

# Origin and fate of $^{129}\text{I}$ in Swedish lakes and soils

M. Meili<sup>1</sup>, N. Buraglio<sup>2</sup>, A. Aldahan<sup>3</sup>, G. Possnert<sup>2</sup> & A. Kekli<sup>3</sup>

<sup>1</sup>Institute of Applied Environmental Research, Stockholm University, S-106 91 Stockholm, Sweden  
<sup>2</sup>Tandem Laboratory and <sup>3</sup>Dept. of Earth Sciences, Uppsala University, S-751 21 Uppsala, Sweden

## Abstract

Recent measurements of iodine-129 using accelerator mass spectrometry (AMS) have revealed surprisingly high concentrations in Swedish lake waters: often more than one order of magnitude above present background levels in Arctic lakes, and 5 orders of magnitude above natural levels. Patterns along a steep local gradient of Chernobyl fallout are first to show that present emissions from the nuclear fuel reprocessing facilities at La Hague (France) and Sellafield (UK) are the dominant source of  $^{129}\text{I}$  not only in the oceans but also in remote freshwaters, even at distances of over 1400 km. Comparison of  $^{129}\text{I}/^{127}\text{I}$  isotope ratios suggests that most of the  $^{129}\text{I}$  is supplied by a large-scale dispersal of ongoing emissions to the atmosphere, rather than by volatilisation of  $^{129}\text{I}$  from polluted seas. Calculations based on simultaneous monitoring of  $^{129}\text{I}$  in precipitation indicate contributions from both wet and net dry deposition. Comparison of lakes with different watershed properties suggests an efficient retention of  $^{129}\text{I}$  in boreal forest soils. All these findings point at the relevance of studying the dispersal and fate of European  $^{129}\text{I}$  emissions not only in marine waters but also in freshwater and terrestrial environments.