

Chromium isotopes in Arctic ocean water

K. AMOR^{1*}, D. PORCELLI¹, P. ANDERSSON² AND
S. J. G. GALER³

¹Department of Earth Sciences, University of Oxford, UK
(*correspondence: kena@earth.ox.ac.uk)

²Laboratory for Isotope Geology, Swedish Museum of Natural History, Stockholm, Sweden

³Max Planck Institute for Chemistry, Climate Geochemistry Department, Mainz, Germany

Very little marine Cr-isotope data has been published to date, but values from the S. Atlantic appear to show that seawater is isotopically heavy[1]. Isotopic compositions of dissolved chromium in seawater are here reported from across the Arctic Ocean, a predominantly stratified water body, as measured by TIMS and using a well constrained and optimized double spike of ⁵⁰Cr and ⁵⁴Cr[2]. All Cr-isotope values are reported relative to NIST SRM 979 [3]. Values among the sub-basins of the Arctic Ocean: the Canadian basin and the three Eurasian basins, Makarov, Nansen and Amundsen, show significant variations with depth. For example the Amundsen Basin varies from $\delta^{53}\text{Cr} \sim 0\text{‰}$ in near surface waters in the Cold Halocline Layer to $\delta^{53}\text{Cr} \sim +0.45\text{‰}$ in the Atlantic layer and Upper Polar Deep Water. It is unclear whether variations in Cr-isotope values can be attributed to water mass, water column processes, particle scavenging on the shelf, or riverine input into the basins or a combination of all of these factors.

Initial values for the Canadian basin show even more extremes with a near surface water Cr-isotope value of $\delta^{53}\text{Cr} \sim -0.76\text{‰}$. Again it is unclear whether this low value originates from Pacific water inflow across the Chukchi Sea, water column processing or riverine input from the McKenzie River.

Thus it appears there is considerable complexity in marine Cr-isotope values that has implications for their use as a palaeo-redox indicator.

[1] Bonnand *et al*, (2013), *EPSL*, **382**, 10-20. [2] Galer, (2007), *GCA*, **71** (15S), A303. [3] Shields *et al.*, (1966), *J. Res. Nat. Bur. Standards – A, Phys and Chem*, **70A** (2), 193 – 197.