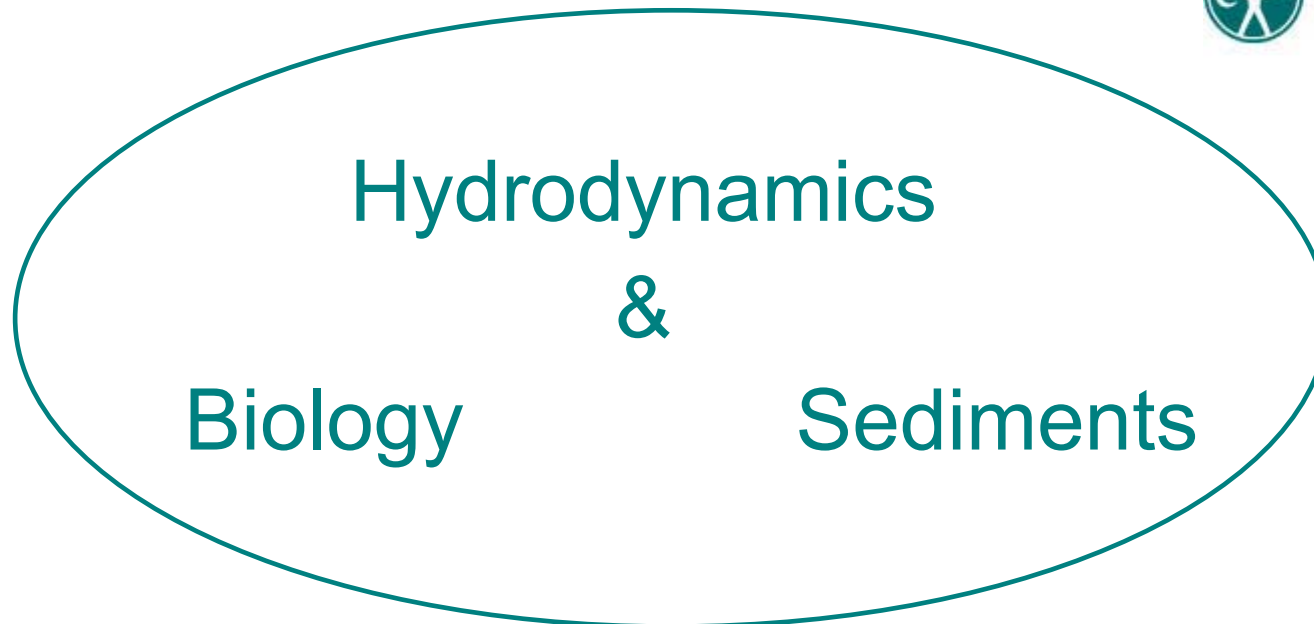


EstProc

Estuary Processes



Richard Whitehouse, HR Wallingford

Research objectives

- EstProc
 - Estuary Process Research Project
- Project FD1905 Defra/EA TAG
- Runs 2001 through to November 2004

- Snapshot of work in progress July 2003
 - a few examples

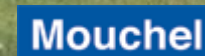
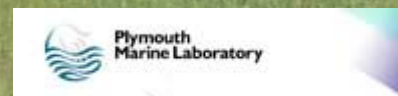
Research objectives

- Working on specific tasks within:
 - Hydrodynamics (currents, waves)
 - Sediments (muds and sands / gravels)
 - Biology (flora and fauna)
- Hydro-bio-sedimentary processes and interactions
- Builds on national / EC research
- Inception Report early in project (2002)

- June 2003 workshop at Gatty Marine Lab, Scotland



- 11 partner organisations from UK and Netherlands
- Research organisations and universities



