

## The Pb isotope evolution of Arctic Ocean intermediate water over the past 16 million years

B.A. HALEY<sup>1</sup>, M. FRANK<sup>1</sup>, R. SPIELHAGEN<sup>1,2</sup> AND J. FIETZKE<sup>1</sup>

<sup>1</sup>IFM-GEOMAR, Leibniz Institute of Marine Sciences at the University of Kiel, Germany, bhaley@ifm-geomar.de

<sup>2</sup>Academy of Sciences, Humanities and Literature, Mainz, Germany

We present the first record of the dissolved Pb isotope composition of Arctic intermediate water of the past 16 Myr. The data were obtained from leaches of sediments of IODP Leg 302 (“ACEX”) drill-cores and from a piston-core (PS2185), both located near the North Pole on the Lomonosov Ridge (~1200m water depth). Both the leaches and bulk dissolutions of the same sediments show similar Pb isotope compositions in the “Neogene” (>1 Ma) and in the “Pleistocene” (<1 Ma) sediments, although the median values differ slightly between the two sections (e.g. <sup>206</sup>Pb/<sup>204</sup>Pb ~18.5 in the “Neogene” versus ~18.6 in the “Pleistocene”). These central Arctic isotope signatures are much less radiogenic compared with N. Atlantic records, and, although similar trends between these two basins are observable for the Pleistocene, they differed significantly during the Neogene.

From these observations and comparisons in Pb-Pb isotope space, we argue that the source of dissolved Pb in Arctic intermediate waters has primarily been derived locally from exchange with sinking ice transported sediment particles. These sediments originated from the Eurasian shelves and have continuously been carried to the North Pole region via the Transpolar Drift for the past 16 Ma.

On short millennial time scales of the Quaternary our Arctic records reflect isotopic changes in the Siberian continental sources of Pb. The most likely process driving these changes was incongruent weathering and soil formation during interglacial periods. These soils were a reservoir of relatively unradiogenic Pb, which was eroded and supplied to the Arctic ocean as an early “pulse” at interglacial-glacial transitions. Our central Arctic Pb isotope record only shows a significant glacial-interglacial cyclicity for the past ~1 Ma. On the longer Myr timescales of the Neogene, the Pb isotope data do not indicate very pronounced variations and do, for example, not show any major changes during the ~2.7 Ma intensification of Northern Hemispheric Glaciation, as observed for dissolved records in the N. Atlantic. The long term variability will be discussed in terms of relatively small changes in the continental input sources (i.e., Siberia vs. Northern Canada/Greenland).

## <sup>86</sup>Sr/<sup>88</sup>Sr ratio by ICP-MS-MC as a new tracer of terrestrial geochemical processes

L. HALICZ<sup>1</sup>, I. SEGAL<sup>1</sup>, N. FRUCHTER<sup>2</sup>, B. LAZAR<sup>2</sup> AND M. STEIN<sup>1</sup>

<sup>1</sup>Geological Survey of Israel, 30 Malkhe Israel St., Jerusalem (ludwik@gsi.gov.il; motis@vms.huji.ac.il; irena.segal@gsi.gov.il)

<sup>2</sup>Institute of Earth Sciences, The Hebrew University of Jerusalem (boaz.lazar@huji.ac.il; noaf01@pob.huji.ac.il)

This study shows that the stable isotopic composition of strontium (the <sup>86</sup>Sr/<sup>88</sup>Sr ratio expressed as δ<sup>86</sup>Sr values) in sedimentary rocks may vary significantly. The rocks were analyzed by MC-ICP-MS “Nu Plasma” (fitted with Aridus sample introduction system). Five Faraday collectors were used for measurement of following isotopes: <sup>83</sup>Kr (as monitor of <sup>86</sup>Kr interference from the argon gas, where <sup>86</sup>Kr=1.52·<sup>83</sup>Kr), <sup>85</sup>Rb (to correct for <sup>87</sup>Rb interference) and three strontium isotopes (<sup>86</sup>Sr, <sup>87</sup>Sr, <sup>88</sup>Sr). Each measurement comprised three blocks, each block consisting of 28 measurements of 10 seconds integration time. The zero reference points were reset simultaneously for all measured masses by deflecting the potential of the electrostatic analyzer before each block measurement. The optimum Sr concentration was 0.1-0.2 mg·L<sup>-1</sup>, giving sensitivity of ~5-7 V·ppm<sup>-1</sup>.

All rocks that originated in the marine environment: corals (*porites lutea* and *acropora* from the Gulf of Aqaba); Cretaceous limestone (Judea Mt.); Pliocene epigenetic dolomite (Dead Sea rift margins) as well as lacustrine evaporitic aragonite (Dead Sea) yielded uniform δ<sup>86</sup>Sr value (-0.28±0.07 ‰) within the 1σ error of Red Sea and Atlantic seawater (-0.35±0.04 ‰). On the other hand, secondary materials (products of chemical weathering) from the terrestrial environment of the Judea Mt. such as speleothem calcite and terra rossa soil (airborne dust particles residual rock material) both yielded significantly higher δ<sup>86</sup>Sr value (0.17±0.03 ‰). It should be noted that both groups are distinctly different from the SRM987 standard that has by definition a value of 0 ‰. It appears that strontium isotopes are fractionated within the terrestrial environment by geochemical processes such as chemical weathering and genesis of soils and hence <sup>88</sup>Sr/<sup>86</sup>Sr ratio may be developed as a tracer for these processes.