MARINE ENVIRONMENTAL NEWSLETTER

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ASA Responds to LNG Concerns

Worldwide trade in liquefied natural gas (LNG) is rapidly expanding, with imports to the U.S. expected to double within the next 20 years. This increased activity will require the construction of new LNG terminals and the maintenance of existing terminals. ASA is providing services to evaluate LNG-related issues from two perspectives. The first is through the analysis of environmental effects relating to LNG terminal construction and operation. The second is by developing an LNG transport and fate model system for use as an emergency response planning tool.

For more information contact Craig Swanson, cswanson@appsci.com.

THE INSIDE STORY

Effects of LNG Terminal Construction and Operation

ASA recently evaluated the environmental effects of two proposed LNG terminal facilities, one onshore and the other offshore. For the onshore terminal the impacts on marine biota in response to dredging the access channel were determined. ASA's hydrodynamic, suspended sediment fate, and biological dosing models were used to evaluate the effects of sediment released during dredging operations to deepen the existing channel.

For the offshore terminal, ASA focused on the environmental effects of pipeline burial and the use of seawater to vaporize LNG to a gas for transfer to shore. The pipeline analysis involved determining the extent of resuspension and deposition of sediments during the burial process and the resultant effects on biological communities in the area along the pipeline route. The use of seawater for heating the LNG and the subsequent discharge of a cooled water plume examined both the entrainment and impingement of marine biota through the heating water system, and the discharge plume's extent and biological effects.

Emergency Response Planning Tool for LNG

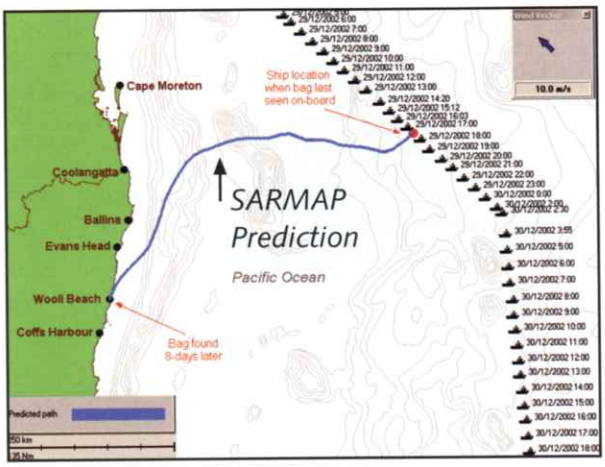
The increasing use of LNG and its consequent transport increases the possibility of a spill due to either accidents or terrorist activities. Work is currently underway at ASA to develop a model system for evaluating the consequences of an LNG spill on water. The integrated models will predict the fate of LNG (or other cryogenic liquid) beginning with its release from a tanker or pipeline. Spreading, vaporization, burning, and vapor dispersion will be included. Thermal radiation resulting from a pool fire is of particular concern.

The models will be incorporated in a comprehensive GIS-based user interface to simplify specification of the release scenario and facilitate interpretation of model results. Hazardous concentrations and thermal radiation levels overlaid on a map of the affected region will indicate areas of concern at a glance.

Above photo: Moss-spherical tanker ship, a specially designed ship used to transport LNG.

Trajectory Modelling Used to Assist Marine Pollution Investigation

Early on the morning of 7 January 2003, a large empty yellow plastic quarantine bag was found on the high tide mark of Wooli Beach, New South Wales, Australia. These heavy duty plastic bags are used for storage of items that pose a quarantine risk and are sealed on board ships by Quarantine Inspectors. As the disposal of plastic at sea is prohibited, the Australian Maritime Safety Authority (AMSA) undertook an investigation to determine the source of the bag. A suspect ship was identified, and AMSA inspectors boarded the ship and obtained documentation that confirmed eight days earlier the ship had travelled past Wooli Beach some 514 kilometres offshore. To assist AMSA, Asia-Pacific ASA performed a series of SARMAP model simulations (backward and forward) to determine the trajectory of the bag and establish whether the ship identified was in fact responsible.