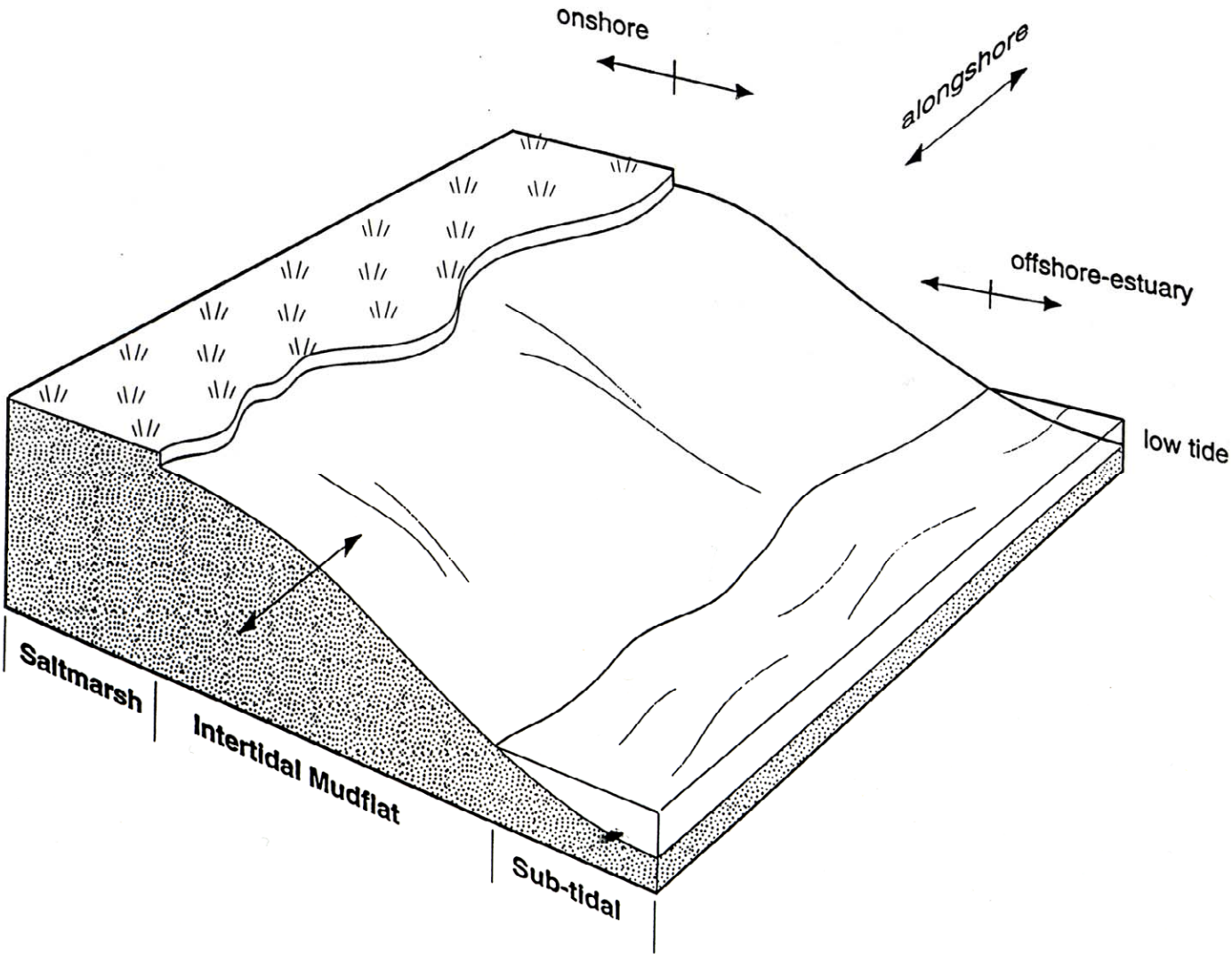
Research functions / environments

- Progress is by:
 - Interdisciplinary work
 - Modeller / process scientist interaction
 - Data interrogation
- Estuary wide modelling
- Tidal flat sedimentation
- Mudflat-saltmarsh interactions
- Morphological / physiotype modelling

- Eden Estuary, Scotland



- Estuary fringe



Research deliverables

- Improved process knowledge and tools
 - tools = methods and models
 - component parts of physical processes
 - algorithms for specific processes

Estuary wide modelling

- Feed direct to modelling of processes
- Applications within models for:
 - Mersey (POL) - Prandle paper
 - Humber (ABPmer/Delft)
 - Crouch & Stour/Orwell (HRW)
- Tidal flat environment
 - Potential for advance is high

Estuary wide modelling

- Wave propagation
- Dissipation including role of vegetation
 - direct benefits to flood protection
- Morphology of high water zones
 - dendritic channels (ABPmer, HRW)
- Extreme events
 - including salinity structure Tamar (PML)



- Extensive mudflat

- Saltmarsh



HRW: Waves - Outer Thames Estuary

- Comparison of 2 wave models
 - SWAN, TU Delft, NL; TOMAWAC, EDF, Fr
- Both models represent similar / same processes using similar / same formulations

