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Integrated Ocean Observing System (IOOS) Applications

Observational meteorological and oceanographic (metocean) data and models are used on a daily basis for:

- Detecting and forecasting oceanic components of climate variability
• Facilitating safe and efficient marine operations
• Ensuring national security
• Managing resources for sustainable use
• Preserving and restoring healthy marine ecosystems
• Mitigating natural hazards
• Ensuring public health

In response to such needs the National Oceanographic Partnership Program (NOPP) has put together the Integrated Ocean Observing System (IOOS) development plan. The IOOS is a coordinated national and international network of observations and data transmission, data management and communications (DMAC), and data analyses and modeling that systematically and efficiently acquires and disseminates data and information on past, present and future states of the oceans and coastal waters.

The U.S. Navy and National Oceanic and Atmospheric Administration (NOAA), as members of NOPP, put forth a Broad Agency Announcement to create demonstration applications that integrate existing Navy and NOAA data products by applying the IOOS architectural concepts. Northrop Grumman and ASA responded to this announcement and teamed up to create demonstration applications for marine mammal and ship interaction as well as naval sea basing.

In order to rapidly implement these operational demonstrations, ASA used its COASTMAP framework to integrate Commercial-Off-The-Shelf (COTS) and OpenSource technologies to demonstrate integration of a wide variety of

data products. The system was extensively adapted to demonstrate end-to-end implementation, from data supplier to user, and includes data discovery, data access, archive access, data fusion, product generation and assessment, and product dissemination.

For the marine mammal ship interaction application, the system was applied to assess the impact of ship traffic on the North Atlantic right whales in Cape Cod Bay and humpback whales on Stellwagen Bank and specifically the probability of ships striking whales. Data used to make such an assessment was gathered from aerial surveys, historical data from the U.S. Coast Guard Automated Identification System (AIS), real-time observation data from NOAA and Gulf of Maine Ocean Observing System (GOMOOS), as well as other historical and real-time environmental data. A ship routing model extension was built and the system demonstrated the ability to predict the probabilities of ships striking whales in the region.

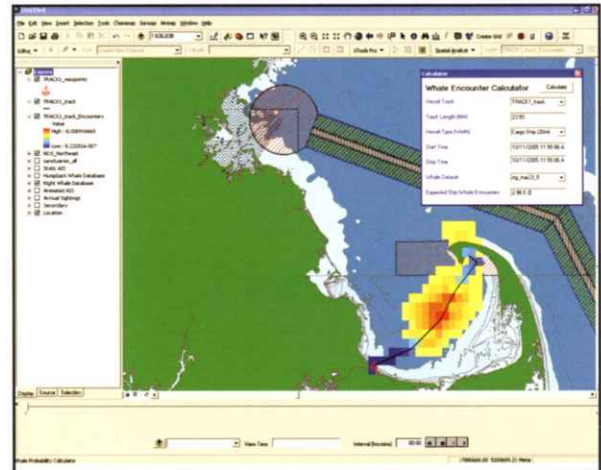
For the sea basing application, the initial focus was to demonstrate the use of the system to assist in the pre-positioning and continued environmental assessment of the deployment of a maritime force platform in the eastern Gulf of Mexico, off the west coast of Florida. The system integrated real-time and operational model data from the U.S. Navy and NOAA to determine acceptable areas for pre-positioning and on going deployment of Navy assets based on a spatial analysis of the overlap of areas where user selected environmental variables do not exceed threshold values.

The demonstration successfully showed the integration of a variety of data and technologies, including ArcGIS and other ESRI tools, Minnesota Map Server, OPeNDAP, the OGC WxS services as well as a variety of other web services.

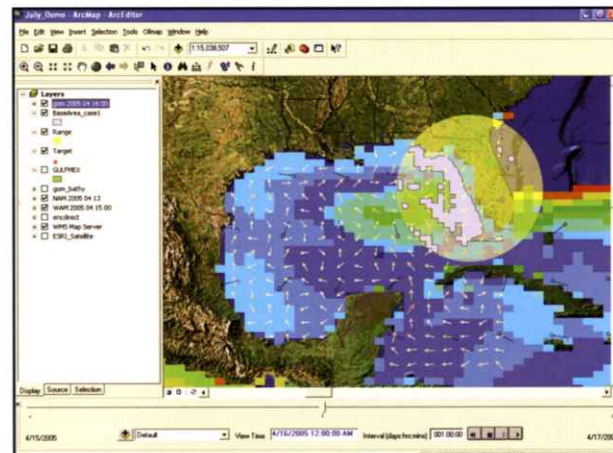
For more information contact Eoin Howlett, ehowlett@appsoci.com.

THE INSIDE STORY

- Waterborne Chemical Dispersion Modeling in HPAC
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Demonstration of the Marine Traffic Controller operational display showing alternative ship's course and computation of expected marine mammal encounters.



