Defra/Environment Agency
Flood and Coastal Defence R&D Programme

Integrated Research Results on Hydrobiosedimentary Processes in Estuaries

Final Report of the Estuary Process Research Project (EstProc): Metadata report

R&D Technical Report FD1905/TR4

Environment Agency

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R&D Technical Report No FD1905/TR4

Authors: Estuary Process Consortium for the Fluvial, Estuarine and Coastal Processes Theme

Produced: January 2006

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Collaboration Statement

The report was prepared by the EstProc Consortium comprising: HR Wallingford (lead), Proudman Oceanographic Laboratory, Professor Keith Dyer / University of Plymouth, St Andrews University, Gatty Marine Laboratory (Sediment Ecology Research Group), ABP marine environmental research, WL | Delft Hydraulics, Plymouth Marine Laboratory, University of Cambridge, Cambridge Coastal Research Unit, University of Southampton, School of Ocean and Earth Sciences, Digital Hydraulics Holland B.V., and Centre for Environment, Fisheries and Aquaculture Science.

SUMMARY

The EstProc project has delivered fundamental new research on estuarine hydrodynamics, sedimentology and ecological processes. During the course of the study a large number of data sets have been either created or accessed and it is essential that this information is correctly managed to be of benefit to future users. This report builds on existing work to provide an overview of best practice data management procedures and introduces the concept of the data lifecycle. In order to ensure that valuable data from projects such as EstProc is not lost, a catalogue of metadata should be created; this has been done in this report. The metadata provides a description of the data sets that pertain to the project and also includes information on data ownership, storage format and access restrictions.

At the beginning of the EstProc project a dedicated website was created to promote the work being undertaken during the study and to provide a secure location for partners to store and access information (www.estproc.net). This website is one of the tools used for disseminating the research findings to the scientific community and to actors in estuarine management.

Key reports produced by the project

EstProc Consortium (2002). Estuary Process Research Project (EstProc): Inception Report. Report prepared by the Estuary Process Consortium for the Defra and Environment Agency Joint Flood and Coastal Processes Theme. Report No FD1905/TR1.

EstProc Consortium (2004). Integrated Research Results on Hydrobiosedimentary Processes in Estuaries. Final Report of the Estuary Process Research Project (EstProc). R&D Technical Report prepared by the Estuary Process Consortium for the Fluvial, Estuarine and Coastal Processes Theme. Report No FD1905/TR2 – Synthesis Report.

EstProc Consortium (2004). Integrated Research Results on Hydrobiosedimentary Processes in Estuaries. Final Report of the Estuary Process Research Project (EstProc). R&D Technical Report prepared by the Estuary Process Consortium for the Fluvial, Estuarine and Coastal Processes Theme. Report No FD1905/TR3 – Algorithms and Scientific Information.

EstProc Consortium (2004). Integrated Research Results on Hydrobiosedimentary Processes in Estuaries. Final Report of the Estuary Process Research Project (EstProc). R&D Technical Report prepared by the Estuary Process Consortium for the Fluvial, Estuarine and Coastal Processes Theme. Report No FD1905/TR4 – Metadata Report.

More information on the project and a copy of this report can be obtained from the website: www.estproc.net or from the Defra website: www.defra.gov.uk

CONTENTS

1. INTRODUCTION

This report has been produced by the EstProc Consortium and contains a description of the project website and an inventory of metadata for the various data sources accessed and supplied to the project during the research programme, 2001-2004. It was prepared as part of the deliverable requirements of the Estuary Processes Research Project funded by Defra under contract FD1905 within the Defra and Environment Agency Fluvial, Estuarine and Coastal Processes Theme. EstProc is one of the ERP2 projects (Estuaries Research Programme, Phase 2).

The report structure is as follows:

Chapter 2 presents an introduction to data management and a description of the data life cycle following standards produced for estuary projects within the ERP project "Scientific data management by project consortia" which led to a report on Best practice guidelines. DEFRA/Environment Agency Flood and Coastal Defence R&D Programme. Technical Report FD2110.

Chapter 3 presents a description of the EstProc website.

Chapter 4 presents the EstProc metadata tables giving details of the data and where it is held, and how the data can be obtained, using recognised metadata format.

For more information contact the project leader, Dr Richard Whitehouse at HR Wallingford (r.whitehouse@hrwallingford.co.uk or tel: +44 (0)1491 835381), or contact the originating organisation regarding data.

1.1 Acknowledgement

The EstProc Consortium would like to thank all the external suppliers of data named in the metadata catalogue who have supported the project.

1.2 Data supply

Other parties who wish to obtain data from the sources listed in this report should contact the relevant party with their request and determine the conditions of supply. The EstProc Consortium cannot make any guarantees relating to the availability of data or charges for supply (if applicable), which will depend on the nature of the request and the data suppliers policy in force at that time.

2. INTRODUCTION TO DATA MANAGEMENT

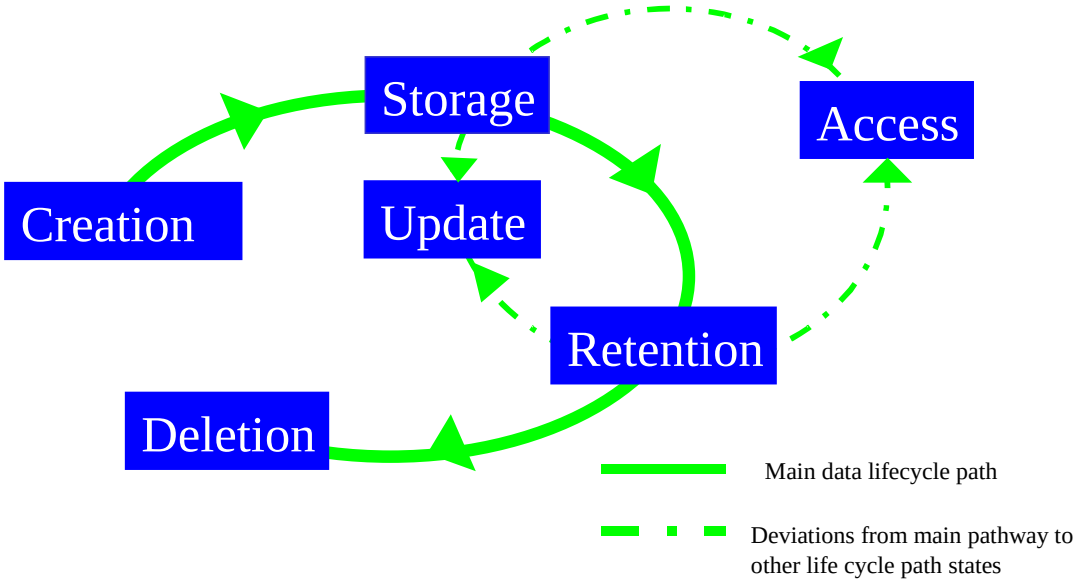
Consortia based projects such as EstProc operate within a framework that is governed by the project contract. Hence, the project lifecycle commences upon signature of the contract and ends when all outputs are accepted by the client.

A large volume of data has been collected and collated during the EstProc project. In order to derive the maximum benefit from this information, it is important to establish suitable data management procedures before the end of the project lifecycle. All data collected within a given project has a specific lifecycle, which may extend beyond the project lifecycle. The issue of data lifecycle vs. project lifecycle is extremely important when considering how best to store data. The accessibility of the data and the needs of the client should undoubtedly be of primary concern but it is also important to consider future distribution requirements. It is necessary to understand each stage of the data lifecycle both in isolation and as part of the management chain so that data is not lost at the end of the project.

The data lifecycle considers what happens to an individual data item from its creation. At any given time, a particular dataset will be in one of the following lifecycle stages.

