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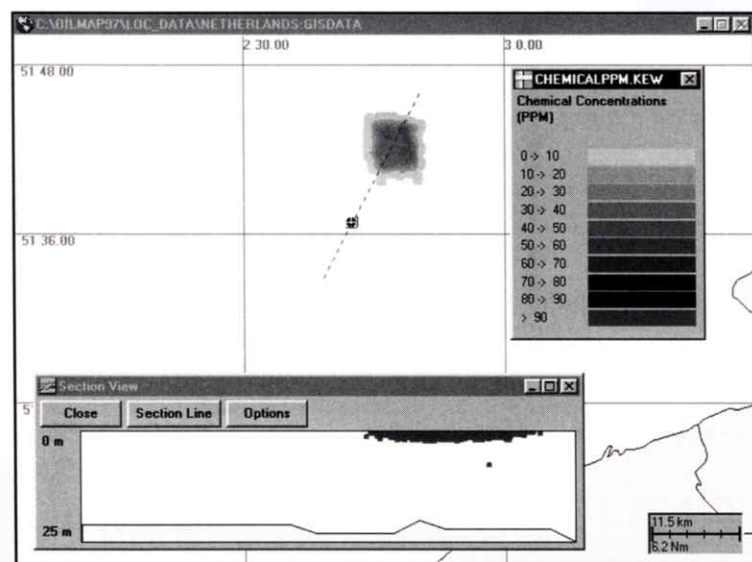
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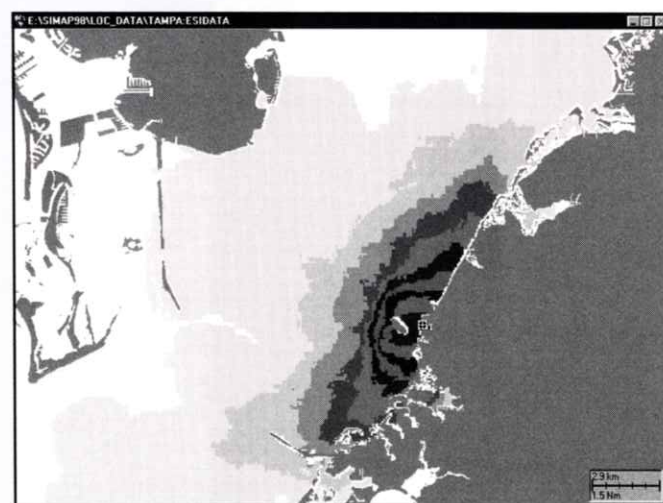
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CHEMMAP: ASA's Chemical Spill Model System



Example output from a chemical simulation.



Example CHEMMAP stochastic model output.

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Integrating Data and Models Enhances Spill Predictions for 1/9th of the Globe's Surface

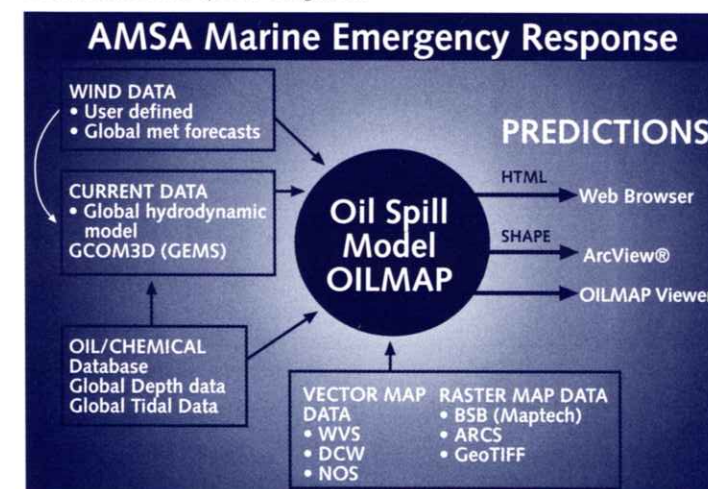
The Australian Maritime Safety Authority (AMSA) co-ordinates Australia's international responsibilities in the area of marine environment protection and oil spill response for 18,000,000 square miles of ocean. AMSA's geographical area of responsibility for search and rescue coordination stretches from the Antarctic shorelines to the outskirts of the Indonesian waters near the equator.

