1. SPECIFICATION OF THE OIL SPILL MODELLING SOFTWARE (OSIS)

The Oil Spill Information System (OSIS) is a state-of-the-art oil spill modelling system for the prediction of the trajectory, spreading, shoreline impact and weathering of marine oil spills. OSIS, winner of the 1994 Seatrade Award for Countering Marine Pollution and now in its' third version, has been developed over the past 8 years and is now in regular use by oil companies, response organisations, universities and government departments world-wide.

OSIS has been developed by BMT and AEA Technology to make use of the enormous wealth of research knowledge developed by AEA Technology (formerly Warren Spring Laboratory) over 25 years of work in the field of marine oil spill pollution. As well as its core of validated science (extensive experimental spills at sea to validate the properties modelling), OSIS benefits from an advanced Microsoft Windows user interface developed by BMT's Marine Information Systems group in direct consultation with users throughout the industry. The software is written in modern C++ and Visual C++ code based on the Microsoft Foundation Classes.

1.1 OSIS v3.0 System Configuration

The configuration of OSIS may be thought of in two distinct parts; the generic software user interface and models, and the databases which provide the core information for OSIS v3.0.

OSIS v3.0 Databases

OSIS relies on five primary database types to provide its model predictions. Four of these databases are pre-configured and stored in the system to provide maps, oceanographic information, bathymetric data and oil properties information. The fifth database is the weather database which is set-up by the user for the prevailing weather conditions at the time of the spill.

1.2 OSIS v3.0 Database Configuration

Map Databases

The OSIS v3.0 map databases contain information for display using the Geographical Information System (GIS) in OSIS. These maps may contain information on the coastline, bathymetry, coastal features, areas sensitive to oil spills, response information etc. Data can be imported from external applications using digital inter-change formats.

Tides and Currents Database

OSIS derives information on water movement from a sophisticated current data server which allows multiple data sources to be combined and integrated to provide water flows information on tidal and seasonal cycles. BMT's Digital Tidal Atlas can be then be used to visualise and manipulate this information. Thorough the common application container this information is common to both SARIS and OSIS.

Bathymetric Database

The requirement for bathymetric data within OSIS is satisfied by the bathymetric database which takes random bathymetric data input and stores it in a digital bathymetry model format.

Oil Properties Database

OSIS models oil weathering based on the properties of the fresh oil. The oil properties database contains over 100 international oils and new oils may be added as required provided that the necessary oil analyses have been carried out;

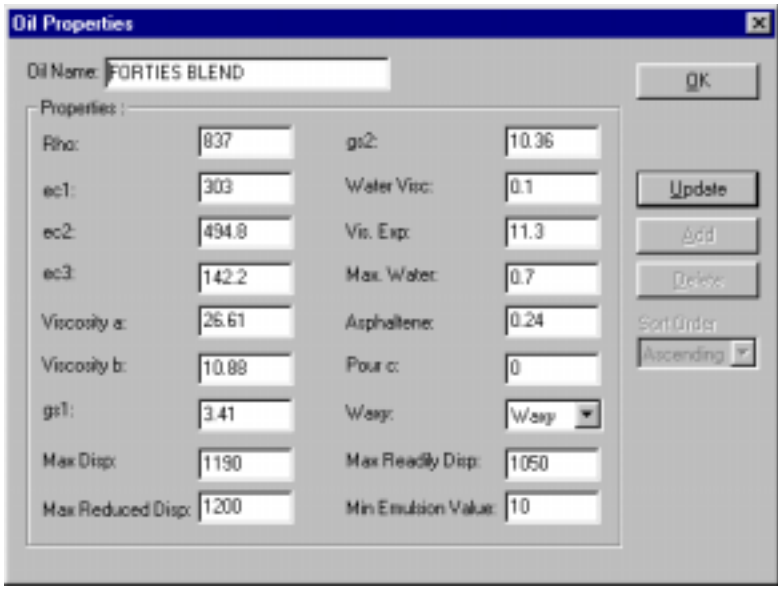

Figure 1. Oil Properties Database in OSIS v3.0

1.3 OSIS v3.0 User Interface

OSIS v3.0 uses a comprehensive graphics user interface under Microsoft Windows to provide the user with clear and straightforward operation of the model. The following shows the general screen layout with a GIS map area, toolbars, status panels and status bars;