- creation
- storage
- access
- update
- retention
- deletion.

Naturally, the data lifecycle begins with creation and ends with deletion but the order, duration and repetition of the other lifecycle stages will be case specific. A schematic representation of the data lifecycle is shown below.



2.1 Creation

Creating a dataset represents more than simply compiling a series of measurements. It is also an integration of the policies and working practices of the organisations that own and manage the data. This was of particular importance to the EstProc project where datasets have been compiled by different individuals and used by members of the consortium.

The most fundamental issue in the creation of a dataset is knowing exactly what data is required to fulfil the aims of the project. Once this is established, decisions can be made as to what data is already available and what new data needs to be collected.

At this stage, consideration should be given to the anticipated lifecycle of the data, starting with who owns it and who has responsibility for it beyond the project lifecycle. This should be agreed by the client, the consortium members and, if necessary, other data owners.

2.2 Storage

Having created the dataset, the information may be either stored or accessed for use in the project. How the data is stored is essentially governed by the requirements of the project and also the available storage capabilities. This stage is a critical part of the data lifecycle as failure to effectively manage the data storage can lead to future access problems or total loss of valuable information. Of utmost importance to improved data management and exchange is the creation of metadata to accompany the dataset. The metadata is essentially a description of the data and should contain information on the main attributes of the dataset.

2.3 Access

In order to derive maximum value from the data, it is necessary to determine access procedures both during and beyond the project lifecycle. In addition to the newly created datasets, the EstProc project has drawn on data from previous studies by both consortium members and 3rd parties.

Whilst it is recognised that data exchange leads to better integration and more effective analysis and dissemination of results, it is important to establish access limitations at an early stage in the project. This includes not only copyright and IPR issues associated with new datasets but also licence fees and permissions for 3rd party data.

Information on contact details for data owners and any access restrictions must be included in the metadata.

2.4 Update

Research projects such as EstProc generate a large amount of new data, some of which may be used to validate and update work from previous studies. The datasets created during the EstProc study present the results of new research in this field. Good management practice should ensure that the data sets are stored in a format that is not only fully accessible using off the shelf technologies but also one that is easily

upgradable. Given that much of the update stage of the EstProc data lifecycle will be outside the project lifecycle, the metadata must contain detailed information on the data formats and associated technologies.

2.5 Retention

At the end of the project, there is a risk that the data may be 'lost' but this can be avoided if provisions are made at the outset. A catalogue of what data is to be retained and by whom must be included in the metadata and a copy of the metadata should be kept by the client and the consortium members that contains details of where the data is stored and how it can be accessed.

The archiving procedures must also be clearly documented and stored with the data to ensure that it is not lost or accidentally deleted whilst in storage. Attention should also be given to the proposed lifespan of the data and due consideration given to ensuring that the storage medium will not deteriorate over time. Data recovery procedures should be defined at this stage.

2.6 Deletion

Deletion is the final stage of the data lifecycle. Data generated during the project can only be deleted if specified by the contract whilst the deletion of 3rd party data remains the responsibility of the owners. Given that data such as that generated during EstProc represents new research, including new analysis of previously existing datasets, it is likely to remain valuable as historical data beyond the end of the project lifecycle. For this reason, the data should only be deleted if it is corrupted or technologically obsolete. This stage of the lifecycle requires careful management to ensure that data are not inadvertently destroyed.

This information on data management is drawn from the following document produced as part of the ERP1 programme:

Scientific data management by project consortia: Best practice guidelines. DEFRA/Environment Agency Flood and Coastal Defence R&D Programme. Technical Report FD2110.

This document is available to download in PDF format from
www.hrwallingford.co.uk/dowloads/project/estuary_data.pdf

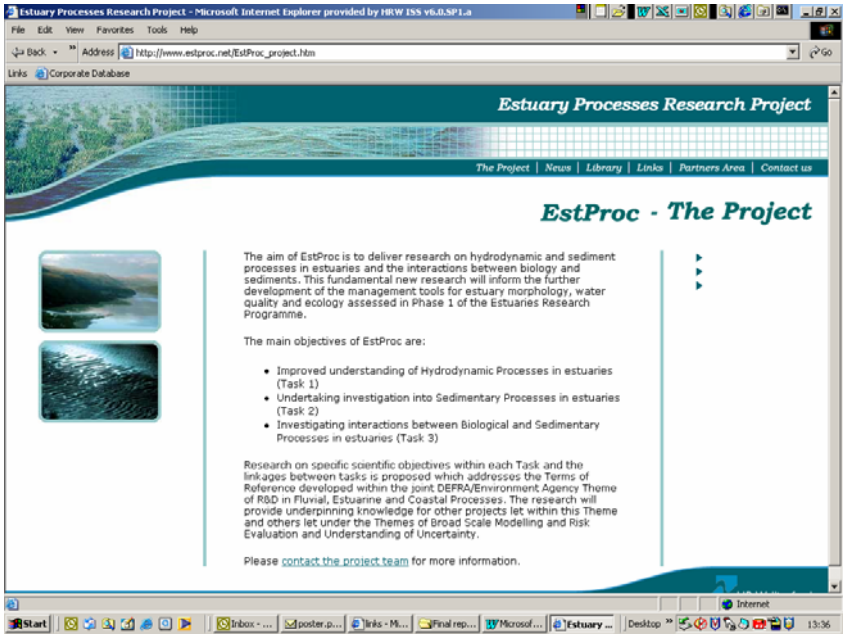
Having identified the data lifecycle with respect to the EstProc project, and highlighted the management procedures, it is clear that the most important aspect of data management is the creation of metadata. Consequently, a metadata catalogue has been compiled of all datasets either created or accessed during the study. The catalogue provides a description of each data set and information on the format, owner and access conditions. The EstProc metadata catalogue is presented in Chapter 4.

3. ESTPROC WEBSITE

A designated website was created shortly after the start of the project. The purpose of this site was to inform about the aims of the project and to provide updates on progress for the duration of the study.

The website will remain live for at least one year after the end of the project (i.e. to end November 2005). In addition to general information about the project and the consortium members, the website will provide access to copies of the final reports, including this one with the metadata catalogue. All new data collected during the study will be publicly available upon request from the project consortium, subject to an appropriate handling fee in some cases, whilst the distribution of 3rd party data will remain the discretion of the owners. All contact details may be obtained from the metadata catalogue.

During the project the website was divided into the following categories and an example page is shown below.



3.1 The project

Provided an overview of the EstProc project including details of the main aims of the project.

3.2 News

This section contained brief summaries of the workshops and principal meetings held during the course of the project.

3.3 Library

A range of documents that are available for public viewing can be downloaded from this page. The final reports will be available from this page.

3.4 Links

This page contains links to other projects and initiatives that were relevant to EstProc.

3.5 Contacts

The contact details for each partner organisation, including key representatives and links to their websites were provided in this section.

3.6 Partners Area

In addition to the public pages, there was also a protected area of the site that could only be accessed by members of the EstProc consortium. Minutes of meetings and workshop reports were available to be downloaded from this page along with any internal circulation project documents. At completion of the project a range of the supporting reports and papers were made available as open access from this website.

4. METADATA FORMS

The metadata forms presented in this section provide the basic description of all data sets created and accessed during the Estproc project. Contact details for the data owners and access conditions have been provided for all data sets.