Waves - Outer Thames Estuary

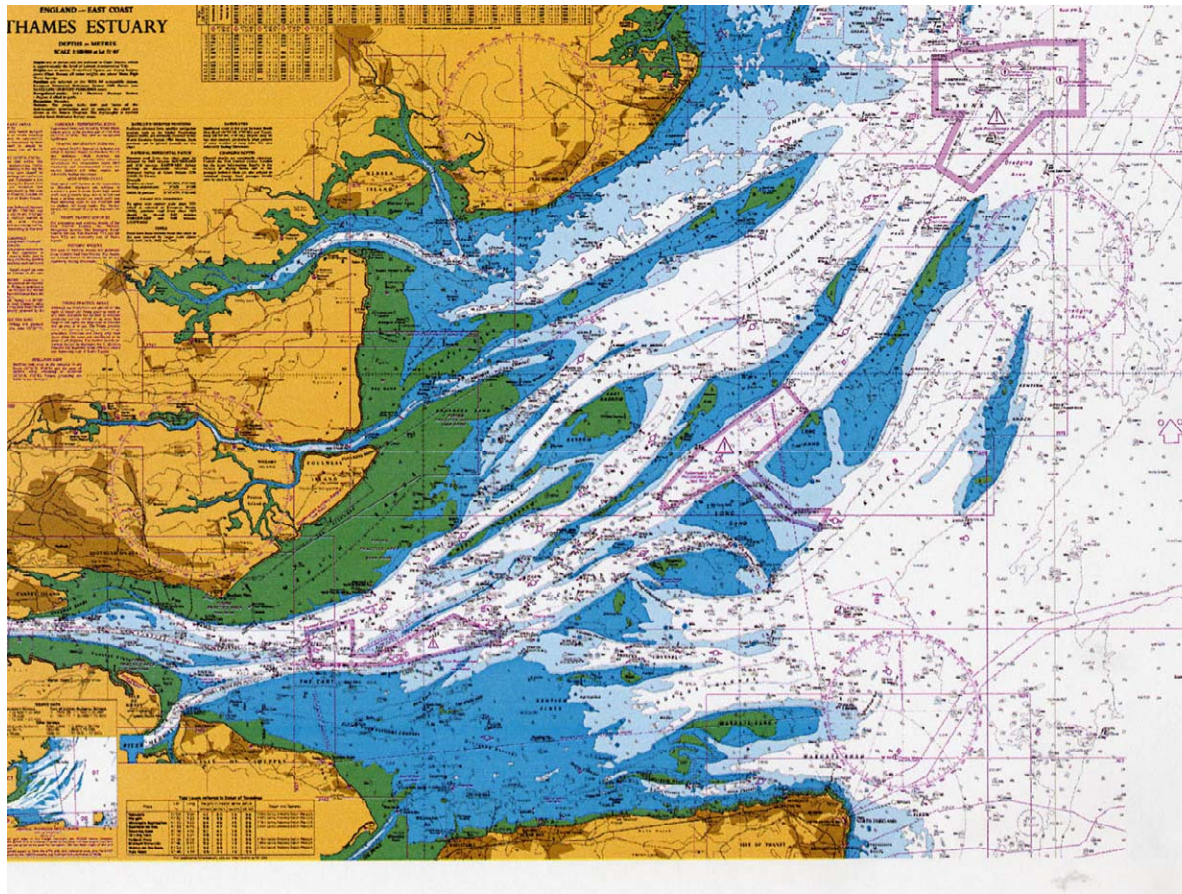
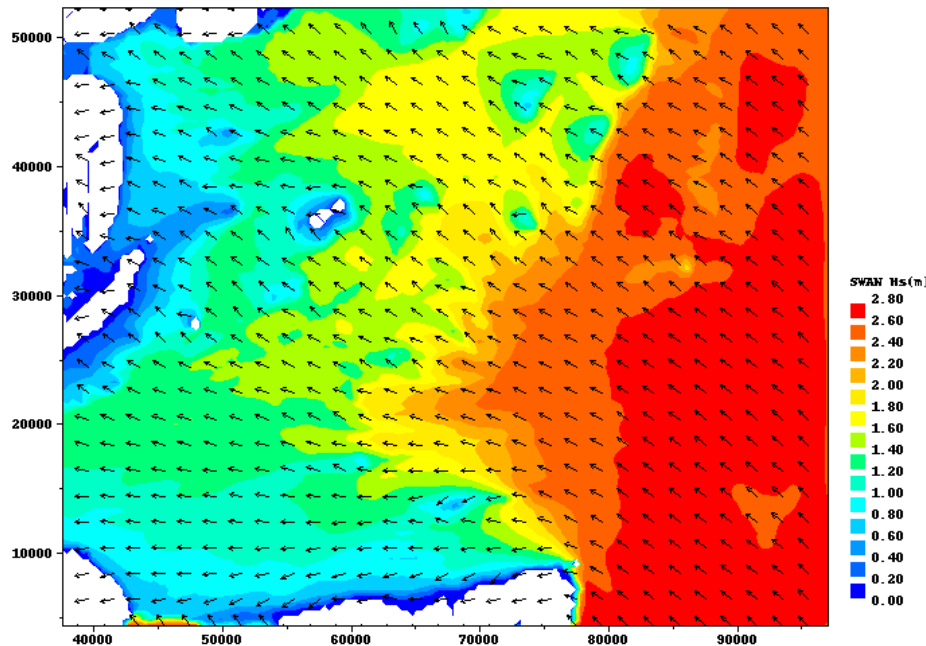


