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FLEXIBLE MESH MODELLING IN MIKE 21 - EXAMPLES FROM THE U.K.

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ABSTRACT

This paper describes the application of the MIKE 21 flexible mesh (FM) series to two complex regions of the U.K. In the first application, the Solent region, southern U.K. was used in a collaborative project between ABP*mer*, DHI and Microsoft. The work was part of a technical test case for the launch of Microsoft's new x64 bit operating system. The Solent was selected because of the variety of coastal processes that occur there and for its importance as a shipping hub and haven for marine recreation. The local refinement provided by the flexible mesh proved extremely useful, particularly in the many complex tributaries and inter-tidal zones which would have been impossible to resolve with rectilinear or curvilinear approaches. The model was also run with a dynamic land boundary where the limit of the wet zone was dictated by real coastal topography rather than a fixed boundary. This approach required high inter and supra-tidal topographical resolution but provided a much better description of flooding and drying.

The second application was in the Bristol Channel, a large macro-tidal estuary in the Western U.K. The main interest was in understanding the morphological relationship between regional sediment transport and a linear banner-type sandbank in the north of the region. The position of the sandbank appears fixed to a prominent coastal headland and its role as a marine aggregate resource is the subject of extensive environmental litigation and concern. A combination of extreme wave events and large tides provided the backdrop to an extremely complex modelling environment. The biggest challenge of the project involved resolving the varying spatial and temporal scales of the contributing processes. At one level, the regional sediment transport is driven by tidal currents and on another, by strong local wave-driven currents. The two interact to produce highly complex patterns of transport. Superimposing the effect of storms and meteorological forcing adds further complication. The system has demonstrated competency in simulating wave-induced currents and wave-current interaction as well as complex sediment transport processes including wave-drift, streaming and littoral drift.

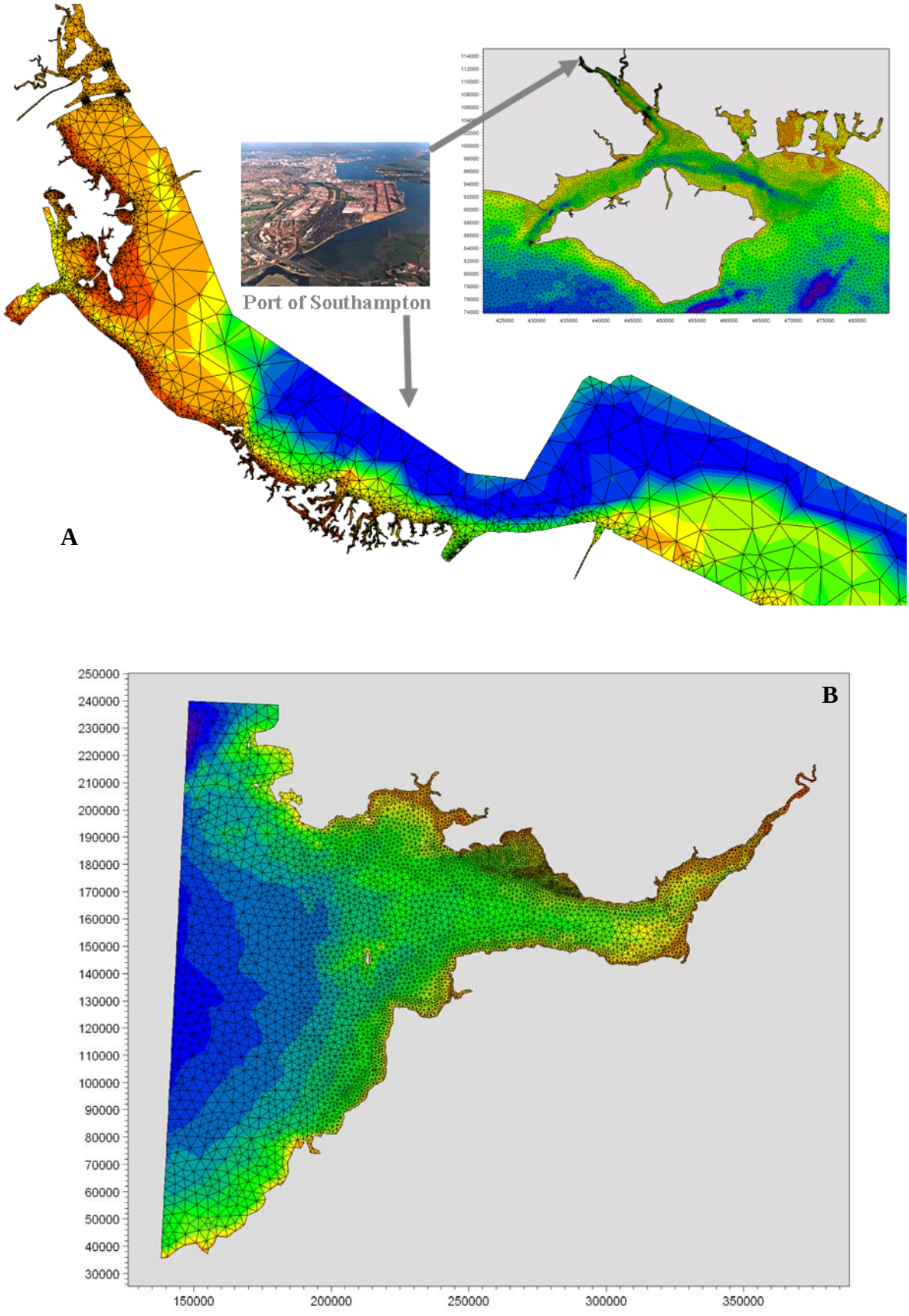

Figure 1. Examples of the unstructured grids used in a) the Solent model and; b) the Bristol Channel model.