Data User: HR Wallingford
EstProcTheme: 1 Representation of Near Bed Stresses

Title	Bed Shear Stress Measurements Over a Smooth Bed in 3 Dimensional Wave Current Motion		
Author(s)	M.M. Arnskov, J. Fredsoe and B.M. Sumer	Date	1993
Source	Coastal Engineering, 20, pp 277-316		
Description			
Wave and current experiments have been carried out with the purpose of measuring the instantaneous bed shear stress over a hydraulically smooth bed, in order to evaluate the extent of the interactions. Measurements have been carried out with a dual component hot film probe, which, with some constraints, enables the magnitude and direction of the instantaneous bed shear stress to be measured. Results are presented as maximum obtained bed shear stress values over one cycle and the corresponding mean value in the direction of the current for various combinations of waves and current. Data is tabulated, but note that kinematic viscosity = $1x10^{-6}$ m^2/s (BM Sumer, not quoted in paper).			
Format	Tables in journal paper – also available electronically		
Access (Data provider) / Contact details			
Contact: Professor Mutlu Sumer Technical University of Denmark, MEK Coastal, Maritime & Structural Engineering Section (formerly ISVA) Nils Koppels Allé, Building 403, DK-2800 Kgs. Lyngby, Denmark Email: bms@mek.dtu.dk Telephone: +45 45 25 14 23 / +45 4525 1400. Fax: +45 45 93 06 63 / Fax: +45 4593 6328 Web: http://vb.mek.dtu.dk/staff/bms.txt			

Data User: HR Wallingford
EstProcTheme: 1 Representation of Near Bed Stresses

Title	Turbulent combined oscillatory flow and current in a pipe		
Author(s)	C.R. Lodahl, B.M. Sumer and J. Fredsoe	Date	1998
Source	Journal of Fluid Mechanics, 373, pp313-348		
Description			
Laboratory experiments to measure bed shear stresses in combined steady and oscillatory flow for smooth wall conditions measured in circular pipes of various diameters. The largest pipe approximates to flat-bed conditions. Measurements have been carried out with a hot film probe, which enables the instantaneous bed shear stress to be measured. Velocity profiles were measured by LDA. Results are presented as maximum obtained bed shear stress values over one cycle and the corresponding mean value in the direction of the current for various combinations of waves and current. Data is tabulated, but note that kinematic viscosity = $1x10^{-6}$ m^2/s (BM Sumer, not quoted in paper).			
Format	Tables in journal paper – also available electronically		
Access (Data provider) / Contact details			
Contact: Professor Mutlu Sumer Technical University of Denmark, MEK Coastal, Maritime & Structural Engineering Section (formerly ISVA) Nils Koppels Allé, Building 403, DK-2800 Kgs. Lyngby, Denmark Email: bms@mek.dtu.dk Telephone: +45 45 25 14 23 / +45 4525 1400. Fax: +45 45 93 06 63 / Fax: +45 4593 6328 Web: http://vb.mek.dtu.dk/staff/bms.txt			

Data User: ABPmer
EstProcTheme: 1 Interrogation of Existing Data

Title	River Aire flows		
Author(s)	N/A	Date	1990-2000
Source	Environment Agency		
Description			
Measured river discharge data for Beal Weir (Gauge ref. 27003) on the River Aire. The River Aire is a tributary to the River Ouse, a tributary of the Humber Estuary. Data at hourly intervals. Data provided was reformatted as MS Excel spreadsheet. Grid Ref; 44(SE) 535 255.			
Format	ASCII text file		
Access (Data provider) / Contact details			
Contact: Environment Agency Phoenix House Global Avenue Millshaw Beeston Ring Road Leeds West Yorkshire LS11 8PG Tel: 08708 506 506 Tel: (non-UK calls): 00 44 1709 389 201 Web: http://www.environment-agency.gov.uk/ Gauged-daily flows also available from the National River Flow Archive (www.nwl.ac.uk)			

Data User: ABPmer
EstProcTheme: 1 Interrogation of Existing Data

Title	Blacktoft Water Levels		
Author(s)	N/A	Date	1990-2000
Source	ABP tide gauge network		
Description			
Water levels recorded at tide gauge operated by ABP. Levels are record to centimetre accuracy and are referenced to local chart datum. Data for years 1990-1997, 1999 and 2000 were sampled at 15-minute intervals. Gauge location: 484040mE, 424140mN.			
Format	ASCII text file		
Access (Data provider) / Contact details			
Contact: Hydrographic Manager ABP Hull PO Box 1 Port House Northern Gateway Hull HU9 5PQ Email: hull@abports.co.uk Tel: 01482 327 171 Fax: 01482 608 434 Web: http://www.abports.co.uk/custinfo/ports/hull.htm			

Data User: ABPmer
EstProcTheme: 1 Interrogation of Existing Data

Title	Inner Humber Estuary Channel Length		
Author(s)	N/A	Date	1990-2000
Source	ABP Marine Environmental Research Ltd		
Description			
The meandering channel thalweg between Trent Falls and Humber Bridge was manually digitised by ABPmer based on ABP annual survey charts for the years: 1990, 1993, 1997-2000. The channel position is recorded as a series of easting/northing grid references with data points approximately 400m apart.			
Format	ASCII text file		
Access (Data provider) / Contact details			
Contact: Paul Norton ABP Marine Environmental Research Ltd Suite B, Waterside House Town Quay Southampton SO14 2AQ Email: pnorton@abpmer.co.uk Tel: +44 (0) 2380 711 840 Fax: +44 (0) 2380 711 841 Web: http://www.abpmer.co.uk			

Data User: ABPmer
EstProcTheme: 3 Biology Interactions

Title	Humber Benthic Surveys		
Author(s)	N.J.Frost, C.D.J.Jackson	Date	2003
Source	ABP Marine Environmental Research Ltd		

Description

Data in the Humber Estuary was collected during surveys carried out in January and July 2003. The surveys included the collection of biological (abundance, biomass) and sediment (OC, PSA, erosion threshold (CSM) and shear strength (pocket vane tester)) data. 18 sample sites were repeated for both surveys, 6 each at Brough, Saltend and Pyewipe. Three replicate cores were taken at each site for biological analysis, with extra cores taken for OC and PSA processing. CSM and pocket vane tester readings were taken insitu.

Format	MS Excel spreadsheet

Access (Data provider) / Contact details

Contact: Natalie Frost
ABP Marine Environmental Research Ltd
Suite B, Waterside House
Town Quay
Southampton
SO14 2AQ
Email: nfrost@abpmer.co.uk
Tel: +44 (0) 2380 711 840
Fax:+44 (0) 2380 711 841
Web: http://www.abpmer.co.uk

Data User: ABPmer
EstProcTheme: 3 Biology Interactions

Title	Distribution of invertebrate species in the Humber Estuary		
Author(s)	N.J.Frost	Date	2000
Source	ABP Marine Environmental Research Ltd		
Description			
Data was collected in October 2000 on the Humber. The 43 sample sites were spread over Brough, Saltend and Spurn. 3 replicate cores were taken at each site for biological analysis (abundance and biomass), and additional cores for PSA, OC and water content were also obtained.			
Format	MS Excel spreadsheet		
Access (Data provider) / Contact details			

Contact: Natalie Frost
ABP Marine Environmental Research Ltd
Suite B, Waterside House
Town Quay
Southampton
SO14 2AQ
Email: nfrost@abpmer.co.uk
Tel: +44 (0) 2380 711 840
Fax:+44 (0) 2380 711 841
Web: http://www.abpmer.co.uk

Data User:ABPmer
EstProcTheme: 1 Impact of extreme events

Title	LIDAR altimetry for Southampton Water		
Author(s)	N/A	Date	2002
Source	Environment Agency		
Description			
Elevation data provides a high-resolution (2m) grid of ground levels for an intertidal site towards the mouth of Southampton Water. The data includes a network of dendritic channels.			
Format	ASCII text file		
Access (Data provider) / Contact details			
Contact: Rebecca Allen Email: rebecca.allen@environment-agency.gov.uk Environment Agency Southern Regional Office Guildbourne House Chatsworth Road Worthing Sussex BN11 1LD Tel: 08708 506 506 Tel: (non-UK calls): 00 44 1709 389 201 Web: http://www.environment-agency.gov.uk/			

