

Sediments

Sediment investigations undertaken within LOIS have largely focused on fluxes through the river - estuary - coastal seas continuum. Sediments are important not only in their morphological role, but also as substrates for microbial activity and as vehicles for contaminant transport. An aim within LOIS has been to link contemporary sedimentary processes to those within the historical and recent geological time frames. Some work has been undertaken on sediment deposits in lakes and on river flood plains in order to link evidence of variations in sediment properties to changes in sediment sources and fluxes during this longer time frame. These sediment studies also link with studies of the longer-term sediment record and with detailed investigations of particular sedimentary environments, such as intertidal saltmarshes.

Sediment data have been collected within LOIS in order to:

- provide linking data sets between observations in the rivers, estuaries and the offshore waters of the North Sea,
- document the suspended sediment fluxes from the main rivers of the LOIS study area and establish the main sediment sources and the overall sediment budgets of the river systems,
- investigate recent changes in sediment sources and sediment fluxes with the river basins of the study area,
- provide information on short-term, seasonal and long-term processes controlling suspended particulate matter (SPM) concentrations within the estuarine and marine components of the study area,
- facilitate estimation of the fluxes and fate of suspended sediment and other SPM within the estuarine systems and the North Sea,

During LOIS detailed monitoring of suspended sediment fluxes has been undertaken on most of the main rivers of the study area and measurements of bank erosion have been undertaken in both the freshwater and tidal reaches of the rivers Ouse and Trent. Studies of metals on particles in suspension and on the bed allow estimation of the sequestering of trace metals in deposited sediments, where changes in concentration over time can be estimated from cores. Sediment cores have been collected from both lakes and flood plain areas for investigation of past changes in sediment sources and fluxes.

Measurements of salinity and suspended particulate matter (SPM) concentrations were made in the tidal reaches of the Yorkshire Ouse and Humber estuary during the period March 1994 to December 1996. Across the mouth of the Humber, a 'flux curtain' array of five stations, measuring hourly values of salinity, temperature, flows and SPM, has been operated over the past five years. These data are transmitted to the Humber Observatory at the University of Hull. Along the Holderness coast, two major studies have used sea bed arrays and remote radar measurements to characterise the nature and magnitude of sediment movement along and across the coastal margin. New sensor systems such as the Proudman Oceanographic Laboratory Mooring Package (PMP) and the Boundary Layer Intelligent Sensing System (BLISS) were deployed. They measured currents, tidal and wave elevations and SPM concentrations at sampling speeds rapid enough to capture intra-wave effects, and for durations long enough to allow seasonal variations to be studied. Data were also obtained within the North Sea coastal strip, between Berwick and The Wash, during 1993-1995 and within the Tweed estuary during 1996-1997.

These estuarine and coastal data will provide quantitative information, via modelling studies, on the fluxes of SPM from river to sea. Within the Humber, measurements identified a persistent, high concentration turbidity maximum (TM) in the upper estuary that was generally associated with the freshwater-saltwater interface (FSI) region. Near-bed concentrations within the TM sometimes exceeded fluid mud levels following slack-water periods. At the estuary mouth an unexpectedly high spatial variability of SPM was found. Along the Holderness coast sediment transport was dominated by the influence of storms.

The Overview CD-ROM provides examples of sediment and sediment related data collected within LOIS. These include:

- suspended solids and turbidity data for the main **river monitoring stations** for the period 1994-1996,
- suspended solids data from an intensive survey of the river Aire undertaken in 1995 (**river monitoring stations**),
- measurements of salinity and SPM in the coastal strip undertaken from *Challenger* (1993–1995) (**estuarine and coastal sediment and sediment / water chemistry**),
- measurements of SPM in the Humber and Ouse between March 1994 and December 1996 (**estuarine and coastal sediment and sediment / water chemistry**),
- **Humber Observatory data set** and the **Holderness Experiment data**,

- current metre, temperature and depth time series data collected for the moored instruments in the SES area (**shelf edge sampling stations**) and (**shelf edge mooring data**),
- SPM concentration maps derived from CASI images of the Humber estuary and Humber plume obtained from June to August 1995 (**estuarine and coastal CASI images**),
- an SPM concentration map of the tidal Ouse from Goole to Barmby-on-the-Marsh derived from CASI imagery obtained in August 1994 (**river catchments CASI image**),
- an aerial photograph of Cawood at the confluence of the rivers Wharfe and Ouse during floods in February 1995. It shows the different suspended sediment loads of the two rivers (**river catchments aerial photography**),
- **shelf edge sea floor photographs** obtained at a series of stations within the Shelf Edge study area,
- **shelf edge current data from drifters** launched within the Shelf Edge study area,
- SPM concentrations from water bottle data obtained from the S section the Shelf Edge study area based on the same casts as the CTD data (**shelf edge water quality data from bottles**),
- scanned electron micrograph images of surface sediment in the Humber estuary (**estuarine and coastal micrograph images**).

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