Due to AMSA's national role in coordinating oil and chemical spills, it needed accurate and reliable metocean data and numerical predictive models in order to respond efficiently. The tender was won by a team led by Australia's Bureau of Meteorology which coordinated the expertise and inputs from many government agencies and specialist companies including: Global Environmental Modelling Systems (GEMS), Asia Pacific ASA, and ASA, Inc.

The result is the development of a unique real-time prediction and forecast system for oil spills and chemical spills. The system incorporates:

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A schematic of the system integration



CHEMMAP: ASA's Chemical Spill Model System

As an increasing number and variety of chemicals are produced at chemical plants and shipped throughout the world today, the potential risk to the environment increases.

Both international and national regulators recognize the need to draw up suitable rules and guidelines to help ensure the safe movement and transport of chemical products, and at the same time encourage a regime of suitable contingency planning and emergency response in the event of a spill incident.

The chemical tanker industry has a good record, reflected in the general quality and relatively young fleets and the operational standards of their crews and ship management. However, the International Maritime Organization (IMO) and other national marine regulators recognize that a chemical spill incident could pose a far greater threat to the environment than a hydrocarbon spill, with little or no realistic opportunity to contain or recover the spilled hazardous substance. Similarly the petro-chemical manufacture industry is now required to meet tougher regulations governing the minimum criteria for waste discharge and related safety audits and emergency response procedures. The offshore oil industry is also increasingly reviewing the potential impact of chemicals discharged during drilling operations. While these discharges are carefully controlled, industry has a responsibility to continuously assess the potential effects of such continuous discharges.

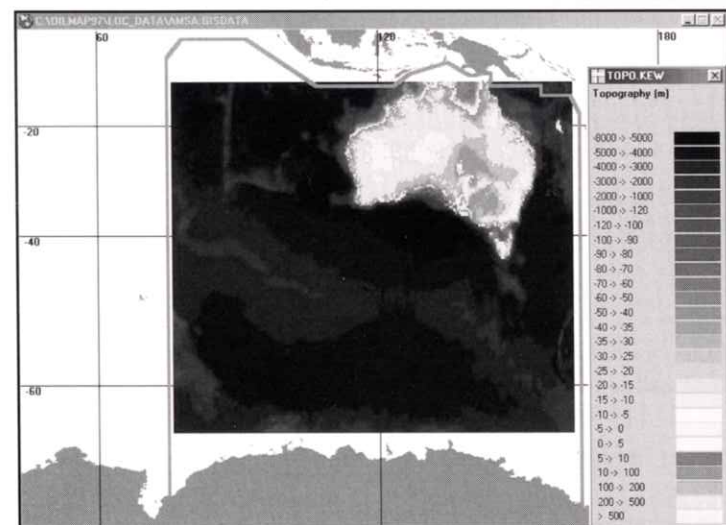
In the event of a spill incident, chemical products can pose a far more varying and complex impact to aquatic life than hydrocarbon products. In a planning or emergency response situation the basic question is: If one of these chemicals is spilled into a water body, what would be the chemical's fate and would an impact to aquatic life be expected? ASA's chemical spill model, CHEMMAP, is designed to quickly answer this and other related questions.

Continued pg 2

- Global and regional numerical model wind forecasts (Bureau of Meteorology)
- Three-dimensional wind/tidal driven hydrodynamics (GEMS)
- Oil spill trajectory, weathering and response model (ASA)
- Stochastic and receptor models (ASA)

The components are fully integrated so that the databases are exchanged between the different models. Further, this integration of the databases and models enables the user to run predictions at fine resolution anywhere in the area under AMSA's responsibility and then interchange the simulated trajectory output with the National Oil Spill Response Atlas (GIS) system.