Data User: ABPmer
EstProcTheme: 1 Impact of extreme events

Title	Tidal Currents in Southampton Water		
Author(s)	N/A	Date	2002
Source	ABP Marine Environmental Research Ltd		
Description			
Tidal currents recorded at 2 intertidal locations on both spring and neap tides. Sites located within narrow channels within a site towards the mouth of Southampton Water.			
Format	MS Excel spreadsheet		
Access (Data provider) / Contact details			
Contact: Paul Norton ABP Marine Environmental Research Ltd Suite B, Waterside House Town Quay Southampton SO14 2AQ Email: pnorton@abpmer.co.uk Tel: +44 (0) 2380 711 840 Fax: +44 (0) 2380 711 841 Web: http://www.abpmer.co.uk			

Data User: HR Wallingford
EstProcTheme: 1 Wave modelling in estuaries

Title	Met Office European wave model data		
Author(s)	Met Office	Date	2002
Source	UK Met Office or HR Wallingford		

Description

The Met Office European Wave Model provides wind and wave data at nodal points on a grid system spaced at approximately 30km intervals. The model includes the main coastlines of the British Isles and Europe, and many of the larger islands around these coastlines. The resolution of the model is such that smaller islands are not included.

The model has effectively been run in real time mode since October 1986. The Met Office wave model is driven by wind fields from operational global weather forecasting models. Sea state observations from fixed buoys, oil platforms, ocean weather ships and more recently satellite wave measurements, are used for real time calibration of the model.

The archive held at HR Wallingford contains predictions of wind and sea conditions at the grid nodes at six hourly intervals until June 1988 and at three hourly intervals thereafter.

Parameters: wind speed, wind direction, significant wave height, mean wave period, mean wave direction, significant wave height of wind waves, mean period of wind waves, mean wave direction of swell, significant wave height of swell waves, mean period of swell waves.

Further details given:
http://www.metoffice.com/research/ocean/operational/wave/index.html

Format	ASCII

Access (Data provider) / Contact details

Contact: Karen Barfoot
Meteorological Office
FitzRoy Road
Exeter
Devon
EX1 3PB
Email: karen.barfoot@metoffice.gov.uk
Tel: +44 (0) 1392 884978
Fax: +44 (0) 1392 885681
Web: http://www.metoffice.com

Contact: Peter Hawkes
HR Wallingford Ltd
Howbery Park
Wallingford
Oxon
OX10 8BA
Email: P.Hawkes@hrwallingford.co.uk
Tel: 01491 835381
Fax: 01491 832233
Web: http://www.hrwallingford.co.uk

Data User: HR Wallingford
EstProcTheme: 1 Wave modelling in estuaries

Title	Bathymetry data		
Author(s)	UK Hydrographic Office	Date	Various
Source	UK Admiralty charts		
Description			
Bathymetric data from UK Admiralty Charts covering Outer Thames Estuary was digitised by HR Wallingford from paper charts. This data, supplemented with PLA survey data, formed the basis for the SWAN model bathymetry model.			
Format	Paper Chart		
Access (Data provider) / Contact details			
Contact: UK Hydrographic Office Admiralty Way Taunton Somerset TA1 2DN Tel: +44 (0) 1823 337900 Fax: +44 (0) 1823 284077 Web: http://www.hydro.gov.uk			

Data User: HR Wallingford
EstProcTheme: 1 Wave modelling in estuaries

Title	Bathymetry data		
Author(s)	Port of London Authority (PLA)	Date	1999-2002
Source	Port of London Authority (PLA)		
Description			
Bathymetric data from a number of surveys have been incorporated into the ground models of the Outer Thames. Surveys cover a variety of regions in the Outer Thames.			
Format	ASCII		
Access (Data provider) / Contact details			
Contact: Port of London Authority London River House Royal Pier Road, GRAVESEND Kent DA12 2BG Tel: +44 (0) 1474 562 200 Fax: +44 (0) 1474 562 277 Web: http://www.portoflondon.co.uk			

Data User: HR Wallingford
EstProcTheme: 1 Wave modelling in estuaries

Title	CEFAS wave rider measurements		
Author(s)	CEFAS	Date	19/3/2002 to 14/7/2002
Source	www.cefas.co.uk/wavenet		

Description

The wave conditions at the CEFAS Warp Directional Waverider (51°31'.51N, 001°1'.82E, in 18m water depth) are recorded using a Directional Waverider.

This deployment is due to last from 19 March 2002 until 14 July 2002.

Mean wave direction, mean wave period, peak wave period, significant wave height and directional spread of waves.

Format	ASCII

Access (Data provider) / Contact details

Contact: CEFAS Lowestoft Laboratory
Pakefield Road
Lowestoft
Suffolk
NR33 0HT
Email: wavenet@cefas.co.uk
Tel: +44 (0) 1502 562244
Fax +44 (0) 1502 513865
Web: http://www.cefas.co.uk/wavenet

Data User: PML
EstProcTheme: 3 Effect of biological processes on sediment stability and erodibility

Title	Impact of biotic and abiotic processes on sediment dynamics and the consequences to the structure and functioning of the intertidal zone		
Author(s)	Widdows J. and Brinsley M.D.	Date	2002
Source	J. Sea Resarch 48, 143-156		

Description

This paper reviews field and laboratory studies using flumes to quantify the erodability of undisturbed intertidal sediments as a function of changes in (1) the natural benthic community structure and sediment properties, and (2) the abundance of key intertidal species. Sediment erodability, which varies spatially and temporally, is dependent on the interactions between physical processes, sediment properties and biological processes, particularly the balance between two functional groups of biota, the stabilisers and the destabilisers. Bio-stabilisers can influence the hydrodynamics and provide some physical protection to the bed (e.g. mussel beds, macroalgae, salt marsh macrophytes), or can enhance cohesiveness and alter the critical erosion threshold (e.g. microphytobenthos). In contrast, bio-destabilisers (e.g. bioturbators such as *Macoma balthica, Hydrobia ulvae*) increase surface roughness, reduce the critical erosion threshold and enhance the erosion rate. Field studies in the Humber (England) and Westerschelde (Netherlands) have shown that interannual changes in sediment erodability were a result of a shift from a stabilised sediment dominated by microphytobenthos to a destabilised sediment dominated by *M. balthica*. Interannual changes in key biota, their influence on sediment erosion, and the consequences for intertidal ecology and morphology, appear to be driven in part by climatic factors (primarily a shift from mild to cold winters). Quantification and understanding of these benthic processes has been used to parameterise mathematical models of intertidal sediment dynamics, and this has provided insight into the relative importance of biological and physical factors in determining sediment erosion / accretion in the intertidal zone.

