Instructions for setting-up and running an ASMITA model of Southampton Water

Download the code

The ASMITA code can be downloaded from www.coastalsea.uk.

In addition, you should download the 'ASMITA training pack' and unzip the file to your working folder.

Installation

ASMITA is installed as an App and requires muitoolbox and dstoolbox to be installed. The download for each of these includes the code, documentation and example files. The files required are:

dstoolbox: dstoolbox.mltbx

muitoolbox: muitoolbox.mltbx

The App file: Asmita.mlappinstall

Installing the toolboxes

The two toolboxes can be installed using the *Add-Ons>Manage Add-Ons* option on the Home tab of Matlab™. Alternatively, right-click the mouse on the 'mltbx' files and select install. All the folder paths are initialised upon installation and the location of the code is also handled by Matlab™. The location of the code can be accessed using the options in the *Manage Add-Ons* UI.

Installing the App

The App is installed using the Install Apps button on the APPS tab in Matlab™. Alternatively, right-click the mouse on the 'mlappinstall' file and select install. Again all the folder paths are initialised upon installation and the location of the code is handled by Matlab™.

The App file contains the code for the three models. Once installed, the model can be run from the Command Window using:

>> Asmita;

Documentation can be viewed from the Supplementary Software in the Matlab™ documentation. The location of the code can be accessed by hovering over the App icon and then finding the link in the pop-up window.

Opening ASMITA

A graphical user interface (GUI) is used to set-up, run scenarios, plot results and export model output.

With the Matlab working directory (folder) pointing to the folder containing the ASMITA code, the GUI is run from the command prompt by typing:

>> Asmita;

A splash screen crediting the developers appears for a few seconds before being replaced by the ASMITA interface.

Training exercise materials

The ASMITA_training_pack.zip file should contains some background notes on Southampton Water, some slides on the exercise and the data needed to setup the model, as follows:

- ASMITA training exercise.docx – this file
- ASMITA training exerecise.pdf – slides used to explain the exercise
- Note on Southampton Water.pdf – a background description of the estuary.
- SW4e model parameters.xlsx – spreadsheet with summary of element properties and historic changes.
- SW4e element properties.txt – text file of the element properties.
- Inner Channel Interventions.txt – text file of the historic interventions.

The slides (ASMITA training exerecise.pdf) provide some additional guidance on how to develop the model schematisation and construct the model using the data provided.

Training exercise

Set-up a 4-element model of Southampton Water using the data provided in 'SW4e model parameters.xls'. Set start year to 1800 and run the model for 300 years.

The historic interventions for the 4 elements are provided on the Change tab of the 'SW4e model parameters.xls' file. These can be used to construct the base case. Maintenance dredging predominantly takes place in the Inner channel and a text file is provided which includes historic maintenance dredging and an assumed rate of maintenance dredging for the duration of the simulation (to 2100). This can be loaded from the Setup menu.

Construct a base case comprising the historic changes and sea level rise of 2mm/year.

Then examine the following scenarios:

1. With sea level rise of 2mm/year (base case)
2. With sea level rise of 2mm/year, and a nodal cycle of amplitude 0.15m.
3. As case 1 and introduce dredged channel 200m wide and 2m deeper than existing bed in 2000
4. As case 3 and introduce a reclamation on the R. Test tidal flat element removing 20ha and reducing tidal prism by 0.5Mm3 in 2020.

What are the changes in volume of the estuary over 50 years from 2000 to 2050?

a) Total volume changes (moving surface); and

b) Relative to a fixed plane (fixed surface).

Of the 4 scenarios, which has the biggest impact? Why do you think this is? How do the proposed changes compare with the impact of historic interventions? What are the assumptions and limitations of the model being used? What other modelling approaches could be used and how are they likely to compare with the approach adopted for this exercise (strengths and weaknesses)?