Evolution of the oceanic circulation on the southern Tethyan margin during the Late Cretaceous

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Within the Late Cretaceous, the Campanian-Maastrichtian interval is marked by the occurrence of large deposits of phosphorites and organic-rich sediments on the southern Tethyan margin (GLENN et al., 1994). The occurrence of these deposits has been largely attributed to the development of upwelling regimes, possibly linked to an intensification of the Tethyan Circumglobal Current (TCC; e.g. ALMOGI-LABIN ET AL., 1993; SOUDRY et al., 2006; PUCÉAT et al., 2005). Yet there is currently no direct evidences of the prevailing of this upwelling regime, apart from tracers of a high primary productivity regime (ASHCKENAZI-POLIVODA et al., 2011 and references therein). In this context, our study aims to track changes in water masses on an area of the southern Tethyan margin that recorded phosphorites, organic-rich deposits, and high productivity microfossil assem-blages, through the evolution of local seawater neodymium isotope composition (ε_{Nd}).

To that purpose, we have collected fish teeth from 25 different levels within the Turonian to Maastrichtian interval on the Levant Platform in the modern Negev desert of Israel. The fish teeth have been analyzed for their ε_{Nd} and rare earth element (REE) composition, along with 32 carbonate leachates from a core drilled in southern Israel (Mishor Rotem, RE-6 core). REE composition and ε_{Nd} of the detrital clay-size fraction of RE-6 core sediments have additionally been determined. The carbonate leachates yield similar ε_{Nd} values and trend than those displayed by the fish teeth from the Negev, pointing to a local seawater origin for both records. The new data highlight a decrease in local seawater ε_{Nd} from quite radiogenic values of about -3.5 ε-units in the Coniacian to minimum values of -6.5 ε-units in the Early Campanian. Local seawater Nd isotope values then increase prior to the main phosphorite unit to reach a maximum of -4 ε-units within the phosphorite level, and then decreased again down to -6 ε-units in the Maastrichtian. By contrast, ε_{Nd} values of the detrital fraction of the sediment are much less radiogenic, ranging from -11 to -6 ε-units, which points to a conservation of an oceanographic signal in the local seawater ε_{Nd} record, at least partially. The origin of the variations depicted in the local seawater εNd record is then discussed: oceanographic or linked to local changes in the composition of the nearby eroded material.

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