A new database for Nd isotopes in marine environments

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Neodymium isotopic ratios in seawater have been used as a tracer of ocean circulation, continental weathering and exchange processes between dissolved and particulate phases. Over the recent years, the interest in this tracer has been growing with improvement of our knowledge on its behaviour in the modern ocean, thanks to GEOTRACES programme, and identification of archives that can preserve seawater Nd isotopic signatures. In the framework of the French INSU-LEFE project NEOSYMPA (Workshop NEOdymium isotopes in marine environments: SYnergy between Modern, Modelling and PAleo communities), we have updated a database for the available Nd isotopic data in the ocean, and compiled ε_{Nd} values for sedimentary oxyhydroxide coatings, foraminiferal tests, deep-sea corals and fish teeth/debris from the Holocene period (<10 ka). The objective of the study was to update the database of seawater-Nd isotopic ratios, to assess relationships with other more conventional water mass tracers, and to evaluate how well the marine archives could record seawater isotopic ε_{Nd} signatures. Based on the observed relationships between seawater Nd isotopic compositions, salinity and dissolved silica concentrations, we demonstrate that the bottom water Nd isotopic signatures in the Arctic and Nordic Seas and the Bay of Bengal are decoupled from the general trend defined between the North Atlantic and the Pacific, which suggests the importance of local dissolved-particulate interaction. Although seawater and archive samples were not systematically collected at the same sites, the general relationship observed between bottom/deepwater (> 2500 m) Nd isotopic ratios and dissolved silica concentrations allows us to evaluate the reliability of the ε_{Nd} values extracted from the archives. The marine archives generally show Nd isotopic ratios that agree well with estimated seawater values. We will discuss a few cases when they do not.

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Elemental patterns in agricultural and grazing land soils in Norway, Finland and Sweden – what have we learned from continental scale mapping?

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The GEMAS Project (Geochemical Mapping of Agricultural and Grazing Land Soil in Europe) resulted in a large coherent data set displaying baseline levels of elements in agricultural and grazing land soil, on both a European and a regional scale. The geochemical mapping of agricultural and grazing land soil in Norway, Sweden and Finland provides an exceptional opportunity to demonstrate regional geochemical trends in arable soil. When looking at the European data set as a whole, Norway, Sweden and Finland stand out as geochemically distinct, mainly due to the old bedrock and the extent of the last glaciation, and they were thus considered valuable for a study as a separate entity.

The interpretation of the elemental maps and statistics identified several groups of factors influencing the observed trends in the geochemical patterns of Norway, Sweden and Finland, with the most important factors being bedrock geology, the presence of ore deposits, the soil type and its properties, and climate. Anthropogenic impact on soils appears to have a minor influence on the soil geochemistry of both agricultural and grazing land. In mining regions, with the natural signal from the mineralisation, it is often difficult to discriminate between the original anomaly and any anthropogenic contamination.

The results of this survey are available for a public and can be used by both local authorities and research groups.

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