Radiogenic isotope signatures of past coastal waters from ornithogenic sediments in North Chile

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Ornithogenic sediments built up by seabird-droppings ("guano") are known from various areas and age sections in the world and are potentially useful but largely unexplored proxy archives for past ocean composition. Long-lasting arid climate favoured the preservation of guano along the North Chilean and Peruvian Pacific coast. The stratified guano deposits range in age from recent to ~2.5 Ma derived from field evidence. Local seabirds feed exclusively on small schooling fish that sample plankton of the upper watercolumn no more than 100 km off-shore. Watermasses are presently dominated by S-N transport in the Humboldt current system and upwelling of nutrient-rich deep water. The guano is composed of water insoluble Ca-phosphates (whitlockite), Ca-oxalates (Whewellite), carbonate, and gypsum and water soluble NaCl and organic N bearing compounds. $^{87}Sr/^{86}Sr$ in carbonate leachates and water soluble constitutes vary between ~0.7085 and 0.70918 (modern seawater), Sr isotopes in the respective residues agree or deviate to more radiogenic ratios. Ages according to $^{87}Sr/^{86}Sr$ evolution in seawater are between ~18 Ma and 0 Ma and agree with geological evidence, but absolut ages and variations within profiles appear to be unreasonable large. Nd isotopes show a small variation between -1.5 to + 2.2 eps Nd; excursions to -9 and +4 are restricted to single locations. Published values of modern Pacific seawater are generally less radiogenic than eps Nd -3. The $^{206}Pb/^{207}Pb$ (1.192 – 1.221) and $^{208}Pb/^{207}Pb$ (2.475 – 2.510) of guano are similar to published values of Pacific manganese nodules and seawater. The differences in isotopic composition between guano and Pacific seawater could be triggered by mixing of surface water with variable quantities of run-off flux from the Andean magmatic arc in the humid climate zones of southern Chile and northward transport. Weathering of the magmatic rocks there provides unradiogenic Sr and radiogenic Nd and similar Pb isotope composition.