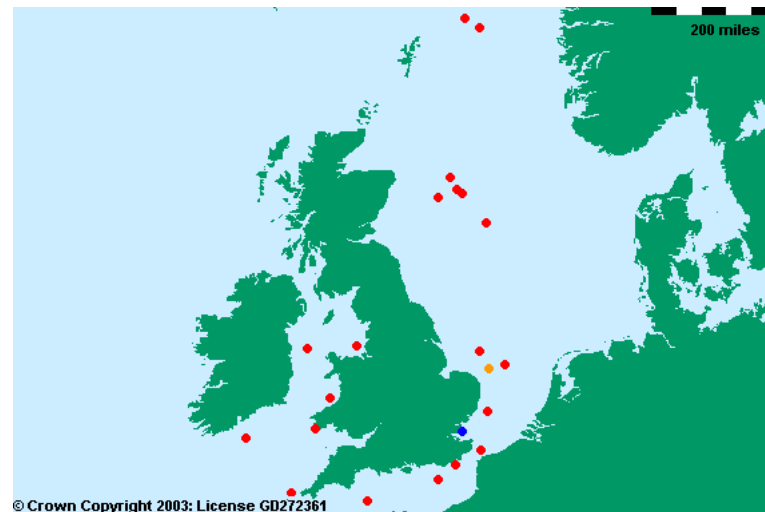
Chart from UKHO

Waves - Outer Thames Estuary

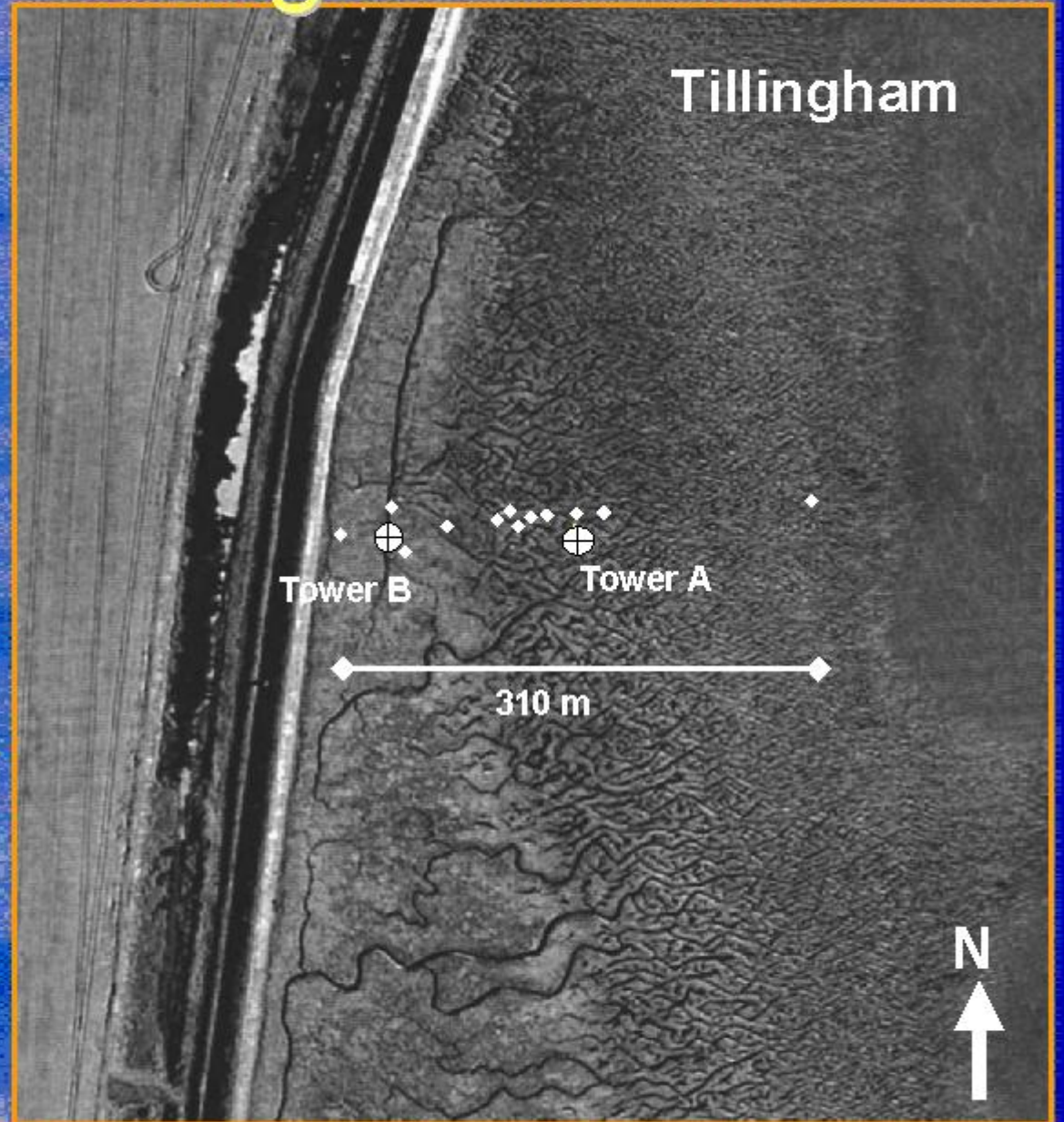
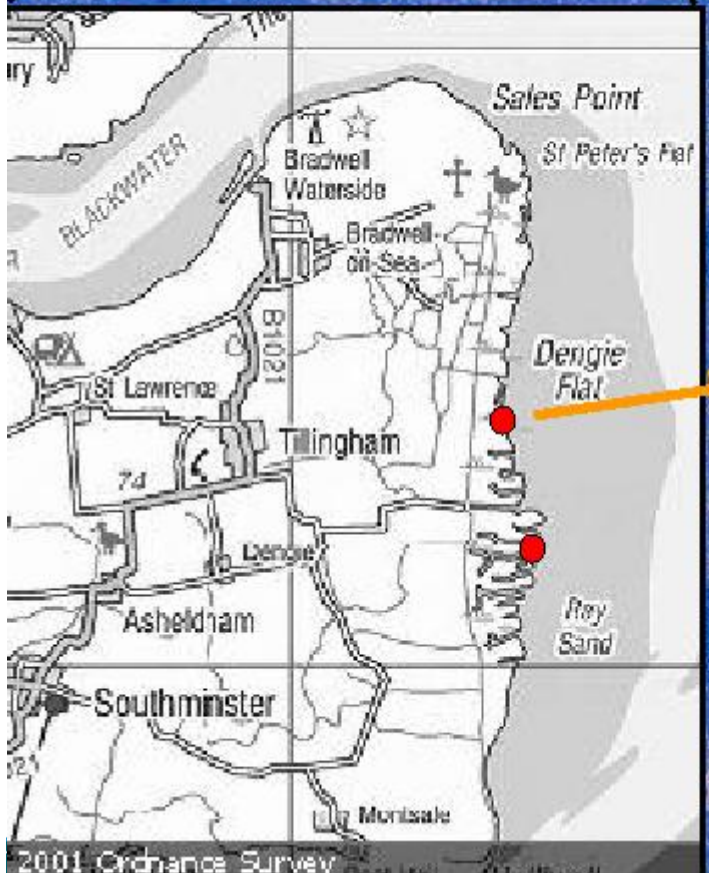
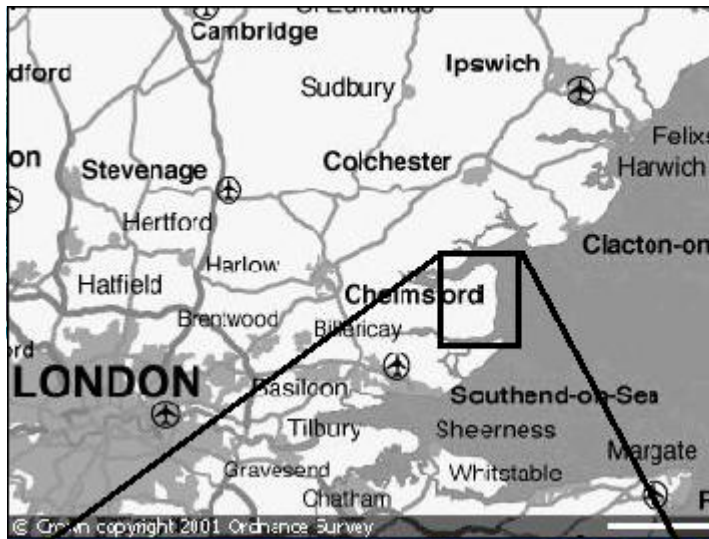