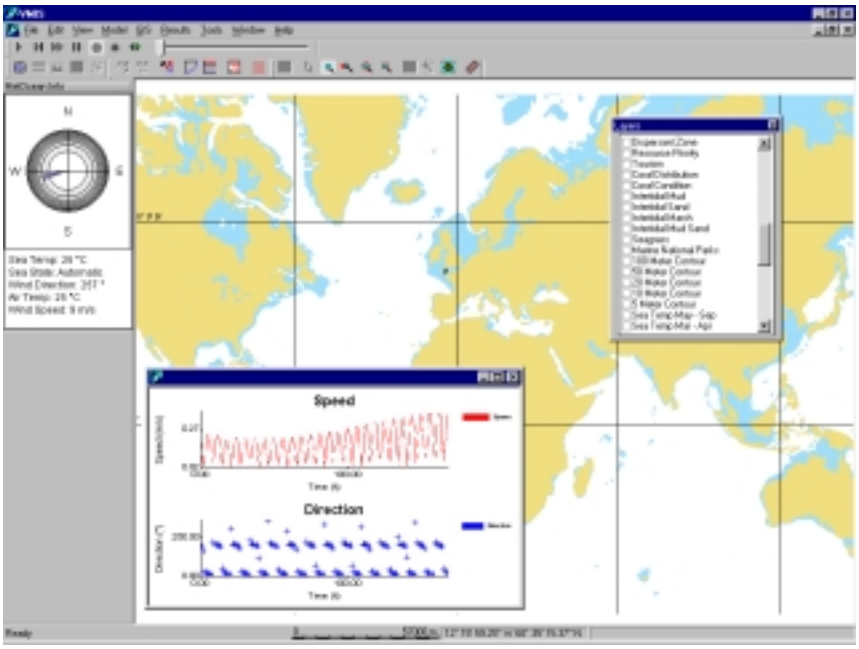

Figure 2. The OSIS v3.0 Graphical User Interface

1.4 Oil Spill Setup

OSIS requires two types of information to initiate a modelling run; spill scenario data, and weather forecast data. This information is entered via the model run manager which contains linked spreadsheets. These spreadsheets allow the user to setup multiple spills and associated weather data for running in a batch mode ideal for the multiple spill runs required during contingency planning;

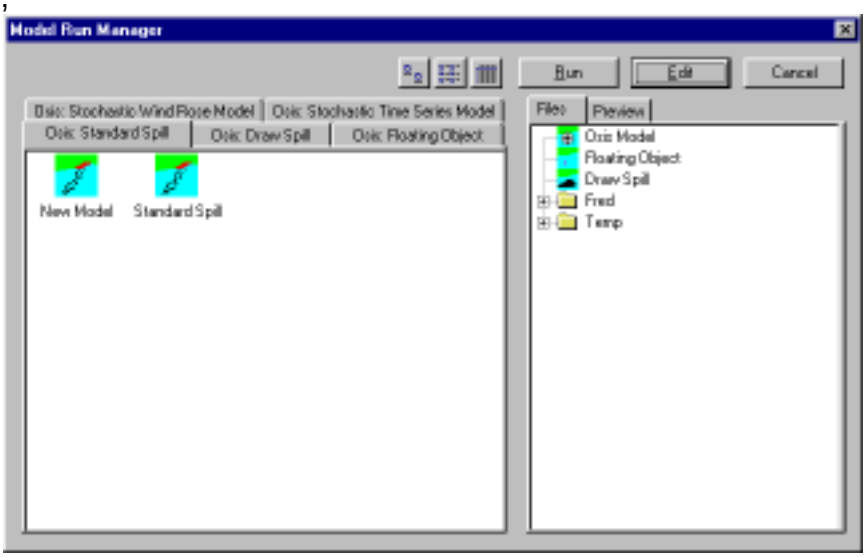

Figure 3. OSIS Model Manager

Information on the spill scenario is input using the Spill Data menu which allows definition of the volume, duration, diameter and depth of the spill as well as the oil type, tidal data to be used and the model run conditions;

