar potential increase by ~1 psu in bottom water salinity (BWS) and by ~1 kg m⁻³ in bottom water density (BWD) from 3.5 to 3.35 Ma (if taking the Mg/Ca ratios of *Cibicidoides* spp. as face values of bottom water temperature). The latter joint salinity increase in surface and bottom waters records a significant aridification of Mediterranean summer climate. This event was coeval with the onset of more “steppic” vegetation in the Gulf of Lion (Fauquette et al., 1998). It was also documented at the northeast Atlantic continental margin (DSDP 548; 1250 m w.d.) up to Rockall Plateau (ODP 982; 1135 m w.d.) by a coeval singular and persistent increase in BWS by ~2-psu and in BWD by ~1 kg m⁻³ of Mediterranean Outflow Water (MOW) being traced by ε Nd values larger than -11. The outlined interval of strongly enhanced deep-water convection in the Mediterranean Sea and the resulting increase in MOW flow (estimated as ~1 Gt/day higher than today) record a major change in Mediterranean hydrology, that had no direct counterpart in Atlantic ocean history (Kleiven et al., 2002) and most likely originated from key changes in the African monsoon system, as shown by increasingly dry conditions depicted in terrestrial records from equatorial East Africa around that time (Trauth et al., 2007).

References

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