Geophysical Research Abstracts,
Vol. 10, EGU2008-A-03607, 2008
SRef-ID: 1607-7962/gra/EGU2008-A-03607
EGU General Assembly 2008

Marine mammal teeth as long-term archives of changes in stable carbon isotopes in the Arctic Ocean – are they recording the Seuss Effect, or ecosystem productivity changes?

P. Outridge (1,3) and K. Hobson (2)

(1) Department of Environment & Geography, University of Manitoba, Winnipeg, R3T 2N2, Canada, (2) Environment Canada, Saskatoon S7N 0X4, Canada, (3) Institute for Environmental Geochemistry, University of Heidelberg, Germany. (outridge@nrcan.gc.ca / Fax: +49 6221 54 42 08 / Phone +49 6221 54 60 65)

The rate of dissolution of anthropogenic CO_2 in global oceans is one of the uncertainties surrounding the fate and effects of CO_2 emissions, and the subject of on-going research. Here we show long-term (past 800 years) and high-resolution short-term (since $\sim$ 1940) data on changes in the stable carbon isotopic composition of the Arctic Ocean ecosystem. The teeth of beluga whales and ringed seals, collected from archeological sites and modern harvests in two regions of the Canadian High Arctic, show stable long-term del.^{13}C values from about 1200 A.D. up to the 1920s, and recent declines amounting to about 2 ^{o}/oo below the long-term averages. Micro-drilling and analyses of annual growth layers in beluga tooth dentine from the Beaufort Sea revealed that the decline started in the early 1970s and accelerated in the late 1990s. A similar pattern was found in Bering Sea bowhead baleen plates by Don Schell, who attributed it to changing Arctic Ocean productivity. However, unlike bowhead baleen, the stable nitrogen isotope composition in these beluga and seal teeth has not changed significantly over time. We will explore the alternative hypotheses that the changes in carbon isotopes reflect ecosystem productivity trends, or are the result of dissolution of isotopically-depleted anthropogenic CO_2 (the Seuss Effect).