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Hydrology & Earth System Sciences

Special Section:

Sediment dynamics and channel change in rivers and estuaries

Physical, physico-chemical and biological factors controlling the transport of fluvial and estuarine sediments were addressed in four papers presented at a session at the General Assembly of EGU in Nice, 2003. The focus of the session was on field and laboratory experiments designed to examine the influence of physical properties and biological processes relevant to the stability and transport behaviour of polluted fine sediments. The significance of the identification and quantification of erosion related factors such as grain size, bulk density, water and gas content, biomass and extra cellular polymer substances was highlighted. Subsequently a fifth paper has been added as it is considered an appropriate addition to the set.

Bunch *et al.* introduced a numerical process-imitating model, Discrete Storm Event Sediment Simulator (DSESS) to represent the climatic and hydraulic conditions of drylands and model their geomorphological development and sedimentary facies distribution (water-lain, sheet flood only). DSESS employs storm-flood automata, released across a cellular landscape, to model sediment transport: erosion, migration and deposition.

The flooding of the Elbe in August 2002 resulted in widespread erosion and relocation of soils and sediments. Babarowski *et al.* assessed the pollutants entering the aquatic phase, dissolved constituents and suspended particulate matter (SPM) by daily surveys during the flood. Results presented included dry weight and particle size distributions of SPM, of selected heavy metals, DOC concentrations and UV extinction. Analysis of the internal structure of a flood wave revealed the main input pathways of pollutants in the catchment during a flood.

Aspden *et al.* studied the socio-economic and environmental implications of clam (*Tapes philippinarum*) harvesting in the Venice lagoon. Bottom trawling disrupts the structure of benthic communities but the effects on sediment stability were studied by comparing two sites, demonstrating greater and lesser impact and measuring sediment stability by a cohesive strength meter. Sediment stability was initially higher at the less impacted site, correlating with indicators of biogenic sediment stabilisation. At the less impacted site, the critical erosion threshold decreased by approximately 50% following a trawling session.

In Portugal, Figueiredo da Silva *et al.,* researching in the Ria de Aveiro system, considered seagrass beds as important indicators of ecosystem change; the decline in seagrass harvesting has led to the beds becoming covered in sediments and the coverage of seagrass species (*Zostera, Ruppia and Potamogeton*) has been reduced. These changes reflect changes in the physical forcing associated with increased tidal wave penetration; this has redistributed coarser, sandy sediment and increased resuspension and turbidity.

In China, Yang *et al.* measured fair weather currents and suspended sediment concentrations (SSC) using an Acoustic Doppler Current Profiler and two turbidity sensors over a neap to spring tidal cycle at a site near the inner mouth of a semi-enclosed macrotidal embayment (Jiaozhou Bay). SSC varied from about 3 to 16 mg L^{-1} at the surface and from 6 to 40 mg L^{-1} close to the bed, while the current velocity reached 79 cm s^{-1} at the surface and 61 cm s^{-1} near the bed. SSC was tidally cyclic.

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