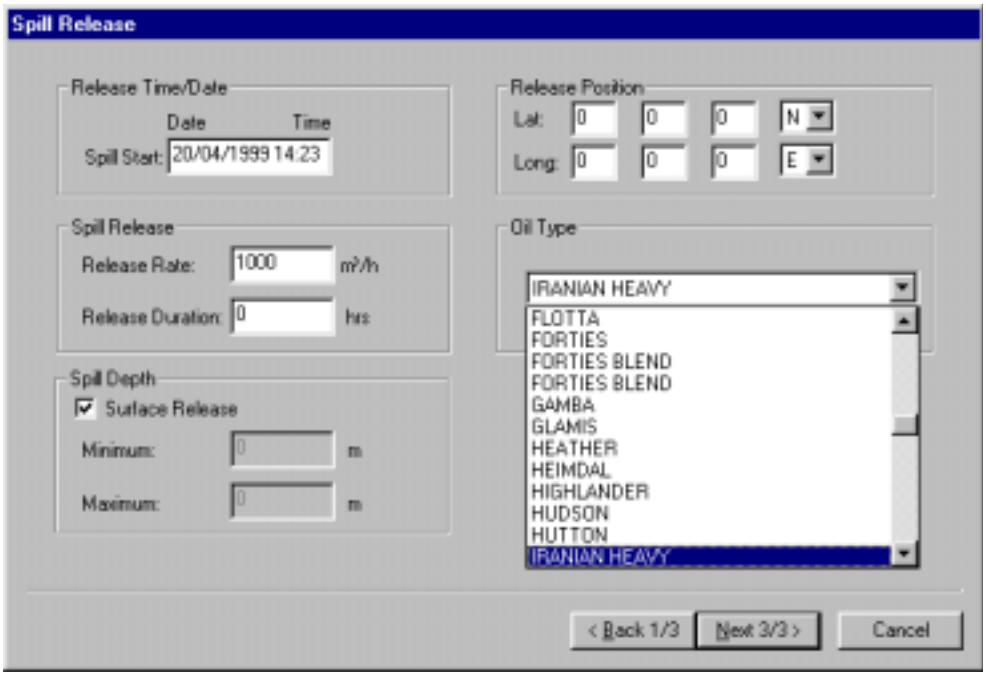

Figure 4. Spill Release Section of Model Manager Wizard

A weather forecast is then added to the spill scenario based on the best available data including wind speed and direction, sea and air temperature, and sea state;

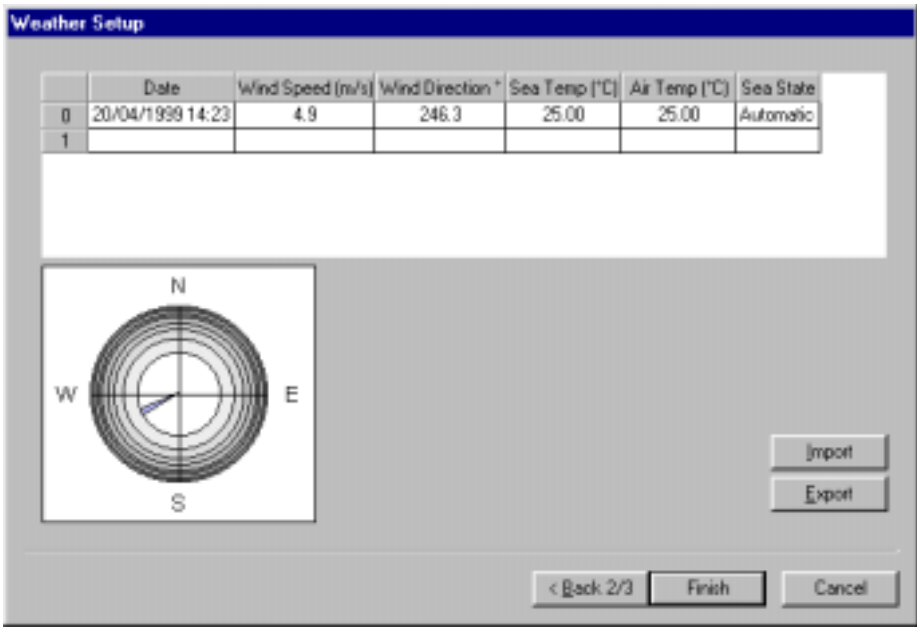

Figure 5. Weather Set-up Spreadsheet in Model Manager Wizard

1.5 Running the Spill Model

The spill model run is controlled via a set of ‘video’ buttons included in the toolbar;

Figure 6. Spill Model Run Control Buttons.