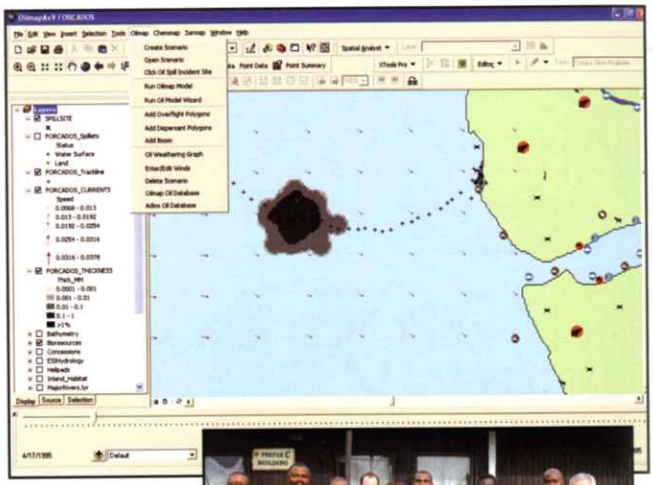


The backward tracking simulation demonstrated the bag moving seaward from Wooli Beach would intersect with the ship's path. To further understand the movement of the bag, a series of forward tracking simulations were carried out along the ship's recorded geographic positions. By simulating the release of the bag from selected positions, it was calculated that if the bag entered the sea between 17:30 hrs–19:30 hrs on 29 December 2002, the bag would reach Wooli Beach by high tide the night of 6 January 2003. The figure to the right shows the predicted movement of the bag over the 8 days.

The findings from this modelling study formulated part of the evidence in a successful prosecution of the ship's Owners and Master during December 2004 for offences involving illegal disposal of plastic and food waste.

For more information please contact Sasha Zigic, szigic@apasa.com.au.

Latest OILMAP Extension For ArcGIS Version 9.0 delivered to SPDC & SNEPco, Nigeria



The Shell Petroleum Development Company of Nigeria Limited (SPDC) and the Shell Nigeria Exploration and Production Company (SNEPco) have recently acquired ASA's OILMAP for ArcGIS system. This system works as an extension to ESRI's ArcGIS software (version 9.0). OILMAP is an oil spill and response system, which provides rapid predictions of oil movement. Its integration into the ESRI ArcGIS framework provides the user with access to a comprehensive suite of GIS tools allowing detailed analysis of OILMAP's output. Other features include the incorporation of spatial databases, the ability to color code spill trajectories by time, radius, viscosity, or thickness, and analysis of oil weathering data.

The system was delivered to SPDC and SNEPco in support of Shell's training, planning and emergency response operations in Nigeria. Working in close cooperation with SPDC's Geomatics Department ensured seamless integration with the existing GIS infrastructure in Shell. The agreement includes the delivery of several licenses, the provision of an offshore water circulation data set and historical wind data and is applicable to all Shell Operating Companies.

Roddy Thomas of ASA Ltd recently carried out a software training program at SPDC Geomatics Office, Port Harcourt. Aattendees included Emergency Response Coordinators (ERC), HSE, MetOcean and GIS specialists from Shell's Lagos, Warri and Port Harcourt offices.

Other ASA products available as ArcGIS extensions include CHEMMAP, SARMAP, and AIRMAP.

For more information about OILMAP for ArcGIS, contact Kelly Knee, kknee@appsci.com.

NetCDF and OPeNDAP Support

As a component of a variety of projects that ASA is working on, we continue to expand our development of NetCDF and OPeNDAP (www.opendap.org) support.

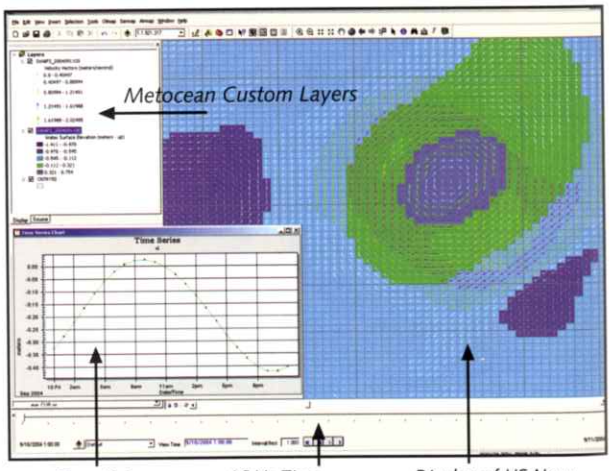
Support for NetCDF within ArcGIS has been a challenge because of the flexible nature of NetCDF, especially in terms of the geospatial definitions. Because of the huge variety of NetCDF conventions used, ASA's ArcGIS NetCDF extension focuses on support for files that meet the COARDS and CF conventions (www.unidata.ucar.edu).

Currently, the NetCDF extension allows the user to add NetCDF files as a custom layer to the GIS view. The user may:

- Display vector and scalar parameters
- Perform time filters and animations
- Use grid striding to visually filter data
- Export time steps to ESRI SHP file format
- Use the Time Series Graph Tool

ASA is also working on a prototype extension that allows the user to connect to metocean data served by OPeNDAP servers so remote data may be visualized within ArcGIS.

For more information contact Eoin Howlett, ehowlett@appsci.com.