Format	Figures in paper

Access (Data provider) / Contact details

Contact: John Widdows
Plymouth Marine Laboratory
Prospect Place
West Hoe
PLYMOUTH
Devon
PL1 3DH
Email: j.widdows@pml.ac.uk
Tel: +44 (0) 1752 633100
Fax: +44 (0) 1752 633101
Web: http://www.pml.ac.uk

Data User: PML
EstProcTheme: 3 Effect of biological processes on sediment stability and erodibility

Title	Impact of *Enteromorpha* mats on near-bed current and sediment dynamics: Flume studies		
Author(s)	C. Romano, J. Widdows, M.D. Brinsley and F.J. Staff	Date	2003
Source	Mar Ecol Prog Ser. 256, 63-74		

Description

The influence of the macroalgal mats of *Enteromorpha intestinalis* on near-bed current velocities and sediment dynamics was quantified by placing relatively undisturbed cored sediments in annular flumes. Density dependent relationships were established for *Enteromorpha* densities, ranging from 10 to 60% cover when air exposed (biomass of 4 to 40 g ash free dry wt m^{-2}) and in comparison with bare sediment (0% cover). There was a significant increase in friction drag with increasing *Enteromorpha* biomass and % cover, ranging from a mean 18% reduction in current velocities at 10% cover to 56% reduction at 60% cover. The net result of a reduction in currents (depth averaged between 1 to 12 cm above the bed) and the physical protection of the bed by *Enteromorpha* was a marked reduction in sediment erosion of 60% at 10% cover to 90% at 60% cover. The presence of *Enteromorpha* also significantly enhanced sediment deposition measured as a flux from the water column to the bed. At 60% cover the deposition rate was 48% higher than bare sediment during the first 30 minutes of slack water (<0.05 m s^{-1}). The results show that *Enteromorpha* has a marked influence on water flow over the bed and the flux of particulate material across the sediment-water interface.

Format	Tables and figures in journal paper

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Data User: PML
EstProcTheme: 3 Near bed stresses – flume and field comparison

Title	Relationships between current speed and bed shear stress - comparison between annular flume and field		
Author(s)	Pope ND and Widdows J	Date	Jan 2004
Source	Unpublished data - Manuscript in preparation		

Description

3D micro ADV has been used in PML's annular flume and the field to quantify the relationship between bed shear stress (based on TKE) and mean current speed over different sediment beds including very smooth newly deposited mud, natural undisturbed intertidal mud, mud with saltmarsh plants (*Salicornia*) at different stem densities and stem heights. Results show good agreement between field (calm conditions) and flume.

Format	Tables and regressions

Access (Data provider) / Contact details

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Data User: PML
EstProcTheme: 3 Effect of biological processes on sediment stability and erodibility

Title	Measurements of spatial and temporal changes in sediment bed level in the Tamar and Tavy estuaries		
Author(s)	Widdows J, Brinsley, MD & Pope ND	Date	Dec 2003
Source	Unpublished data		
Description			
Changes in sediment levels have been measured seasonally at specific sites along the length of the Tamar. At each site the lateral changes in sediment levels have been recorded along a shore normal transect from ~ LWNT, mid tide, HWNT up to the saltmarsh (if present). Short term changes in sediment levels during and after a storm have been measured along a shore normal transect from ~LWNT to the Spartina saltmarsh in the Tavy in Mar-April 2003. The results are presented in terms of max and min bed levels and as a rate of accretion or erosion (mm d^{-1}).			
Format	Tables and Figures		
Access (Data provider) / Contact details			
Contact: John Widdows Plymouth Marine Laboratory Prospect Place West Hoe PLYMOUTH Devon PL1 3DH Email: j.widdows@pml.ac.uk Tel: +44 (0) 1752 633100 Fax: +44 (0) 1752 633101 Web: http://www.pml.ac.uk			

Data User: PML
EstProcTheme: 3 Effect of biological processes on sediment stability and erodibility

Title	Impact of *Salicornia* on hydrodynamics and sediment dynamics		
Author(s)	J. Widdows, ND Pope, Brinsley, MD	Date	Dec 2003
Source	Unpublished data		
Description			
Flume studies quantified the impact of the annual salt marsh plant, *Salicornia*, on hydrodynamics and sediment erodability. The influence of changing stem density and stem height was investigated at different stages through the growing season, beginning with low densities of dead stems in winter to max stem densities in the spring to max height and lower stem density in late summer. Sediment erodability in relation to stem height and density was also determined. Stem growth caused reductions in near bed flows, increased turbulence and shear stress and skimming flow.			
Format	Tables and Figures		
Access (Data provider) / Contact details			
Contact: John Widdows Plymouth Marine Laboratory Prospect Place West Hoe PLYMOUTH Devon PL1 3DH Email: j.widdows@pml.ac.uk Tel: +44 (0) 1752 633100 Fax: +44 (0) 1752 633101 Web: http://www.pml.ac.uk			

Data User: PML
EstProcTheme: 3 Physical/chemical/biological controls

Title	Tidal and seasonal dependence of intertidal mudflat properties and currents in a partially mixed estuary		
Author(s)	R.J. Uncles, A.J. Bale, M.D. Brinsley, P.E. Frickers, C. Harris, R.E. Lewis, F.J. Staff, J.A. Stephens, C.M. Turley and J. Widdows	Date	Oct. 2003
Source	Published data		

Description

Field surveys quantified the seasonal variability of some key physical and biological properties of intertidal mudflats over a section of the central Tamar Estuary and related these to the physical environment. Seasonal variations in 'physical' mudflat properties, such as grain-size, density and moisture content were relatively small. With the exception of the particulate organic carbon content in the upper 0.002 m of surface sediment, biological variations were large. Redox potential exhibited considerable seasonal variation and showed that the sediments were more oxic in winter and more reduced in summer. Chlorophyll-a and extracellular polymeric substances (EPS) contents of the surface 0.002 m of sediment were strongly correlated and exhibited a pronounced seasonal pattern, with smallest values during winter and greatest values during late summer and early autumn. EPS had a dominating influence on the critical erosion thresholds for sediment erosion, as derived from annular flume measurements. Velocity measurements and velocity modelling indicated that during much of the time, and especially during benthic diatom 'bloom' conditions of high chlorophyll-a and EPS sediment contents, the stresses exerted by tidal currents were too small to cause suspension of sediments. Suspended fine sediment in the turbidity maximum zone was transported down-estuary and deposited in the main channel at LW slack. Some of this sediment, in the form of relatively large flocs, was subsequently transported onto the mudflats during the flooding tide, where slack currents and fast settling velocities may have enhanced sediment deposition there in the absence of wave activity.

Format	Tables and Figures in publication

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Data User: CCRU
EstProcTheme: 1 Wave modelling in estuaries

Title	Wave energy dissipation over mudflat / saltmarsh surfaces		
Author(s)	I. Möller, T. Spencer, R. Turner	Date	2000-2002
Source	EA/DEFRA and CCRU Phase 1 data: Möller, I. and Spencer, T. (2003) 'Wave transformations over mudflat and saltmarsh surfaces on the UK East coast – Implications for marsh evolution'. *Proceedings of the International Conference on Coastal Sediments '03*, Florida, USA.		

Description

Wave measurements at two sites across marshes and mudflats of the Dengie peninsula in Essex between the estuaries of the Blackwater and Crouch on the northern margin of the Thames estuary, southern North Sea. Saltmarshes form a generally narrow belt (700 m wide at their greatest extent) between low-lying, seawall-protected agricultural land and intertidal mudflats which extend for up to 4 km offshore. Near-horizontal marsh surfaces lie at elevations of 2.4 to 2.7 m O.D. leading to water depths of up to 1m at the lower marsh elevations during spring tides. These surfaces support a floristically diverse halophytic vegetation community in which *Limonium vulgare*, *Puccinellia maritima*, *Atriplex portulacoides* and *Suaeda maritima* are conspicuous elements. Wave measurements were carried out at two sites:

Tillingham. The seaward marsh margin is characterised by a ramp and a pioneer/seasonal saltmarsh typified by *Aster tripolium* and, at lower levels, *Salicornia* sp. and *Spartina anglica*. Creeks which dissect this sloping margin lead into (at ca. 1.3 m ODN) the larger channels of a 'mudmound topography' of repetitive shore-normal ridges and runnels with an amplitude of ca. 50 cm (Greensmith and Tucker 1967).

Bridgewick. Located to the south of the study area, where the marsh often terminates to seaward in an erosional cliff, 1.5 to 2.2 m high, above a mudflat at ca. 1.6 m ODN.

