

Precessional variation in seawater-derived Late Miocene Pb isotopes

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Marginal marine sediments from the Sorbas basin (Spain) show a strong lithological response to precessionally forced climatic changes. Pb and Sr isotope signatures extracted from authigenic FeMn oxyhydroxides and planktic foraminifera, respectively, from these sediments have been analysed across four precessional cycles in the Late Miocene. The results indicate that Pb isotopic compositions varied in phase with precession. Comparison with data obtained from ferromanganese crusts (outside the Gulf of Cádiz) and ODP Site 978 (Alboran Sea) implies that western Mediterranean water masses dominated the seawater Pb isotope composition of the Sorbas basin during humid periods.

In contrast, during drier periods increased weathering inputs from the Spanish hinterland were enhanced. Incongruent weathering of Pb isotopes [cf. 1] prevailing during these arid periods preferentially released the radiogenic Pb isotopes ²⁰⁸Pb, ²⁰⁷Pb, and ²⁰⁶Pb over primordial ²⁰⁴Pb from accessory U/Th-rich mineral phases to the weathering solutions and ultimately to the seawater of the basin. ⁸⁷Sr/⁸⁶Sr signatures of planktic forams obtained from the same samples indicate that the basin was not isolated from the Mediterranean for the majority of the record, except for short intervals immediately following dryer periods at insolation minima, during which a more continental ⁸⁷Sr/⁸⁶Sr signal is observed. Given the striking recurring Pb isotopic excursions, the authigenic Pb isotope compositions of marginal Mediterranean marine settings seem to be capable of tracing changes between periods of enhanced aridity and humidity on the adjacent land areas.

[1] Erel *et al* (1994) *GCA* **58**, 5299-5306.