- Model output

- Time series data including Wavenet

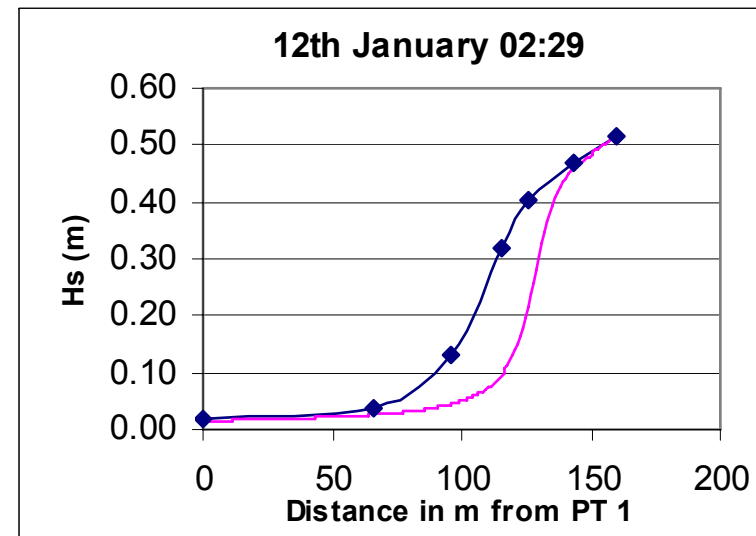


Dengie



CCRU: Waves on flats and saltmarsh

- Dengie (Tillingham & Bridgewick)
- Waves
 - intertidal flat - transition - marsh
- Combined use of:
 - SWAN model
 - process data
 - LiDAR
 - vegetation info

