# The development of $^{129}I/^{127}I$ ratios in Scottish sea water

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$^{129}I/^{127}I$ ratios of Scottish seawater taken at seven locations in 2003 were presented at the Goldschmidt 2004 conference (Schnabel *et al*., 2004). These data constituted the first reported $^{129}I/^{127}I$ ratios in Scottish seawater since 1992. The estimate that iodine isotope ratios increased about by a factor of 7 between then and 2003 is in reasonable agreement with the increase in marine $^{129}I$ releases from Sellafield during that period. The new data presented at the current conference also include samples from the south-west of Scotland, closer to the emission source. Moreover, some locations were sampled in 2003, 2004 and early 2005 to follow the development of the isotope ratio.

The table below compares iodine isotope ratios obtained for the first samples in this work to the datapoint obtained in 1992 by Raisbeck *et al.* (1995).

| Sample | $^{129}I/^{127}I$ (at/at) |
|---|---|
| Troon | $(4.91\pm0.29)*10^{-7}$ |
| Sannox Bay | $(3.13\pm0.20)*10^{-7}$ |
| Gruinard Bay | $(1.28\pm0.09)*10^{-7}$ |
| Dornoch | $(1.15\pm0.15)*10^{-7}$ |
| Vatersay East | $(8.58\pm1.07)*10^{-8}$ |
| Pollachar | $(8.87\pm0.90)*10^{-8}$ |
| Lossiemouth [Rai95] | $(1.6\pm0.2)*10^{-8}$ |

The agreement of the iodine isotope ratios of the two Hebridean sampling locations Vatersay East and Pollachar (their $^{129}I$ concentrations differ significantly) confirms that the isotope ratio is the tracer to follow pathways and not the radionuclide concentration.

## References

Raisbeck G.M. et al., (1995) J. Mar. Syst.. 6 561-570.
Schnabel C. et al., (2004) GCA 68 A492 (Abstract)

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# Incorporation of $^{129}I$ from nuclear sources into lacustrine sedimentary organic matter: a case study in the Great Lakes

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Large quantities of $^{129}I$ ($T_{1/2}$ = 15.7 Ma) have been released during the past six decades, primarily during nuclear fuel reprocessing and bomb testing. Due to the biological affinity of iodine, anthropogenic $^{129}I$ has become associated with organic material such as vegetation, soil and sediment. The current study was undertaken to investigate the presence of $^{129}I$ and its stable counterpart, $^{127}I$ in the sediments of Lake Erie and Lake Ontario. The watershed of these lakes is heavily industrialized on the American and Canadian sides, resulting in the contamination of lake sediments by toxic organic compounds, heavy metals, $^{137}Cs$, $^{241}Am$, and Pu isotopes. The predominant source of $^{129}I$ to the sediments in the study area (eastern Lake Erie and western Lake Ontario, which are connected by the Niagara River) is a defunct reprocessing facility at West Valley, NY which released approximately 10 kg of $^{129}I$ via site runoff and smoke stack emissions during 1966-72. $^{129}I$ and $^{127}I$ data from 3 sediment cores from Lake Ontario and 1 core from Lake Erie will be compared to published data on the bulk and molecular geochemical characteristics of these cores [1,2]. The data will be analyzed in the context of a conceptual model for the incorporation of $^{129}I$ and $^{127}I$ into the water and sediments of the Great Lakes.

## References

[1] Mukhopadhyay et al., Env. Geosciences, 4 (1997)
[2] Kruge et al., Org. Geochem., 29 (1998)