Wave records are available for 14 cross-shore positions at Tillingham and 7 cross-shore positions at Bridgewick, and for 15 and 9 individual recorded events, in the period September 2000 – July 2001 (phase 1) and July 2001 – April 2002 (phase 2) respectively.

Format	Excel tables of date/time of wave burst and spectral summary parameters

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Data User: CCRU
EstProcTheme: 1 Wave modelling in estuaries

Title	Photographic images for extraction of vegetation density, structure, and height information		
Author(s)	I. Möller	Date	various summer 2000-spring 2001
Source	unpublished		

Description

Horizontal photographs of a 10-cm wide belt of marsh surface vegetation were acquired on a seasonal basis of the period summer 2000 – Spring 2001 at five locations on the Tillingham marsh and at three location on the Bridgewick marsh (see metadata on 'wave attenuation').
The images have been processed to provide (semi-quantitative) information on vegetation height and density and qualitative information on vegetation structure.

Format	Excel spreadsheet indicating date, site number, and vegetation parameters

Access (Data provider) / Contact details

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Data User: CCRU
EstProcTheme: 1 Wave modelling in estuaries

Title	Modelled wave attenuation at Tillingham marsh, Dengie		
Author(s)	R. Turner, I. Möller, T. Spencer	Date	February 2003
Source	Internal EstProc report: R. Turner, I. Möller, T. Spencer 'Application of the SWAN model to vegetated surfaces'. (Internal Estproc Report).		

Description

The input and output data from preliminary work in modelling wave attenuation over marshes using SWAN are available. The data features 15 full inundation tides from the Tillingham site, accompanied by the bathymetry over which the observed data were recorded, and data quantifying the density of the vegetation covering the marsh (based on the adapted Collins coefficient).

Format	Bathymetry and calculated vegetation coefficient data are provided in ASCII text format. Further data ready to input (observed wave heights) are available in Excel format with water depth and significant wave height. Output files created by SWAN showing predicted wave attenuation are available in Excel format. All data are provided in the correct file formats ready for instant use for modelling with SWAN

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Data User: CCRU
EstProcTheme: 1 Wave modelling in estuaries

Title	Long-term morphological change at Dengie, Essex		
Author(s)	T. Spencer, I. Möller	Date	1992-2003
Source	Environment Agency Beach Profile data		
Description			
Fully processed and screened bi-annual beach profile data set for Dengie Peninsula, Essex. The profiles have been checked for survey inaccuracies and have been processed to allow computation of volume, slope and convexity changes.			
Format	ASCII files and/or Excel spreadsheet files		
Access (Data provider) / Contact details			

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Data User: CCRU
EstProcTheme: 1 Wave modelling in estuaries

Title	Airborne Imaging Spectroscopy of Intertidal Sediment Dynamics		
Author(s)	P. Elsner, Spencer, T., Möller, I.	Date	1999-2002
Source	Elsner, P.E, Smith, G.M. Smith, Möller, I., Spencer, T. Airborne Imaging Spectroscopy – A novel approach to monitor intertidal sediment dynamics. Proceedings of the International Conference on Coastal Sediments '03, Florida, USA.		

Description

Time series of airborne images, covering tidal cycles at Tollesbury in 10 min steps. Data was collected in 1999 and 2002, each time with three different sensors: CASI ATM, and Aerial Photography. The images are geo-rectified, have undergone atmospheric correction, and are converted to values of reflectance.

Format	HDF files

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Data User: Proudman Oceanographic Laboratory
EstProcTheme: 1 Hydrodynamics – whole estuary models

Title	Saline intrusion in partially mixed estuaries		
Author(s)	David Prandle	Date	2004
Source	Estuarine, Coastal and Shelf Science (in press)		

Description

Applicability of existing theories [of saline intrusion] is evaluated by referencing them to a 'single-point' numerical model. The paper highlights the importance of convective overturning in counteracting unstable density structures brought about by tidal straining. The generality of estuarine responses is also explored.
Data used: recent observations in the eastern Irish Sea (Rippeth et al., 2001); estuary properties from Prandle (1981).

Format	Data are given in the text, and also tabulated.

Access (Data provider) / Contact details

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Data User: Proudman Oceanographic Laboratory
EstProcTheme: 1 & 2 Bathymetry – whole estuary models

Title	Bathymetric evolution of the Mersey Estuary, UK, 1906-1997: causes and effects		
Author(s)	Andrew Lane	Date	2004
Source	Estuarine, Coastal and Shelf Science, 59(2), 249–263		
Description			
Bathymetric surveys in the past century indicate a net loss of estuarine volume of about 0.1% per year in the Mersey estuary, in contrast with sea level rise of 1.23mm per year. Analyses of these bathymetry data reveal that most significant changes occurred in the inter-tidal regions of the upper estuary. The interactions between tidal dynamics, sediment regime and bathymetry were assessed using historical data and a fine-resolution 3-D numerical model. Fluxes of sediment across the Mersey Narrows were examined, and the net rates matched with the model and observations for silty sand, corresponding with dredging records. Data: bathymetry (Emphasys/Estuaries Database CD), tidal constituents (POL), and currents (Lane et al, 1997).			
Format	Tide data are tabulated.		
Access (Data provider) / Contact details			
Contact: Andrew Lane Proudman Oceanographic Laboratory 6 Brownlow Street Liverpool L3 5DA UK Email: ale@pol.ac.uk Tel: +44 (0) 151 795 4800 Fax: +44 (0) 151 795 4801 Web: http://www.pol.ac.uk CD via British Oceanographic Data Centre			

Data User: Proudman Oceanographic Laboratory
EstProcTheme: 1 Hydrodynamics – whole estuary models

Title	Relationships between tidal dynamics and bathymetry in strongly convergent estuaries		
Author(s)	David Prandle	Date	2003
Source	Journal of Physical Oceanography, 33, 2738–50		
Description			
Analytical solutions for propagation of a predominant tidal constituent are derived for a synchronous estuary with convergent triangular cross section. For specified tidal elevation amplitude and water depth, these solutions indicate various parameters including the tidal current amplitude, ratio of friction/inertial terms, slope of the estuarine bed, energy dissipation rate and phase difference between peak tidal elevation and current. An expression for estuarine length in terms of elevation amplitude and estuarine depth is derived which is consistent with observed values from 50 estuaries in the US (Friedrichs and Aubrey, 1988) and UK (Yates et al., 1996). Sensitivities of solutions to bed friction coefficient, mean sea level and tidal conditions are also examined.			
Format	Estuary properties tabulated.		
Access (Data provider) / Contact details			

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Data User: University of Plymouth
EstProcTheme: 2 Sediment processes

Title	Observations of the Properties of Flocculated Cohesive Sediment in Three Western European Estuaries.		
Author(s)	A. J. Manning	Date	2004
Source	*In*: P. Ciavola, M. B. Collins and C. Corbau (eds), *Sediment Transport in European Estuarine Environments, Journal of Coastal Research Special Issue, SI 41* (in press).		

Description

Within the framework of three recent European Commission funded projects – COSINUS, SWAMIEE and INTRMUD - in-situ measurements of floc size and settling velocity were made using the video-based INSSEV (In-Situ SEttling Velocity) instrument. This acquisition technique enabled the calculation of individual floc effective density values by using a Stokes' Law relationship and this in turn showed how the flocs are distributed through the ambient suspended particulate matter (SPM) concentration. In-situ data sets are reported from experiments conducted in the Tamar (UK), Gironde (France) and Dollard (The Netherlands) estuaries, with the purpose of examining how floc properties vary in tidal waters and identifying the factors which influence their resultant characteristics. Floc populations were seen to exist as combinations of macroflocs (floc size > 160 μm) and smaller microflocs.

