

Trace metals

Trace metal investigations undertaken within LOIS aimed to:

- provide data sets linking rivers, estuaries, coastal waters and the shelf edge,
- estimate trace metal fluxes from the rivers of the study area,
- determine dissolved-particulate trace metal relationships through the river-tidal reaches-estuary system in order to develop an improved predictive capability for trace metal transport,
- establish temporal and spatial variations in both dissolved and trace metal concentrations and fluxes in the Humber and Tweed estuaries, and in the Humber-Wash coastal system,
- quantify exchange of trace metals within shelf seas.

Attention focussed on Cd, Cr, Cu, Co, Fe, Mn, Ni, Pb and Zn. An intercalibration programme ensured comparability of results across the wide range of environments and samples involved. Analytical techniques employed included graphite furnace atomic absorption spectrometry (GFAAS), inductively coupled plasma mass-spectrometry (ICP-MS), inductively coupled plasma-optical emission spectroscopy (ICP-OES), automated voltammetric monitoring, automated batch analysis by voltammetry and X-ray fluorescence (XRF). The investigations included characterisation of the surface properties of suspended particulate matter (SPM), separation of temporary suspended particulate matter from the permanently suspended fraction, controlled sorption experiments using radiotracers, and determination of partition coefficients. Work included monitoring of trace metal fluxes at key river monitoring stations and more detailed investigations of dissolved-particulate trace metal relationships through the river-tidal reaches-estuary continuum, involving separation of temporary and permanently suspended particulate matter and characterisation of the surface properties of SPM.

Sampling in estuarine and coastal areas included *Challenger* cruises undertaken on predetermined sampling grids in the Humber-Wash plume and along the Humber-Tweed coastal track. Additional samples were obtained over tidal cycles at anchor stations in the mouth of the Humber, along the Holderness coast and at other selected locations. Axial transects of the Humber and Tweed estuaries were made using inshore craft. A quasi *in-situ* settling tube was used to separate temporary and permanently SPM and this was deployed in conjunction with *in situ* laser diffraction grain size analysis.

Information on trace metals in sediments in the historical and geological perspectives is given in 'Integration over time'. Integrated studies of the uptake of radioactive metals within phytoplankton patches were undertaken over the shelf-edge during *Challenge* cruises. Both *Challenge* and *Darwin* were used in studies undertaken on the Hebridean Shelf, which involved collection of both water and sediment samples.

Examples of trace metal data included on the Overview CD-ROM are:

- Cr, Fe and Zn concentration data for the main **river monitoring stations** for the period 1994-1996 (**river water quality**),
- Cr, Fe and Zn concentration data for a selected set of sites from the Humber and Tweed estuaries and the Holderness coast for the period 1995-1996 and contoured maps from selected areas (**estuarine and coastal sediment and sediment / water chemistry**).

Also included are **river flow data** used in the calculation of loads.