8th international SedNet conference 6-9 November 2013 Lisbon, Portugal

ECSA Special Session: Changing hydrodynamics of estuaries and tidal river systems (Kate Spencer)

Summary

- Theme for the session: impact of medium-long term disturbance (management/climate change) on hydrodynamics, contaminant processes and wider ecosystem functioning in estuaries, and linkages between these.
- Combination of invited ECSA talks and submitted presentations.

Summary

1. Changing dimensions of the estuarine channel – length, depth and shape (basins, structures) – impacts concentrations of SPM, position of the TMZ, erosion/deposition of sediment and tidal prism (MHW/MLW).
2. Seasonal/longer term changes in hydrology (reduced fluvial input) – SPM flux – implications for water quality e.g. hypoxia.
3. Potential (poorly understood/poorly quantified) for contaminants to be remobilised. Of particular concern, due to biogeochemical behaviour and toxicity are Cd and newly emerging contaminants such as cytotoxic cancer drugs.
4. Poor understanding of fate and transport of particles (cohesive particles) and associated contaminants related to these wider hydrodynamic changes.
5. Implications for estuary function: hypoxia, water quality, dredging management, ecology, inundation risk.

Workshop/working group discussion

- Model limitations: site specific, sheer stress, mixed sediments, impacts of biology (e.g. biostability), sediment availability – poor parameterization of models.
- Communication: are we asking the right questions, communicating the limitations/capabilities adequately, strategic data acquisition – modellers need good data.
- Models don't communicate: how do we integrate models for linked systems e.g. morphological creek evolution and in-channel hydrodynamics……Feedback loops?

Initiative

- Need for benchmarking, standardization and development of international validation criteria: what's 'good enough' in terms of model output (e.g. SPM)
- Initiative: compare model outputs for given dataset – accuracy and precision (similar approach to climate change modellers).

How to do more with less? How to make better use of what we've got!

Workshop discussion

- Key stresses on these systems: local vs. global.
- Scaling issues
- Linkages: ecological, sediment, morphological and geochemical models and processes.
- What can't we model – rather site specific, need more data sharing (modellers need good data, field scientists need to know what data are needed) Interreg/EU Horizon-
- Sheer stress – not very good at estimating sheer stress e.g. influence of biostability – means we can't parameterise models.
- Modelling SPM? – poor correlation betweeen modelled and observed conc. of SPM, is this really important? What's good enough? Reproducing surface SPM relatively easy – what about the depth profile?
- Really important to know what question you're asking of the model – prediction can be difficult (i.e. what's good enough?).
- Unknown boundary conditions – e.g. what sediment is available?

- and what fundamental processes don't we understand?
- Modeling: standardization and development of international validation criteria? Need for bench marking and comparing of models. Also about how modellers present their data. What about using the approach of the climate change models – model outputs tend to be published together for comparison – accuracy and precision!

