



## Innovation

The main **scientific innovations** include:

- 1 Integrating three distinct approaches (Figure 1) into a systems modelling framework for decadal coastal change simulation, including open coasts, estuaries and the shallow seabed.
- 2 Capturing and exploring interaction/ coupling in coastal systems (e.g. open-coast and estuary interaction) and potential emergent behaviour (e.g. spit development and breakdown)
- 3 Developing a lasting and open platform for coastal systems modelling to ensure the legacy of the project

The **aim** of this project is to improve our capability to predict decadal scale erosion and accretion around the coasts and estuaries of the UK to enhance the management of erosion and flood risk.

### Project Lead

UNIVERSITY OF  
Southampton

### Project Partners



### Sub Contractors

- Channel Coast Observatory
- Royal Haskoning DHV
- Cardiff University
- University of Liverpool

### Contact

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# iCOASST

Integrating COASTal sediment systems  
1 Feb 2012 - 31 Jan 2016



[www.icoasst.net](http://www.icoasst.net)



# Background

UK coasts are subject to widespread erosion in part due to the cumulative effect of human intervention on soft coastlines, and are further threatened due to climate change, especially sea-level rise. Shoreline Management Planning now requires predictions of coastal evolution up to 100 years in the future. This leads to the challenge of predicting coastal geomorphic behaviour at decadal timescales. Currently, this is often based on expert judgement. However, relevant components for such coastal simulation are emerging (Figure 1), including:

- New methods for system-level analysis of coast, estuary and offshore landform behaviour, which include engineering and management interventions in a manner consistent with natural drivers;
- Well validated 'bottom-up' hydrodynamic and sediment transport coastal area models;
- Operational 'reduced complexity' behavioural landform models of selected coastal landforms (e.g., cliffs, estuaries, saltmarsh); and
- Growing observational datasets that increasingly allow data-driven approaches to coastal analysis and prediction.

The iCOASST Project is enhancing and adding to these components to develop and apply an integrated systems modelling framework for meso-scale coastal simulation.

# Deliverables

The iCOASST **deliverables** are as follows:

- 1 **Systems Modelling Framework:** developing a systems-level understanding that incorporates the complex responses of coupled coastal landforms to changes in hydrodynamics and sediment supply, as well as the interaction of estuarine, coastal and offshore sedimentary systems that have hitherto been studied in isolation
- 2 **Behavioural Geomorphic Models:** advancing our capability in respect of reduced complexity and data-driven behavioural landform models
- 3 **Application and Validation** in case study areas (Liverpool Bay SMP22 & Suffolk Coast SMP7) as shown in Figure 2 to evaluate the ability of the results from Deliverables 1 and 2 to reproduce qualitatively correct and quantitatively useful erosion and accretion predictions at a regional scale.
- 4 **Pathway to Impact:** promoting the uptake, application and legacy of the framework and the component models within strategic coastal assessments and wider coastal science.

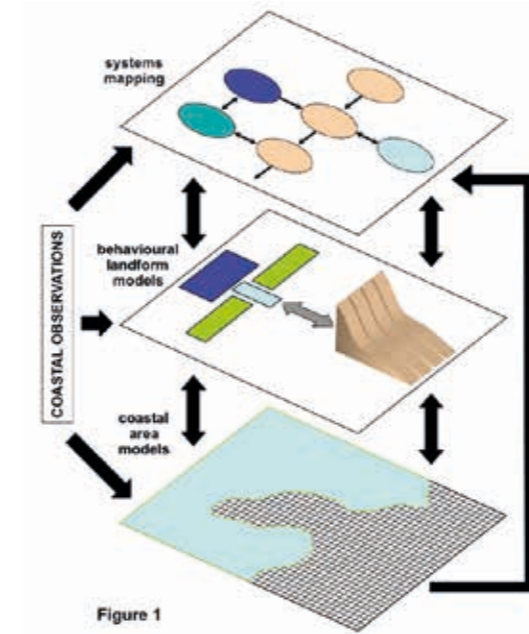


Figure 1 Interaction of coastal systems mapping, behavioural landform models and coastal area models within the iCOASST framework



a) Liverpool Bay b) Suffolk Coast

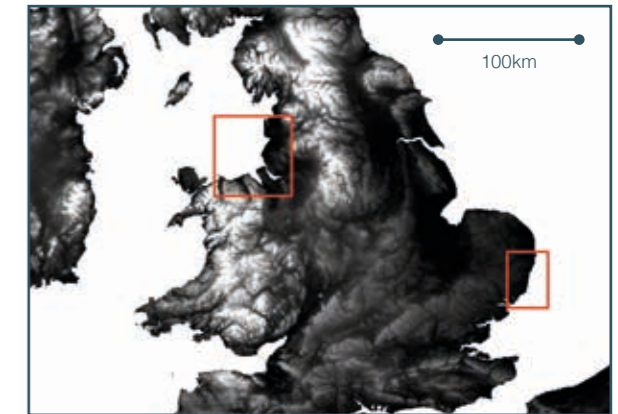


Figure 2 iCOASST case study sites

○ A **Conceptual Framework** that formalises existing knowledge, representing the connections between open coast, estuaries and the shallow sea bed

○ Visualisation of landforms and their linkages through **Systems Mapping** of the entire coast of England & Wales

○ **Manuals, Training and Workshops** to enable stakeholders to apply these tools for the purpose of informing the decision making of coastal managers and practitioners

# Outputs

○ A suite of **linked open-source models** that can be used to simulate decadal regional scale coastal change, incorporating open coast, estuaries and the shallow sea bed

○ Academic outputs, including **journal publications**, presentations and engagement with the international community through hosting workshops