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

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Changes in oceanic circulation during the Late Cretaceous have been inferred from the neodymium isotopic composition (ε_{Nd}) of fish remains, which reflects the signature of past seawater [1, 2]. However the nature of these changes remains controversial, mainly due to insufficient temporal and spatial coverage of Nd isotope data. Data from continental margins in particular remain scarce for the Cretaceous [3, 4].

This work aims at reconstructing the signature of neritic and oceanic water ε_{Nd} during the Late Cretaceous/Early Paleogene in potential areas of deep water sinking and seaways linking different oceans. For this purpose, samples of fish remains, foraminifera and detrital fraction have been recovered in Late Cretaceous to Paleocene sediments from both oceanic (DSDP/ODP sites 152, 258, 323, 690 and 700) and neritic (Wyoming, Texas, New Jersey, Chile, Seymour Island, Egypt and Hokkaidō) sites.

The results primarily point out a decreasing trend after the Cenomanian-Turonian interval, previously observed in the Atlantic and the Indian sector of the Southern Ocean [5, 6] and a general increasing trend during the Maastrichtian and the Paleocene, but also document the first Cretaceous ε_{Nd} data for the Southern Pacific, the continental margins of North America and Japan, and the Panama and Drake passages. Nevertheless, further comparisons with ε_{Nd} data available in the literature and climate modelling are required to tentatively explain the oceanic circulation during the Late Cretaceous.

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Water quality and human helth in relation to aquatic environment polutiom by metals

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The assessment of the ecological consequences of element geochemical cycle changes due to the impact of mining and the metallurgical industry is of great importance for the health of the environment. This study collates published data concerning surface water contamination by metals, bioaccumulation and health of humans and fish within the Euro-arctic region of Russia (Murmansk region), in order to investigate their relationship. The results of metal concentration analysis of water from the sites of surface water intake for five cities and towns, as well as from pipe systems supplying drinking water to the public, show that industrial water treatment fails to remove toxic metals from the water. Fish were used as a biological indicator to show the impact of the pollution on living organisms. Renal disorders prevailed among the observed diseases within human populations. Statistical analysis demonstrated that human populations in those cities which are located in close proximity to smelters show the highest incidence of disease. The highest accumulation of metals within the kidney and liver were recorded in inhabitants of Monchegorsk, where the concentrations of many metals, especially, nickel, copper, chromium, cadmium, and lead, are 2–10-fold higher compared the normal. The highest concentrations within the kidney tissue were recorded for chromium and cadmium. Kidney pathologies are abundant within the population using the contaminated water supply for drinking water. The correlation between the content of this chemical element in water and pathology of kidney and liver of those patients who were examined postmortem was significant. Statistical analysis demonstrated that human populations in those cities which are located in close proximity to smelters show the highest incidence of disease. The highest content of toxic metals, especially cadmium, was found in the liver and kidney organs. The burden of evidence of the disorders observed in fish and in human populations indicates that there is a high probability of prolonged water contamination having a negative influence on the health of human populations.

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