The distribution of particulate matter throughout the macro- and microfloc sub-populations showed a direct correlation with the suspended solids concentration. To quantify this inter-relationship, the dimensionless SPM ratio parameter was introduced and is calculated by dividing the percentage of macrofloc SPM, in a single floc population, by the remaining percentage of microfloc SPM. An SPM ratio of unity would represent an equal apportioning of the floc mass between the two floc sub-populations. An empirical relationship representing the SPM ratio in terms of SPM (mg l^{-1})

Format	Tables and Figures in journal paper

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Data User: University of Plymouth
EstProcTheme: 2 Sediment processes

Title	The Observed effects of turbulence on estuarine flocculation.		
Author(s)	A. J. Manning	Date	2004
Source	*In*: P. Ciavola, M. B. Collins and C. Corbau (eds), *Sediment Transport in European Estuarine Environments, Journal of Coastal Research Special Issue, SI 41* (in press).		

Description

Drawing on examples of floc spectra obtained during recent European Commission funded experiments, this paper assesses how floc properties and the vertical mass flux are influenced by changes in turbulent shear stress intensity. Turbidity was measured by both filtered water samples and optical backscatter sensors. Water column turbulence was measured at 18 Hz by an array of miniature discoidal electro-magnetic current meters.

Initially, a series of simultaneous turbulence and floc property measurements made from within the turbidity maximum in the Tamar estuary (UK), during neap and spring tidal conditions, are presented. The ambient conditions produced a suspended concentration and turbulent shear stress range of 10-8000 g cm^{-3} and 0.04-0.7 N m^{-2}, respectively. The flocs were observed using the INSSEV (In-Situ Settling Velocity) instrument, which provides measurements of floc size, settling velocity and effective density. These field experiments showed that within the turbidity maximum there was an increase in the mean floc size from about 90 μm to about 350 μm, which in general matched the changing suspended particulate concentrations. There was also an increase in mean settling velocity through the turbidity maxima following the changes in size and concentration. This was generally in the range 0.5-6 mm s^{-1}. The changes in floc size and settling velocity indicated a subsequent decrease occurring in the macrofloc (floc size > 160 μm) effective densities, which at times fell from 715 kg m^{-3} to less than 100 kg m^{-3} within the turbidity maximum. In terms of mass settling flux, the fast settling macroflocs from the more turbid spring tides accounted for a continuous tidal time series average of 89% of the mass settling flux, which was 20% greater than for a comparative neap tide time series. A statistical regression analysis of the Tamar estuary macrofloc settling velocity values (Ws_{MACRO}), together with values obtained from similar measurements made in the Gironde estuary (France) and Dollard estuary (The Netherlands), showed that Ws_{MACRO}, is dependent on both turbulent shear stress and suspended particulate matter concentration terms. The best fit relationship representing Ws_{MACRO} had a highly significant R^2 of 90.6%. Quantifiably, the empirically derived model of Ws_{MACRO} displayed an increase in settling velocity at low shear stresses due to flocculation enhanced by shear, and floc disruption at higher stresses for the same concentration; the transition being a turbulent shear stress of about 0.36 N m^{-2}. This critical shear region for macrofloc flocculation was also confirmed by complementary laboratory experiments. A statistical analysis of the Ws_{micro} fraction indicated a closer correlation with just the turbulent shear. As with the macroflocs, the microfloc settling velocity rose with increasing shear stress until a limiting turbulent shear stress of about 0.42 N m^{-2} was reached. At this point the regression model predicted a peak Ws_{micro} of about 1 mm s^{-1}; this was significantly slower than the comparative macroflocs.

Format	Tables and Figures in journal paper

Access (Data provider) / Contact details

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Data User: University of Plymouth
EstProcTheme: 2 Sediment processes

Title	Mass settling flux of fine sediments: measurements and predictions.		
Author(s)	A. J. Manning and K. R. Dyer	Date	2004
Source	Journal of Geophysical Research (*sub judice*).		

Description

This paper describes a new flocculation model, developed as part of the UK DEFRA and EA funded EstProc project, which was based entirely on experimental observations made using low intrusive data acquisition techniques, from a wide range of estuarine water column conditions. This paper has identified the key components which best quantitatively describe a floc population are: the changes in the macrofloc and microfloc settling velocities ($Ws_{macroEM}$ and $Ws_{microEM}$), together with how the suspended particulate matter (SPM) was distributed in each floc sub-population ($SPM_{ratioEM}$). The importance of both turbulent shear stress and SPM concentration terms, as independent variables in controlling $Ws_{macroEM}$, was confirmed by a parametric multiple regression statistical analysis of empirical data which produced a highly significant R^2 of 0.91. $Ws_{microEM}$ was very closely correlated with just the τ parameter. Conversely, the $SPM_{ratioEM}$ showed a strong interdependency principally with SPM concentration.
The flocs were observed using the INSSEV (In-Situ Settling Velocity) instrument, which provides measurements of floc size, settling velocity and effective density. SPM concentration was measured by both filtered water samples and optical backscatter sensors. Turbulence was measured at 18 Hz by an array of miniature discoidal electro-magnetic current meters.

The combination of the three empirical algorithms into a single equation to predict mass settling flux (MSF), estimated the total MSF of the 157 measured floc samples from neap and spring tide conditions, with a cumulative error of less than 4%. In comparison, the use of single settling velocity values of 0.5 mms^{-1} and 5 mms^{-1} were both in error by an average of -86% and +41%, respectively. Representing mean floc settling velocity by: *i)* a simple SPM concentration power-regression relationship, *ii)* the *Lick et al*. [1993], and *iii)* the *van Leussen* [1994] approaches, all under predicted the total cumulative MSF by ~35-43%.

Format	Tables and Figures in journal paper

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Data User: University of Plymouth
EstProcTheme: 2 Sediment processes

Title	Flocculation Measured By Video Based Instruments in the Gironde Estuary During the European Commission SWAMIEE Project.		
Author(s)	A. J. Manning; K.R. Dyer; R. Lafite and D. Mikes	Date	2004
Source	*In*: P. Ciavola, M. B. Collins and C. Corbau (eds), *Sediment Transport in European Estuarine Environments, Journal of Coastal Research Special Issue, SI 41* (in press).		

Description

Acquisition of in-situ images of real estuarine mud flocs is a recent (during the past ten years) development. Furthermore, images coupled with the corresponding floc characteristics offer distinct advantage over previous studies. Therefore, an improved understanding of floc structure (e.g. size and shape) and composition (e.g. porosity and mass) could provide scientists with a greater insight into the flocculation of mud particles and their characteristics. Using simultaneous measurements of the distribution of floc sizes and settling velocities collected during the European Commission funded SWAMIEE project, this paper draws on a selection of visual floc images and illustrates the types of aggregates (i.e. flocs), together with their relevant floc properties, which typically comprise a floc population at various points in the tidal cycle. Measurements were carried out in the lower reaches of the Gironde estuary during neap tides, where the near bed region turbulent shear stress ranged between 0.06-0.6 N m^{-2}, but the near bed suspended particulate matter concentration did not generally exceed 200 mg l^{-1}. The floc size and settling velocity were measured primarily by the low intrusive INSSEV (In Situ Settling Velocity) instrument, with additional optical floc data provided by the Braystoke tube based VIL (Video In Laboratory) system. The study found that either very low turbidity or very high turbulence tended to produce slow settling macrofloc (floc size > 160 μm) with settling velocities of about 1-1.4 mm s^{-1}. Flow periods which generated moderate rates of turbulent shear stress between 0.4-0.47 N m^{-2} were found to produce the most productive environment for flocculation. These ambient conditions resulted in the formation of low density "comet-shaped" macroflocs about 0.5-1 mm in length and settling at a rate of 2-3 mm s^{-1}. These macroflocs displayed settling velocities up to 5-6 times greater than those typically applied in flocculation parameterisations for inclusion in vertical mass settling flux simulation modelling. When the optimum shear stress was combined with a sampling run suspended particulate matter concentration peak of 139 mg l^{-1}, the macrofloc fraction only represented 35% of the ambient suspended particulate matter. However, the resultant high macrofloc settling velocity meant that this fraction actually contributed 66% of the mass settling flux. Representation of the Gironde estuary floc characteristics in terms of a constant fractal dimension, did not adequately represent the varied distribution of flocs observed in-situ. The faster settling macroflocs and microflocs had respective fractal dimension values of 2.3 and 2.6, whilst the very porous slower settling macrofloc displayed a fractal dimension of only 2. The sample mean fractal dimensions ranged from 2.1-2.5 for all Gironde estuary floc populations.