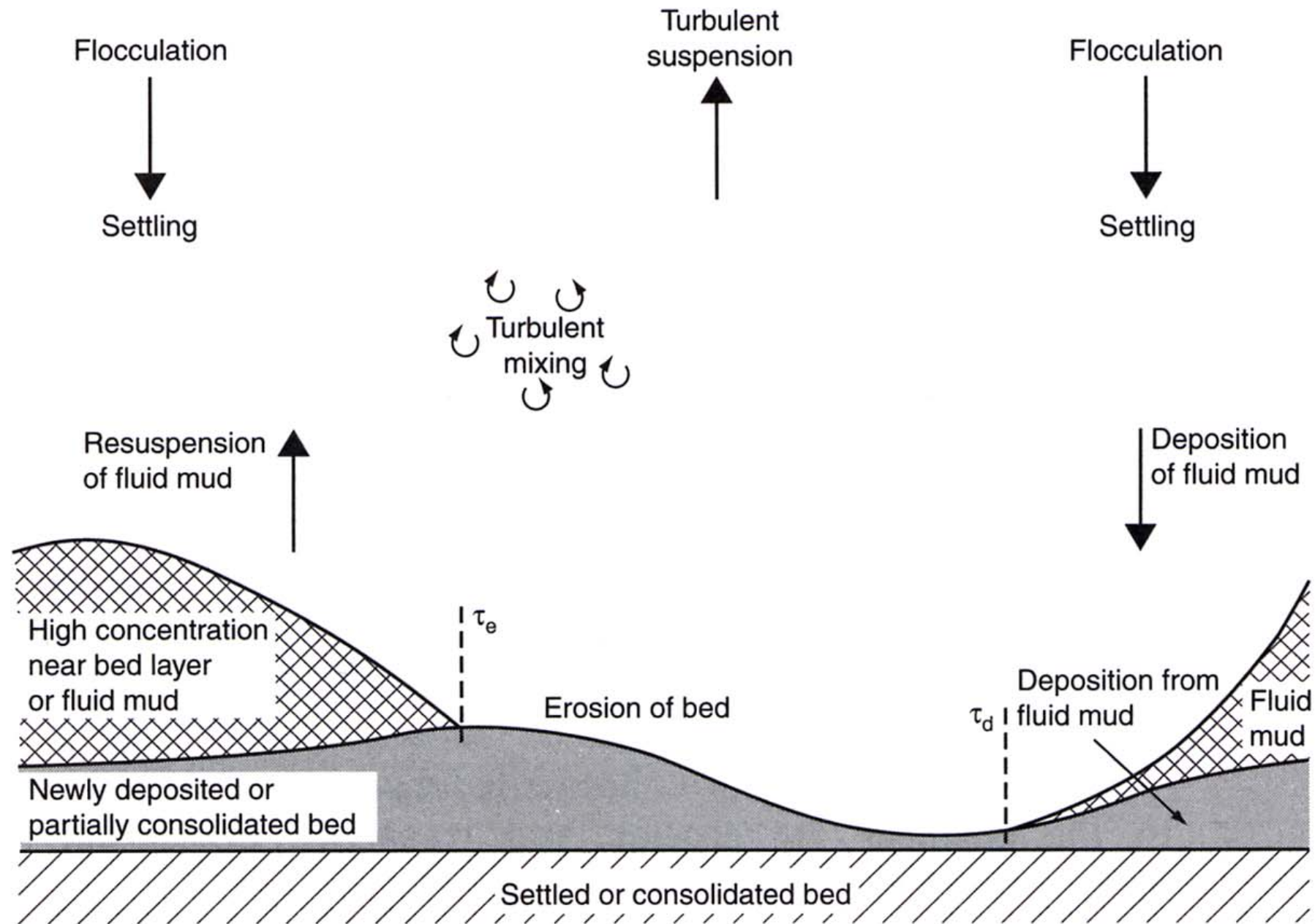




Sedimentary processes

- Bed shear stresses
 - currents & waves, ripples, biology
- Initiation and transport of mixed sediments
- Sediment dynamics
- Sediment fluxes

