Neodymium isotope evolution of NW Tethyan upper ocean waters throughout the Cretaceous

E. Pucéat (1), C. Lécuyer (2) and L. Reisberg (3)

(1) Biogéosciences, Dijon, France, (2) PaléoEnvironnement et PaléobioSphère, Lyon, France,
(3) Centre de Recherches Pétrographiques et Géochimiques, Nancy, France
(emmanuelle.puceat@u-bourgogne.fr / Fax: +33 3-80-39-63-87 / Phone: +33 3-80-39-63-81)

Neodymium isotope compositions of twenty-four fish teeth, nineteen from the NW Tethys and five from different locations within the Tethys, are interpreted to reflect the evolution of Tethyan upper ocean water composition during the Cretaceous and used to track changes in erosional inputs to the NW Tethys and in oceanic circulation throughout the Cretaceous. The rather high ε_{Nd} (up to –7.6) of the NW Tethyan upper ocean waters recorded from the Late Berriasian to the Early Aptian and the absence of negative excursions during this interval support the presence of a permanent westward flowing Tethys Circumglobal Current (TCC). This implies that temperature variations during this time period, inferred from the oxygen isotope analysis of fish tooth enamel, were not driven by changes in surface oceanic currents, but rather by global climatic changes. The results presented here represent a significant advance over previously published Cretaceous seawater Nd isotope records. Our newly acquired data now allow the identification of two stages of low ε_{Nd} values in the NW Tethys, during the Early Albian-Middle Albian interval (down to –10) and the Santonian-Early Campanian (down to –11.4), which alternate with two stages of higher ε_{Nd} values (up to -9) during the Late Albian-Turonian interval and the Maastrichtian. Used in conjunction with the oxygen isotope record, the fluctuations of ε_{Nd} values can be related to major climatic, oceanographic, and tectonic events that appeared in the western Tethyan domain.