Time Series Graph Tool — *ASA's Time Toolbar Extension* — *Display of US Navy SWAFS data, water elevation and surface currents*

PERSONNEL

Malcolm Spaulding and **Roddy Thomas** attended the Search, Assistance, and Rescue Technical Seminar (SAROPs) during SeaTechWeek, Brest, France, 18-20 September. Malcolm presented a paper entitled *The next generation Search and Rescue Optimal Planning System for the US Coast Guard.*

4-7 October, **Eduardo Yassuda**, **Andrea Gallo** and **Tom Richardson** attended the Rio Oil and Gas Exhibition and Conference, at which ASA South America shared a stand with Hidroclean, an emergency response and environmental consulting company.

Craig Swanson, **Deborah French McCay**, and **Jill Rowe** participated in a meeting with federal and state agencies to discuss dredging issues related to the proposed Weavers Cove Energy LNG Terminal in Fall River, MA on 8 October. The main topics of this meeting were to discuss the specifics of the proposed dredge plan, ASA suspended sediment modeling results, ASA biological effects analyses, and possible time-of-year dredging restrictions for the project.

On 19-21 October, **Deborah French McCay** and **Eric Anderson** presented papers at the International Marine Environmental Modeling Seminar (IMEMS) in Washington, DC. Debbie presented *Validation of an Oil Spill Fate and Effects Model Using Field Observations from Spills* authored by Debbie and **Jill Rowe**. Eric presented, *Deep Water Oil Spill Modeling using OilmapDeep and CDOG* authored by **Tatsu Isaji**, Eric and **Eoin Howlett**.

21-22 October **Nicole Whittier** participated in the Air Dispersion Modeling and Risk Assessment Workshop held by Lakes Environmental. Technical details of regulatory air dispersion modeling, screening and refined models for permit applications and risk assessments were explained. Interactive case studies were performed using: AERMOD, AERMET, AERMAP, ISCST3, ISC-PRIME, BPIP, PCRAMMET, and WRPLOT.

In November, **Kathy Sheridan** completed the Introduction to Marine Oil Pollution Response Course, held by WA's Dept. for Planning and Infrastructure (DPI).

Craig Swanson, Eoin Howlett, and **Jiganesh Patel** participated in the Global Ocean Data Assimilation Experiment (GODAE) Symposium, 1-3 November, in St. Petersburg, FL. Eoin and Craig made informal presentations about COASTMAP at the Crisis Management and Risk Management breakout sessions, respectively. A poster, *COASTMAP: A User-Focused Monitoring and Modeling System for Coastal Waters,* coauthored by **Eoin Howlett, Craig Swanson, Matthew Ward** and **Malcolm Spaulding** was displayed during the symposium.

Where in the world are Craig, Eoin, and Jiganesh in the photo of the GODAE participants?

1-4 November, **Jose Edson Pereira** and Professor Edmo Campos participated in the GODAE meeting in St. Petersburg, FL.

Throughout the months of September to December, **Craig Swanson**, **Deborah French McCay**, and **Jill Rowe** participated in public hearings held by Conservation Commissions from the towns of Somerset and Fall River, MA for the proposed Weavers Cove LNG project. During the hearings, members of the commissions and town citizens asked questions regarding ASA's modeling results and the potential dredging impacts to biological organisms within the Taunton River.

1-5 November, **Eduardo Yassuda** and Aldo Fedele from DIRECTEMAR (Chile) conducted OILMAP training for technical personnel of the Chilean Navy in Punta Arenas and Puerto Montt (Chile), as part of a project to develop 5 emergency response centers along Chile's coast.

Punta Arenas

Puerto Montt

Craig Swanson presented *Computer Modeling-Based Source Identification Tool for Pathogenic Pollution* at the American Water Resources Association annual conference in Orlando, FL 1-4 November.

Jill Rowe attended the 57th annual Gulf and Caribbean Fisheries Institute (GCFI) conference on 8 November in St. Petersburg, FL. She presented her paper entitled *Integrating GIS with Fishery Survey Historical Data: A Possible Tool for Designing Marine Protected Areas.* Jill's paper touched on her master's thesis work in which she analyzed 30 years of fishery-independent trawl (MARMAP) data for trends in fish abundance, biomass and diversity. It discussed how an analysis such as this could be used for future fisheries management and aid in the placement of marine protected areas.

Craig Swanson and **Paul Hall** recently participated in a series of regulatory agency meetings to discuss the environmental effects of a proposed desalination facility on the Palmer River in Swansea, MA.