- Parameterisation for whole estuary models

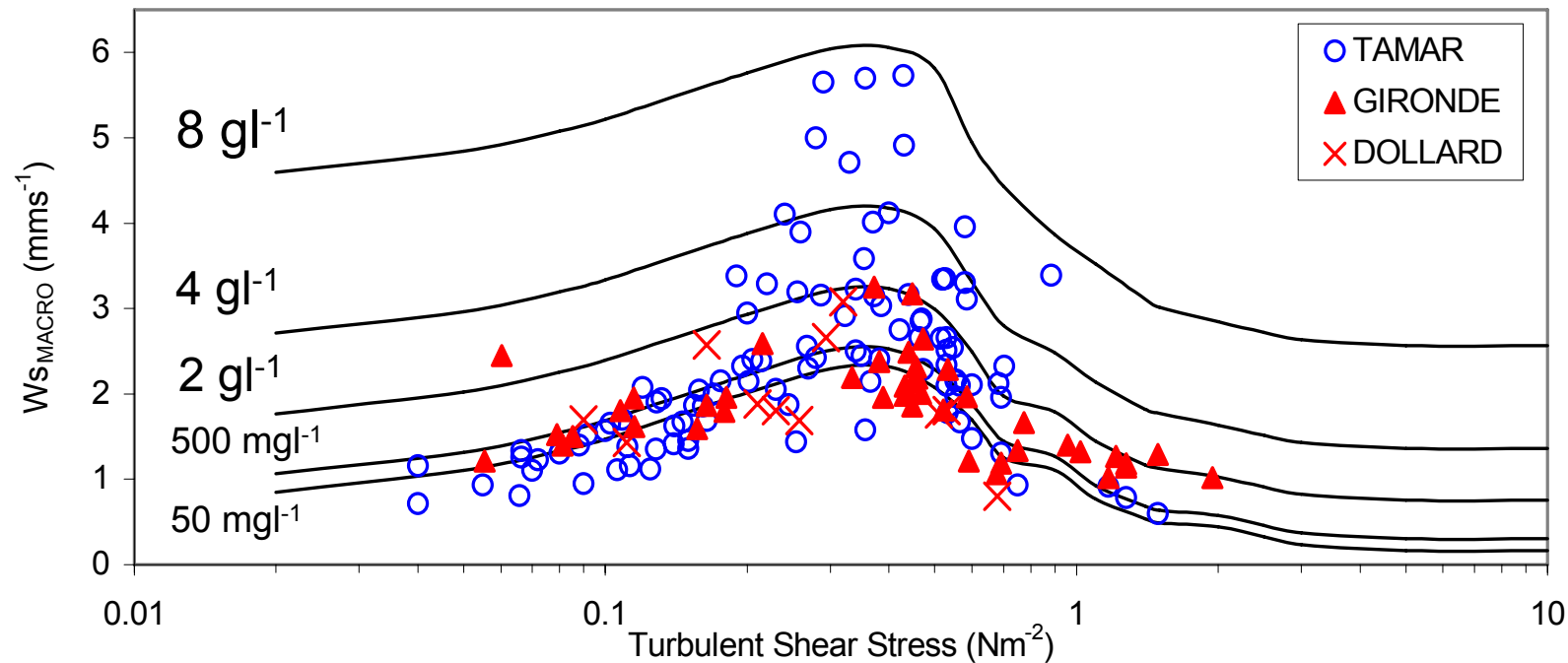


• Mud processes \longrightarrow time

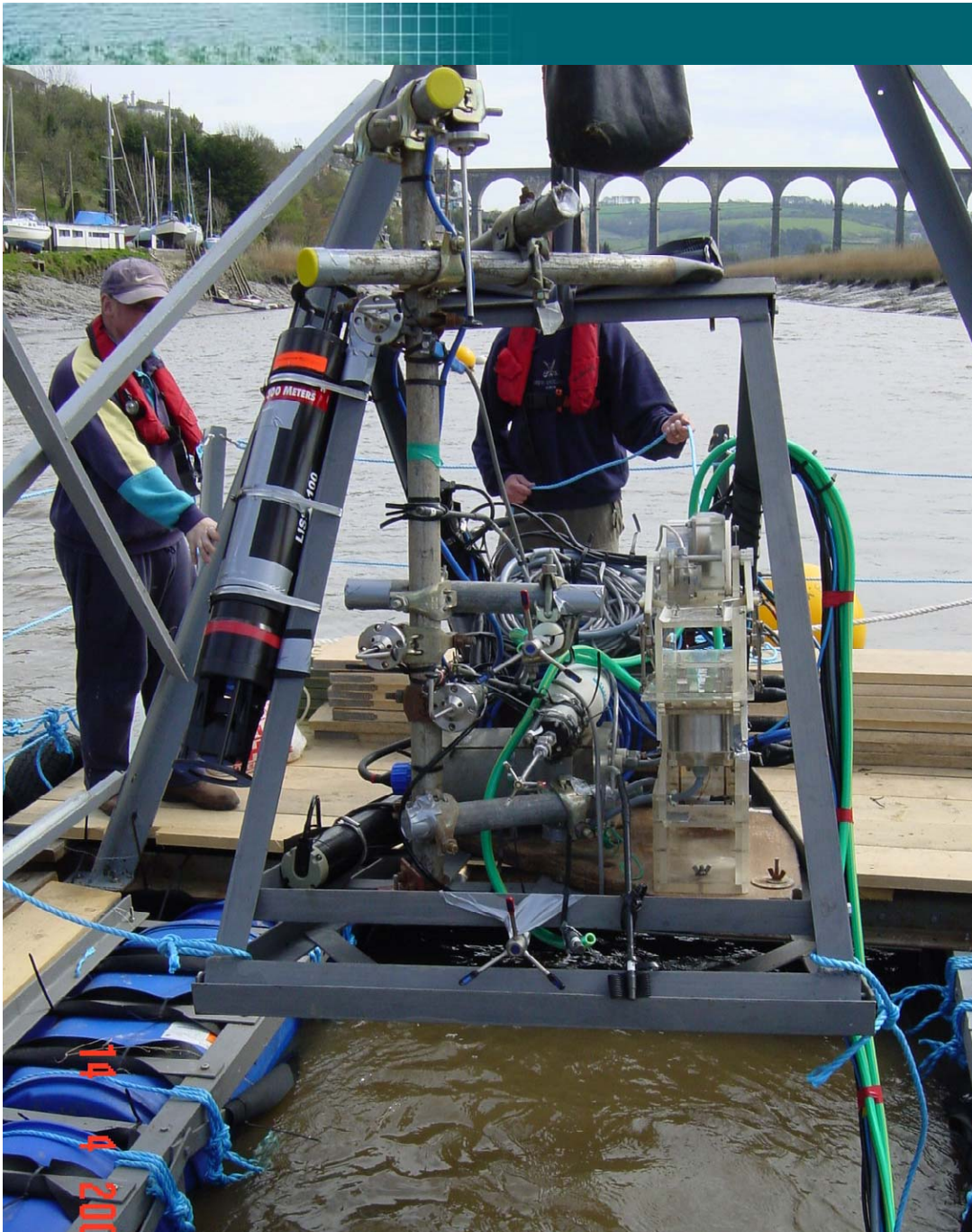
Sedimentary processes

- Cohesive sediment workshop
(Southampton, May 2003)
- Develop conceptual model of system
- Erosion threshold and rate coefficients
- Methodologies - incl probabilistic
- Measurement techniques
- Value of setting up test cases

Settling of mud



- University of Plymouth model
- Database with EC and NERC funded data



- UoP - link to research council funding
- 2003 data on Tamar

Biological process parameters

- Effect of physical conditions on biology
- Interactions within sediment
- Functional groups
 - Primary producers
 - Decomposers
 - Shredders
 - Carnivores