Model domain for Australia's oil spill and search and rescue system.



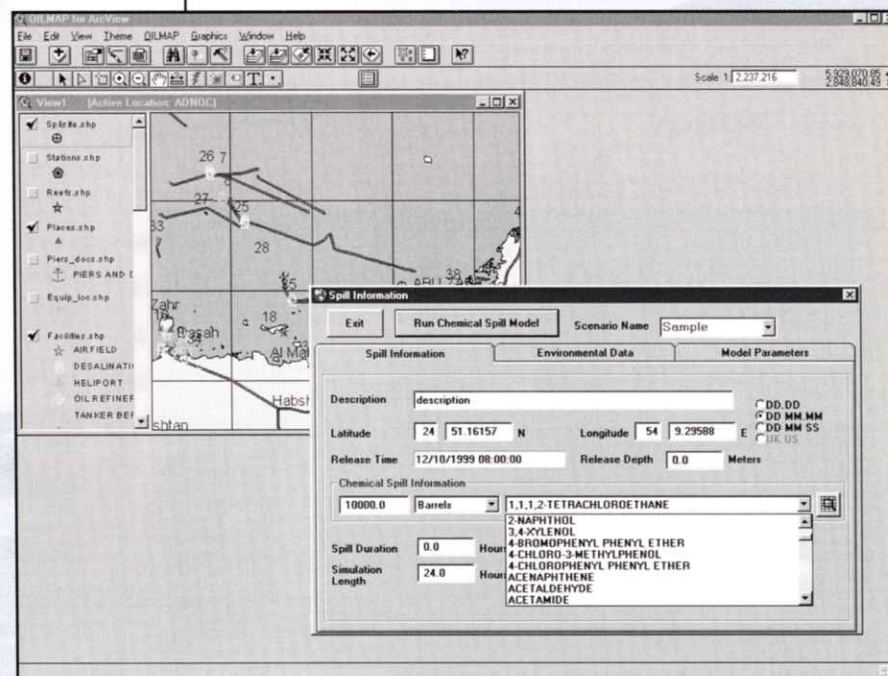
CHEMMAP predicts the transport and fate of floating, sinking, soluble and insoluble chemicals and product mixtures. Using readily available physical-chemical properties, CHEMMAP predicts such processes as evaporation, volatilization, dissolution, adsorption, sedimentation, resuspension, and degradation. Simulations may be run for a specific event, or in stochastic mode to evaluate consequences of spills as part of an ecological risk assessment.

As with our other model systems, CHEMMAP is easily applied and available for use in a wide variety of conditions:

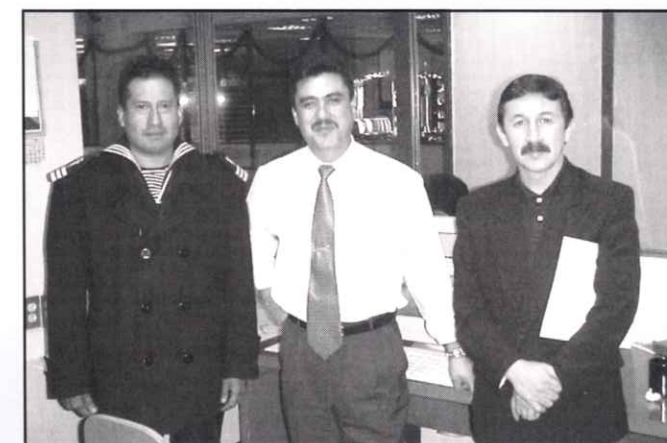
- It runs within ASA's standard Geographic Information system (GIS), or as an ArcView® extension and can be applied anywhere in the world.
- It will run using any of a variety of user-provided three dimensional hydrodynamics as inputs and allows vertically-averaged current files to be created within the program system where modeled currents are not available
- Outputs include a variety of easily-interpreted visual displays of dissolved and particulate concentration fields and trajectory displays, as appropriate to the properties of the chemical being simulated.
- In addition, an optional biological exposure model is available to use the output from CHEMMAP to predict the impacts of the spilled substance on exposed fish and wildlife.