On 9 November, **Eduardo Yassuda** was invited to speak at the Annual Meeting of the National Agency of Petroleum (ANP) Program for Human Resource Development. Eduardo addressed on the *Consulting Job Market in the Oil & Gas Industry.*

Deborah French McCay presented *Habitat Equivalency Analysis Based on Production and Food Web Equivalency* (by Debbie and **Jill Rowe**) and participated in a panel discussion on habitat equivalency analysis for natural resource damage assessment at the Society of Environmental Toxicology and Chemistry (SETAC) Fourth World Congress, 14-18 November, in Portland, OR. She also presented a poster *Probabilistic Impact Evaluation of Oil Spills in the Columbia River and Coastal Washington Waters.*

Craig Swanson was an invited participant in a symposium, State of Science Knowledge on Nutrients in Narragansett Bay, held on Block Island 17-18 November. The symposium sessions focused on nutrient sources and magnitude, circulation and forcing functions, biological and ecological trends, and nutrient biochemistry and fluxes. Craig highlighted some of the previous circulation studies (field programs and modeling) that he and **Malcolm Spaulding** have performed in the Bay.

Eoin Howlett and **Roddy Thomas** attended the Offshore Arabia Oil & Gas Conference, held in Dubai, 29 November - 1 December. ASA exhibited at the conference and met with clients from UAE, Saudi Arabia, Qatar, Oman, Bahrain and Kuwait.

Eoin Howlett visited Singapore 1-3 December as part of an upgrade program for ASA's Crisis Management System (CMS) installed at the Maritime Port Authority (MPA) offices and the Integrated Simulation Centre (ISC). Eoin also spent time preparing for the new SARMAP project at the Civil Aviation Authority of Singapore (CAAS), which is being jointly commissioned with Techno-Sciences SARSAT installation.

Eoin Howlett visited ASA's office in the Gold Coast, Australia, 4-7 December. Eoin spent a few days working on some joint projects with **Brian King**, **Sasha Zigic**, and **Marc Zapata**, including design of an ArcGIS extension for the Australian Navy.

Paul Hall presented a talk titled *On melting, dehydration and the geochemistry of off-axis plume-ridge interaction* at the 2004 Fall Meeting of the American Geophysical Union in San Francisco, CA (13-17 December). While at the meeting he also met with representatives of CODAR Ocean Sensors and members of the Rutgers University Coastal Ocean Observation Lab to discuss the use of data from Coastal HF Radar systems in Search and Rescue modeling.

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PROJECT NEWS

SARMAP was delivered to PETROBRAS, the Brazilian oil company, and the Brazilian Navy on 8 December. As part of that delivery, **Eduardo Yassuda** went to Rio de Janeiro and provided technical training on Search & Rescue and the use of SARMAP.

The Argentinean Coast Guard (Prefectura Naval Argentina) has recently been delivered SARMAP. On 15-17 December, **Eduardo Yassuda** went to Buenos Aires to provide a 3-day technical training course on Search & Rescue and the use of SARMAP.

The North Sea Directorate, the Netherlands, has recently taken delivery of upgraded versions of OILMAP/SARMAP for ArcGIS9 and CHEMMAP for ArcGIS9 to meet their latest operational needs.

Sasha Zigic, **Scott Langtry** and **Nathan Benfer** assisted the Western Australian Water Police with their search and rescue efforts, 5–7 January 2005. Numerical modelling was undertaken to locate an elderly couple that went missing after they set off in their small inflatable raft from Rottnest Island, Western Australia, to paddle out to their yacht moored only 60 meters offshore. At 17:30 on the 4th of January a crayfisherman discovered the raft floating empty. The location of the raft was then compared with the predicted search area and it was found to be contained with in its limits. Since the persons were still lost at sea, a number of release sites were added along the dingy track line from the previous simulation. The release sites were run simultaneously and a search area was created to encompass all possible locations of the missing persons. This predicted search area was then used by the Western Australian Police as part of their search.

Upcoming Conferences

Paul Hall will be attending the Radiowave Operators Working Group (ROWG) meeting in Miami, FL from 31 Jan - 4 Feb. The meeting brings together Coastal HF Radar operators from around the country.

Deborah French McCay and **Nicole Whittier** will be presenting at the 2005 International Oil Spill Conference, 15-19 May at the Miami Beach Convention Center in Miami Beach, FL.

Eoin Howlett will be presenting a paper *Coastmap: An ArcGIS extension for integrating temporal metocean data* at Coastal GeoTools '05, 7-10 March, Myrtle Beach, SC.

New Faces

Kathy Jayko recently re-joined the staff of ASA after a hiatus of several years, during which time she did consulting work, taught Java, and returned to school to get a Master of Science degree in Computer Science. She is currently working on developing and improving many of ASA's models including OILMAP, CHEMMAP and AIRMAP.

Guy deWardener has joined ASA as a senior IT developer. Guy received a BS in Computer Engineering in 1991 from the University of Rhode Island and has spent more than 13 years working in IT for various industries. In addition to design and development tasks, Guy will be focusing on overall development lifecycle, resource management and QA.

Enjoying ASA's Holiday party, Kathy (left) and Guy and his wife Cheryl (right).

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