Flume without mysids:- SPM = 0 mg/l



Flume with 500 mysids:- SPM = 160 mg/l



- PML annular flume
- Parameterise results for modelling

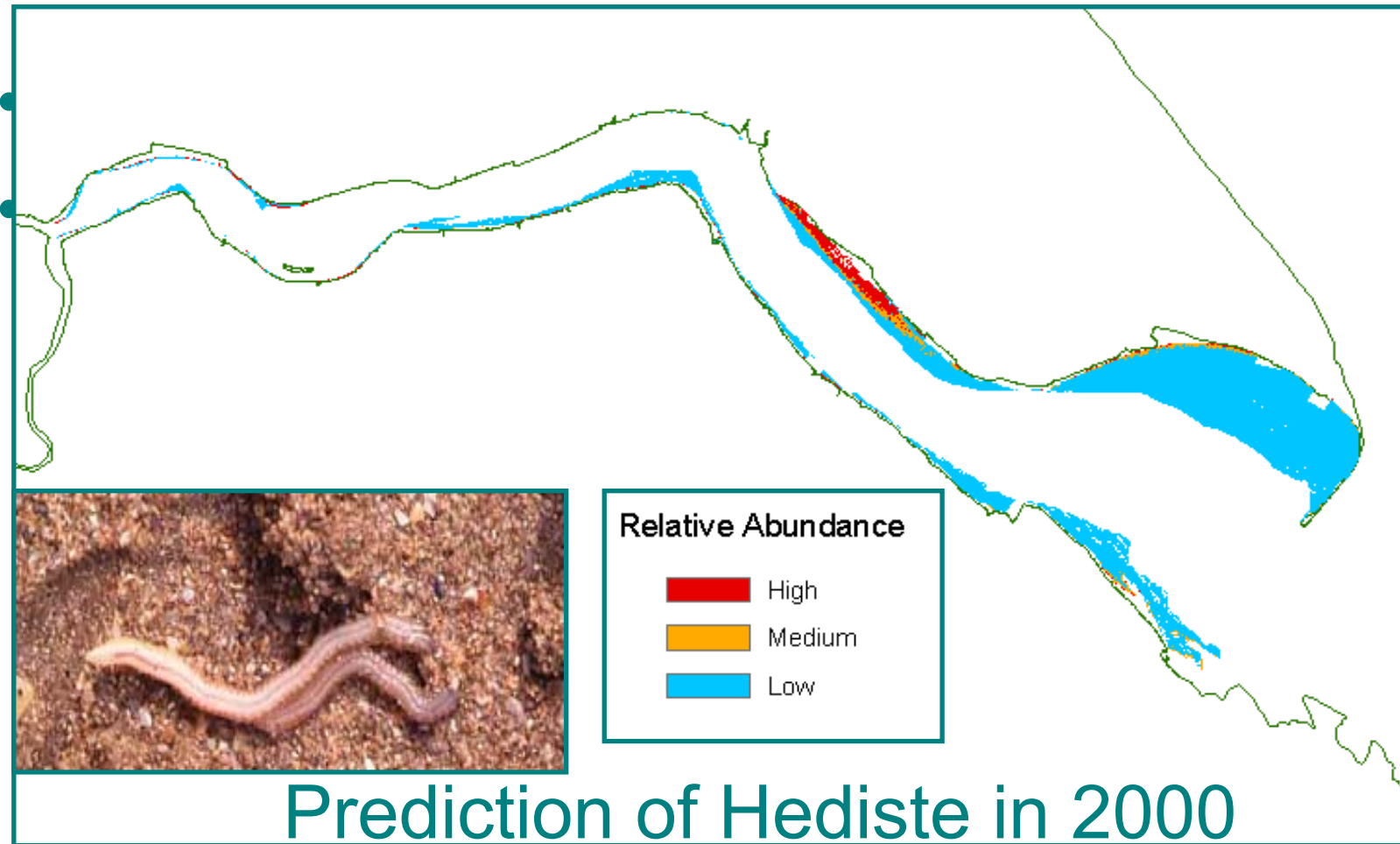
Biological process parameters

- Representation of effects for models
 - surrogate or proxy parameters
- Investigation of day and night erosion
 - sediment and biology effects

Biological process parameters

- Ecosystem process and no. of species
 - estuaries tend to be of low bio-diversity
 - tendency for estuaries to be site specific
 - clear communication needed
- Consequence of anthropogenic impact
 - potential physical effects
 - assemblages change rather than evolve

Intertidal benthos prediction(ABPmer)



Expected outputs

- Final report - end November 2004
 - Summary of research
 - Improved methods and algorithms
- Metadata report
- Update on future research needs
 - underpin long-term goal EIAS
- Scientific reports and papers
- Open participation meeting Oct 2004

Estuary Processes Research Project

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EstProc DEFRA/EA Project FD1905

Innovative and fundamental research in estuarine hydrodynamics, sediments and biological interactions

Delivering improved underpinning knowledge and sound scientific results for the estuary research community and end users

EstProc is funded within the joint DEFRA/EA Flood and Coastal Defence R&D Programme of Fluvial, Estuarine and Coastal Processes

DEFRA
Department for
**Environment,
Food & Rural Affairs**

Terms and Conditions - About this website

HR Wallingford

More information: www.estproc.net

See paper & Inception Report FD1905/TR1

Positive interaction with funders and EAG

Comments, questions, attendance 2004 meeting