CHEMMAP was recently delivered to the Rijkswaterstaat North Sea Directorate (RNSD), a section of the Dutch Government's Ministry of Transport. *Continued pg 4*

Set-up screen for chemical model.



Trevor Gilbert, Principal Scientific and Environmental Adviser for AMSA, recently received training for the initial installation of the system and is optimistic about its use: "We have already used the new system to investigate two spills in the region of Bass Strait. In one incident a quantity of bunker fuel oil was found washed up near seal and penguin colonies, most likely illegally dumped by passing ships. Over 200 Little Penguins and around 100 other local birds had been impacted by the spill. Samples from the weathered oil are being analyzed to compare with samples taken from ships known to have passed through the area. However by using the OILMAP Receptor Model and a simulation of the surface tidal and wind driven currents, we have been able to backtrack where the spill could have originated in the shipping lanes. This simulation has helped significantly narrow down the list of vessels in the area. Along with samples from all suspect vessels, this new technology will ensure more prosecutions against ships illegally dumping oil or chemicals in Australian waters".



Just before Christmas, **Eric Anderson** traveled to Mexico City to finalize the installation and training for our COASTMAP tidal application for the Oceanographic Office of the Mexico Navy. Pictured are SGT. Felipe Hernandez Maguey, LT. Juan Martin Ramirez Miranda, and Dr. Modesto Ortiz. SGT. Maguey is the lead technical worker on the project from the Mexico Navy. LT. Ramirez is the supervisor in charge of the project, and Dr. Ortiz is a tidal oceanographic expert from CISESE, a university in Ensenada, Mexico. Dr. Ortiz supplies harmonic data constants to the project from long-term studies for the Mexican tidal stations.

The COASTMAP application is part of a larger tidal elevation study for the Navy by RACAL Survey Mexicana, and is managed by Ing. David Gonzalez Garcia.

Eoin Howlett and **Roddy Thomas** delivered and provided training on the latest version of CHEMMAP to The Rijkswaterstaat North Sea Directorate (RNSD). RNSD comes under the auspices of the Dutch Coast Guard and coordinates all response activities in the event of a hazardous spill incident in or around the Dutch Continental Shelf. RNSD has added CHEMMAP to its existing suite of ArcView®-based models, OILMAP and SARMAP.



Chris Galagan, Eric Anderson, and Matt Ward participated in an oil spill exercise put on by the Hess Spill Management Team December 2-4 at the Spentonbush/Red Star Facility in Brooklyn, NY. At this exercise, ASA's OILMAP and ICSMAP software were used as the information backbone of the play. OILMAP supplied the exercise, "truth" of where the spilled oil was on water and on shore. The ICSMAP software implemented all ICS forms and managed the development and staffing of work groups to respond to the spill. Five computers in three separate work spaces were connected by a local area network so that players in each of the spaces could view information from each of the other work groups. The exercise was facilitated by Capt. Don Jensen (Retired), and started at 0700 on Friday, ran through the day, restarted on Saturday morning. A "hot wash" debrief concluded after lunch on Saturday. The consensus was that the ASA software worked very well to achieve a semblance of reality for the progress of the spilled oil, and that the ICS forms management and the distribution of the trajectory and response management information throughout the several sections was very effective.

ASA is pleased to announce that **Cheryl Phillips** has joined the ASA staff in our front office. Cheryl is a graduate of Northeastern University and comes to us from Dover Investment Company in Cranston, RI.



Eoin Howlett and **Eric Anderson** traveled to Abu Dhabi in early December to install and train ADNOC personnel on the OILMAP ArcView® version software. Shown (at left) are the trainers and intrepid OILMAP trainees: Eoin, Abdulaziz Awadh, Michael Keogh (ADMA-OPCO), P. Venu Gopal, V.T. Rajan, and Eric. The trainees showed extra effort in attending the course during the first few days of Ramadan. We appreciate their extra effort during this period of daily fasting.