These buttons allow the model to be run continuously or in a time-stepped mode. At any time the model run can be paused. At the outset of a run or when running in batch mode, the results of the model run can be ‘recorded’ using the record button and replayed either forwards or backwards.

By default OSIS displays the spill as a series of ‘particles’ representing the oil slick. The particles are scaled to represent the variation in oil slick volume which can be colour contoured to indicate slick thickness. In addition to this basic display, the volume centroid of the spill can be added together with the historical track of the spill and the sea surface spill ‘envelope’ indicating the total sea area impacted by the spill;

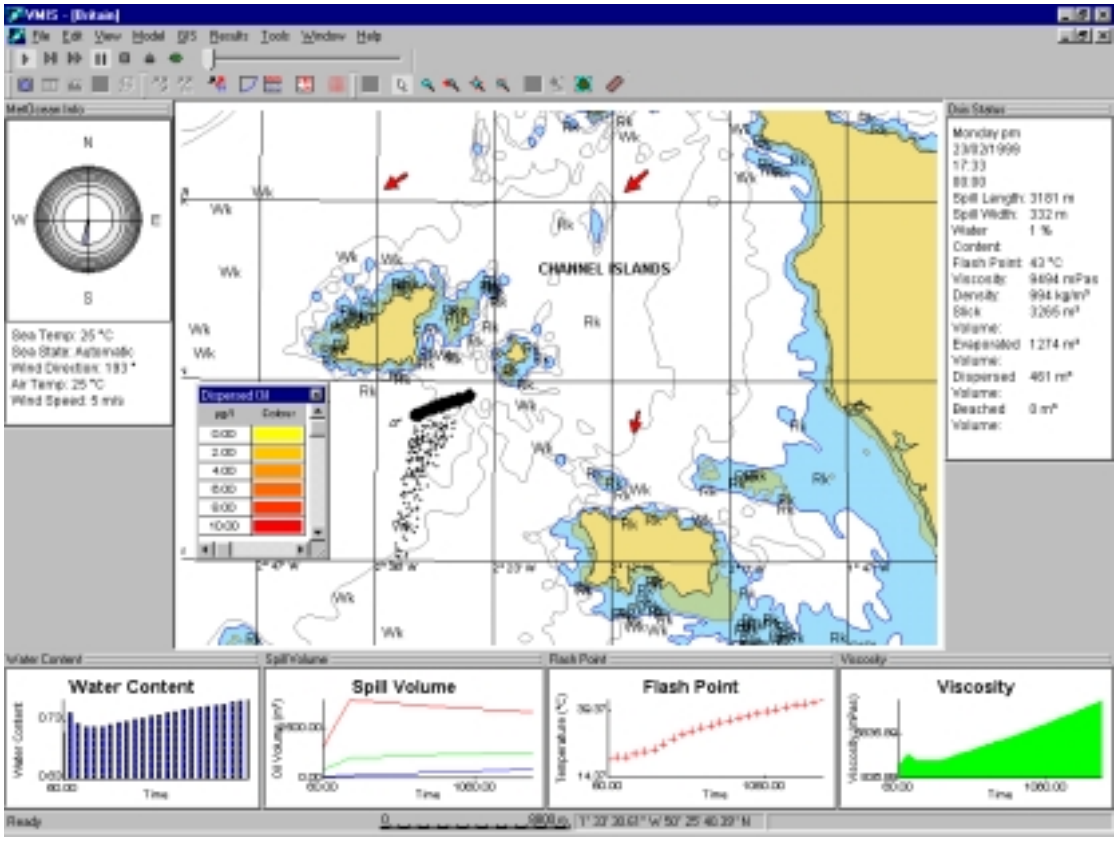

Figure 7. Typical Oil Spill Model Run

Resizable display panels display the oil properties calculated by the properties, slick volumes, flash point, viscosity, density, oil properties etc. Units can be simply changed using the Measurement Units box;