Format	Tables, Figures and floc images in journal paper (a number of digital floc images can be supplied on request)

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Data User: University of Plymouth
EstProcTheme: 2 Sediment processes

Title	Preliminary findings of a study of the upper reaches of the Tamar Estuary, UK, throughout a complete tidal cycle: Part I. *In-situ* floc spectra observations.		
Author(s)	A. J. Manning, S. J. Bass and K. R. Dyer	Date	2004
Source	*In:* J.P.-Y. Maa, L.P. Sanford and D.H. Schoelhammer (eds), *Proceedings INTERCOH-2003, Elsevier, Coastal and Estuarine Fine Sediment Processes*, (*sub judice*).		

Description

A series of field experiments funded by the Natural Environmental Research Council were conducted in the upper reaches of the Tamar estuary (UK), which placed the measurements within the tidal trajectory of the turbidity maximum. The aim of the study was to examine how the distribution of floc characteristics evolved with respect to changes in the turbulent shear stress, suspended concentration and biological constituents, throughout a complete tidal cycle. The main objective of the experiment was to measure simultaneous floc properties observed using the optical INSSEV instrument (which included: floc size, shape, settling velocity, effective density, porosity and floc dry mass) and hydrodynamic components, *in-situ*, throughout a complete tidal cycle. Detailed hydrodynamics were measured at 18 Hz by an array of miniature discoidal electro-magnetic current meters. Suspended solids concentration was measured by both filtered water samples and optical backscatter sensors.

This paper reports the preliminary findings of the measurements made on the 15th April 2003, during a spring tide. During the ebb a concentrated benthic suspension layer formed in close proximity to the bed producing a peak concentration of 4.2 g l^{-1} and a maximum shear stress of about 1.5 N m^{-2}. The more dynamic flood produced a shear stress which exceeded the peak ebb stress by 0.15 N m^{-2}. This in turn meant that the suspended matter was more evenly mixed throughout the entire water column on the flood. Local salinity values ranged from 14 at high water, down to fresh water at low water. A total of 24 INSSEV floc samples were collected on the ebb flow and a further 34 floc populations were obtained on the flood. A combination of a shear stress of 0.38 N m^{-2} and a concentration of 4.2 g l^{-1}, produced the optimum flocculation conditions which was signified by a bi-modal floc distribution. The microflocs represented 25% of the population, but only 9% of the dry floc mass. These microflocs were generally dense, slow settling aggregates, with typical effective density values of 80-1550 kg m^{-3} and settling velocities ranging from 0.03-1.1 mm s^{-1}. The macroflocs, which constituted the second mode, contained 91% of the floc mass, one third of which were flocs over 400 μm in spherical-equivalent diameter. These macroflocs had individual settling velocities ranging between 2.2 to 7 mm s^{-1}. This translated into the macrofloc fraction constituting 98% of the total mass settling flux. Interestingly, a peak turbulent shear stress of 1.62 N m^{-2} also produced a dual modal floc population. However in this instance, the dry floc mass distribution was weighted 60:40 in favour of the microflocs. Also, the mean settling velocity of the macroflocs was 1.1 mm s^{-1}, which was 0.35 mm s^{-1} slower than the microfloc fraction. In terms of the total mass settling flux, this translates into the microflocs now contributing 70%.

Format	Tables, Figures and floc images in journal paper (a number of digital floc images can be supplied on request)

Access (Data provider) / Contact details

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Data User: Prof. K.R. Dyer
EstProcTheme: 2 Understanding the sediment transport profile

Title	The effects of suspended sediment on turbulence within an estuarine turbidity maximum		
Author(s)	Dyer, KR, Christie, MC, Manning, AJ.	Date	2004
Source	Dyer et al 2002, In 'Fine sediment dynamics in the marine environment'. Winterwerp & Kranenburg (eds). Elsevier. 202-218.		

Description

The data comprises measurements of the three dimensional turbulence field at two heights above the bed within the Tamar estuary taken during the ECMAST COSINUS project. Strict quality control has reduced the data to two ebb tides with contrasting vertical structures, but with concentrations exceeding 12g/l. These data are complemented by suspended sediment concentration profiles, together with salinity, temperature and velocity profiles. From the data, calculated turbulence intensity, turbulent kinetic energy, Richardson numbers, Reynolds stresses and Reynolds fluxes are presented.

Format	Excel files

Access (Data provider) / Contact details

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Data User: Prof. K.R. Dyer
EstProcTheme: 2 Understanding the general sedimentary processes

Title	The morphological relationships of English and Welsh estuaries.		
Author(s)	K.R. Dyer	Date	2004
Source	FUTURECOAST		
Description			
The database comprises critical dimensions of 96 estuaries, including surface areas, cross sectional areas, volumes and river flow rates. These data have been re-examined, extended, amended and corrected. From the data, comparative studies of the relationships between variables can be made. These reveal the significance of engineering works and reclamation on the development of estuarinemorphology.			
Format	Excel files		
Access (Data provider) / Contact details			

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Data User: HR Wallingford
EstProcTheme: 1 Impact of extreme events and major anthropogenic influences

Title	Sustainable Flood Defences. Monitoring of Retreat and Recharge Sites, Project Number MRD 21110, Abbott's Hall, Numerical Modelling, HR Wallingford EX Report 4367, August 2001.		
Author(s)	HR Wallingford	Date	August 2001
Source	HR Wallingford		

Description

Field measurements of water levels and tidal currents were undertaken within Salcott Creek, a tributary of the Blackwater Estuary in the UK. These measurements were undertaken to provide calibration data for a TELEMAC-2D flow model of Salcott Creek which was used to predict the likely hydrodynamic impacts of various options for managed realignment within the Creek.

Format	Figures of observed and predicted water levels and tidal currents at locations within Salcott Creek Text regarding the set up of the TELEMAC-2D flow model.

Access (Data provider) / Contact details

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The work was undertaken on behalf of the Environment Agency and HR Wallingford will require their permission before making a copy at cost of the report available.

Data User: HR Wallingford
EstProcTheme: 1 Impact of extreme events and major anthropogenic influences

Title	Environment Agency LiDAR database		
Author(s)	Environment Agency	Date	N/A
Source	Environment Agency		

Description

LiDAR (Light Detection and Ranging) bathymetry data was used for the following Ordnance Survey areas: TL9612, TL9412, TL9812, TL9614. The data was used in an "unfiltered" sense. This means that the data was used without attempting to "smooth out" buildings, etc.

The dates of the LiDAR "flights" were as follows:
TL9612 23 September 2000
TL9412 April 1999 (day unknown)
TL9812 23 September 2000
TL9614 23 September 2000

Format	XYZ data

Access (Data provider) / Contact details

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