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Evolution of neodymium isotopic signature of seawater on the northwest Pacific margin: new insights on oceanic circulation changes during the Late Cretaceous

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Changes in oceanic circulation during the Late Cretaceous have been inferred from the neodymium isotopic signature (εNd) of fish remains, which reflects that of past seawater (Robinson et al., 2010; MacLeod et al., 2011). Yet the nature of these changes remains controversial, mainly due to insufficient temporal and spatial coverage of Nd isotope data. More specifically, data from continental margins remain scarce for the Cretaceous (Soudry et al., 2006). Yet such records would help to discuss the origin of the changes depicted in the deep and intermediate water records (changes in the location of deep water production vs. changes in the composition of water in the source area).

This work aims at reconstructing the evolution of surface water εNd during the Late Cretaceous in a potential area of deep water sinking (Frank et al., 2005), the north Pacific. For this purpose, samples of fish remains have been recovered from sediments from Hokkaidō (northern Japan; Takashima et al., 2004) and analysed for their εNd. Preliminary results display rather radiogenic values, which decrease from -1 ε-unit at the end of the Turonian to -3 ε-units during the Santonian. This evolution may reflect changes in the isotopic signature of the eroded sediments on the northwestern Pacific margin and/or changes in surface current organization in the Pacific. Similar trends have been reported in contemporaneous sediments from the northern Tethyan margin (Pucéat et al., 2005) and from south Atlantic ODP samples (Robinson et al., 2010). This relationship might indicate a contribution of Pacific surface waters to Tethyan surface waters and Southern Ocean intermediate/deep waters. Nevertheless further analyses from additional continental margins are required to support these hypotheses.

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