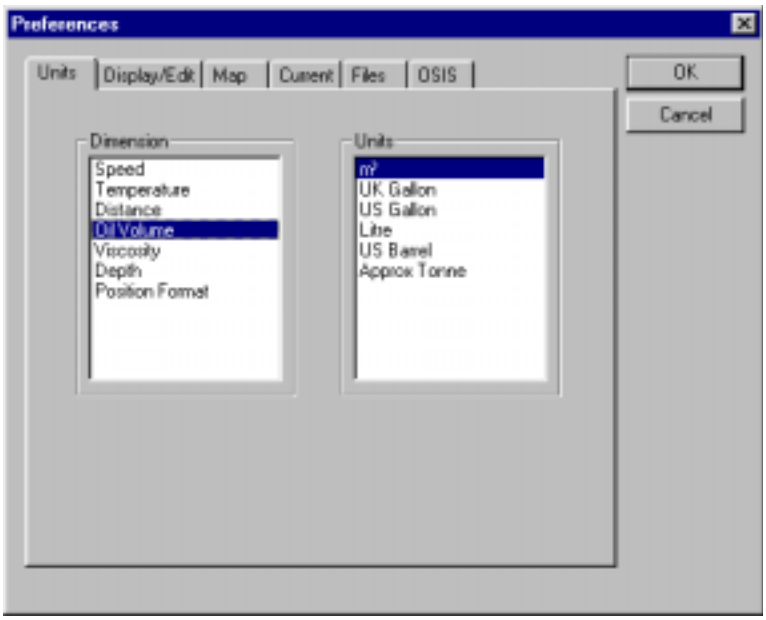

Figure 8. Units Section of the Preferences Dialogue Box

During the spill run the user may utilise a number of options allowing the on-screen data to be analysed or adding supporting data. An example of this is the ability to visualise the current flow field and wind data under which the oil spill is being influenced. The user may also use the Spill Move option to reposition a spill on the basis of visual or remotely sensed observations.

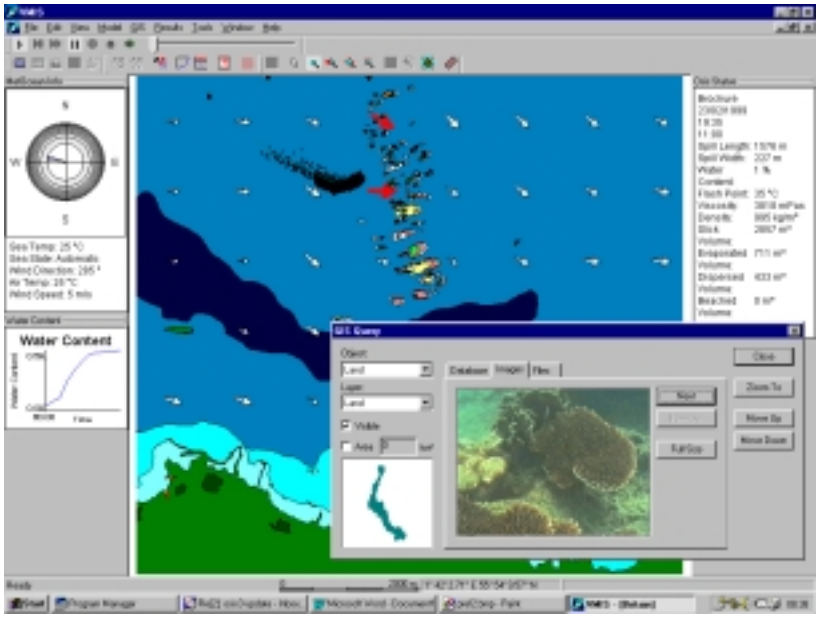

Figure 9. Display Options Including Visualisation of Current Vectors