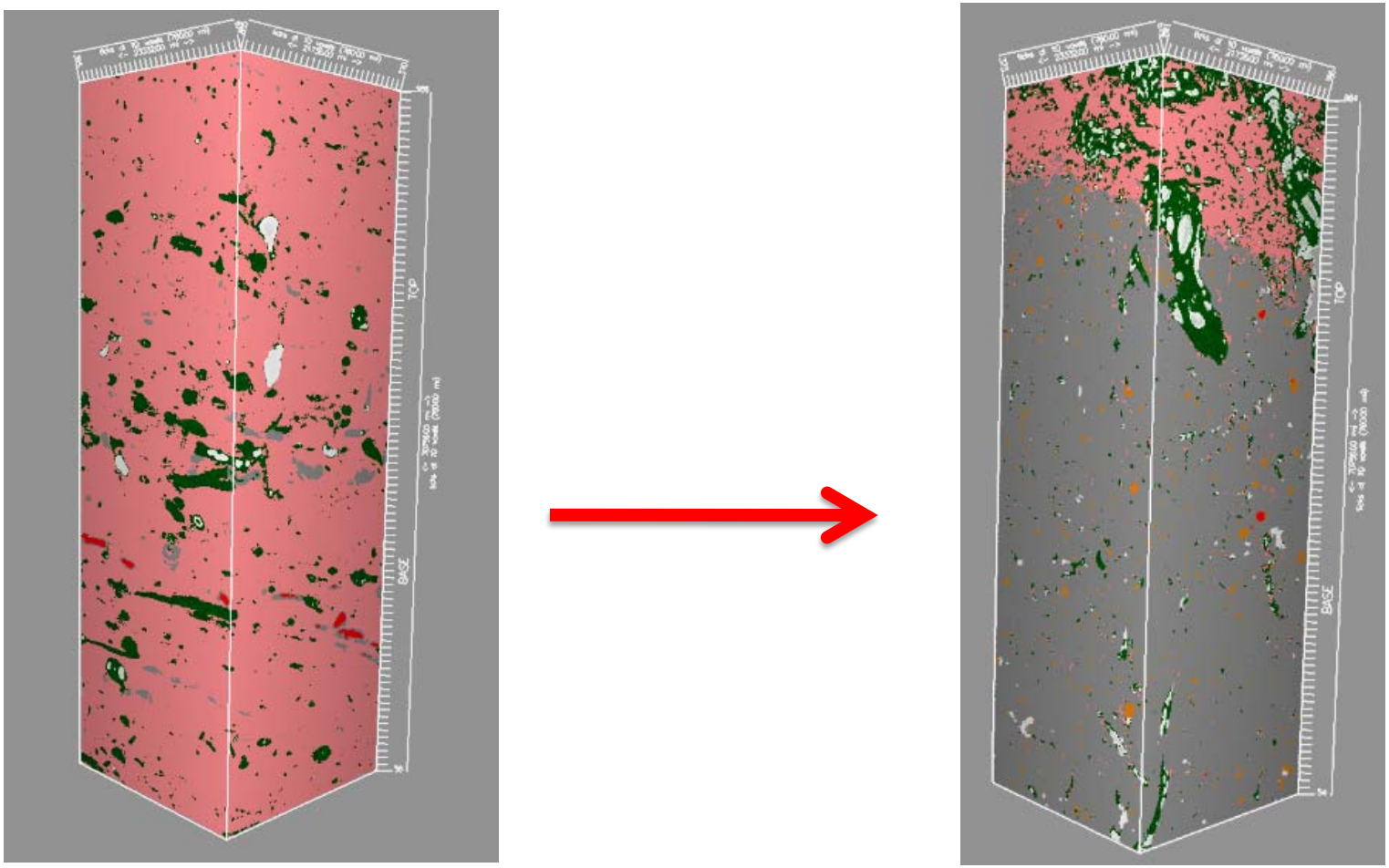
Linkages

- Do we mean poor?
- Linkages: ecological, sediment, morphological and geochemical models and processes.
- Mixed sediment behaviour – v difficult to model.
- Poor morphodynamic models – poor long term predictions of evolution
- Poor understanding of biomorphological linkages in models – biostabilisation by algae, interaction vegetation and sediment e.g. creek networks, cyclic mudflat development (e.g. Bouma and Temmerman).
- Linkages between (bioturbation) short term deposition intensity and characterisation and geochemical cycling -
- Poor linkages in morphological models – feedbacks between different morphological systems not well known (e.g. cliffs and beaches, or creeks and saltmarshes). The models also need to link.

Implications of/for sediment management

- Developing shared knowledge sharing and understanding
- Communicating the capabilities of the model (e.g. uncertainties) to the managers. The limitations of the model also needs to be communicated.
- Poor communication of how data have been generated – e.g. lack of awareness of field sampling protocols, analytical protocols.

Changes in sediment structure associated with de-embankment



X-ray tomography (CT scan) showing sediment structure in inter-tidal sediment

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Save the Date!

ECSA 55

Estuaries and coastal seas in a rapidly changing world*

October 2014, Phuket, Thailand

Supporting journals

Ocean & Coastal Management

Estuarine, Coastal and Shelf Science

Proposed Conference Streams:

- *People, coasts and societies through time*
- *Ecosystem changes and pollution*
- *Human interferences and ecosystem services*
- *Biology and ecology of coastal and estuarine systems*
- *Geochemical processes and interactions*
- *Physical processes in coastal and estuarine systems: sediments, hydrodynamics, and geomorphology*
- *Monitoring and sustainable management of coastal systems*
- *Estuaries and coasts in the future*

ECSA 55 will for the first time feature specialist sessions within these streams submitted by delegates who wish to convene sessions.

Session submission deadline to be announced soon.

We look forward to seeing you next year in Thailand for ECSA 55!

More information will be posted soon at:

www.estuarinecoastalconference.com