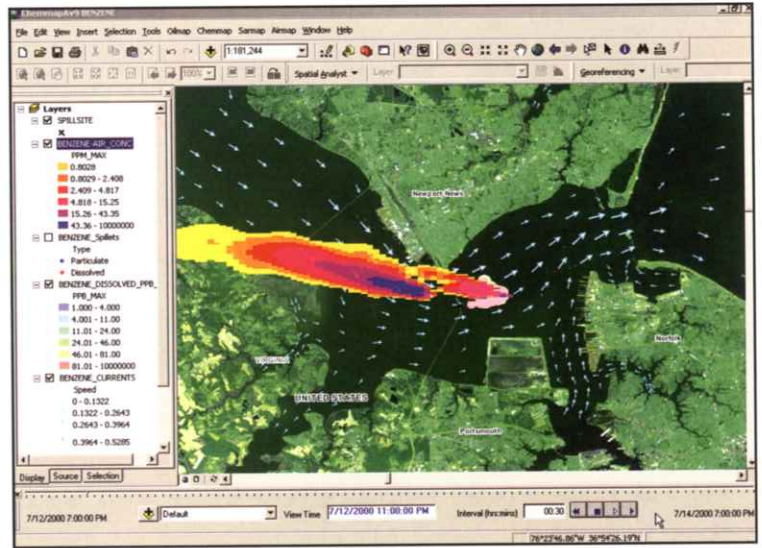
Demonstration of sea basing deployment tool and allowable deployment region. Shaded circular area is the maximum extent of sea basing deployment zone. Current vectors, wind barbs, and color coded gridded wave heights represent forecasted environmental conditions for the Gulf of Mexico. Areas shaded as a light purple represent the allowable deployment region.

PROJECT NEWS

Waterborne Chemical Dispersion Modeling in HPAC

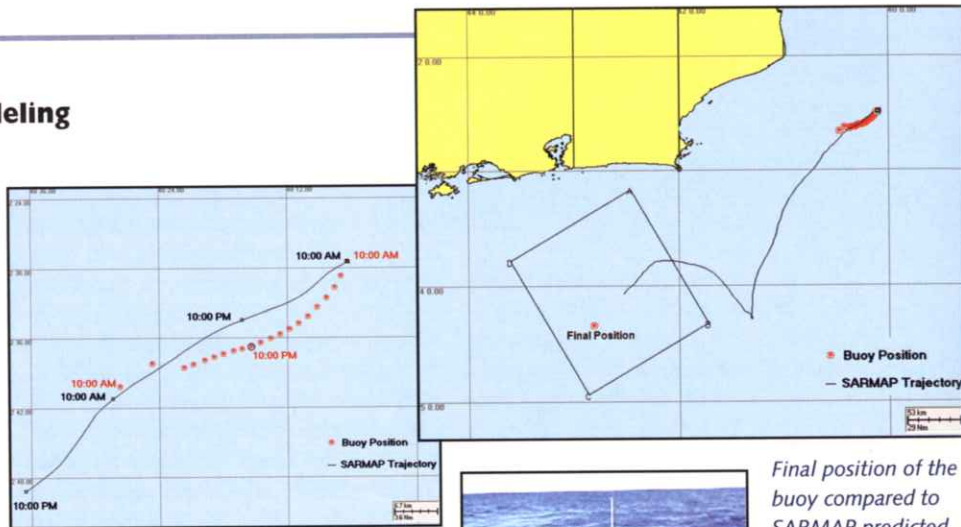
ASA has been awarded a Phase I Small Business Innovative Research (SBIR) contract by the U.S. Defense Threat Reduction Agency (DTRA). The focus of the project is to incorporate ASA's waterborne chemical dispersion modeling capability, available in CHEMMAP, into DTRA's Hazard Prediction and Assessment Capability (HPAC). HPAC predicts the effects of hazardous material releases into the atmosphere and its collateral effects on civilian and military populations. For further information please contact Matthew Ward, mward@appsci.com.

Display of CHEMMAP atmospheric and water concentration output for a hypothetical release of benzene in the James River.



ASA South America Operational Modeling and Forecasting System

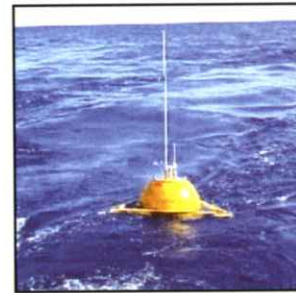
ASA South America has implemented a system to provide support in operational modeling and forecasting for the Brazilian oil company, PETROBRAS. As part of this effort ASA South America used SARMAP to perform search and rescue (SAR) operations for a drift buoy that was lost at sea off the southeastern coast of Brazil. The operational model and forecasting system was utilized to provide accurate and reliable surface current information for SAR planning. Combinations of two hydrodynamic model setups and three atmospheric forecast fields were input to SARMAP to generate six possible drift trajectories that were continuously compared with the buoy's last-known positions. Complications were encountered when the buoy's radio signal was interrupted and a frontal system rapidly approached the area, halting the rescue operations for a day. However, model simulations continued, and registered the shift in the buoy's trajectory induced by vortices in the oceanic currents. The buoy was found and rescued, and the knowledge obtained from the exercise will be used to improve the system. For more information contact Eduardo Yassuda, eyassuda@appsci.com.br.



Buoy positions compared to SARMAP predictions.

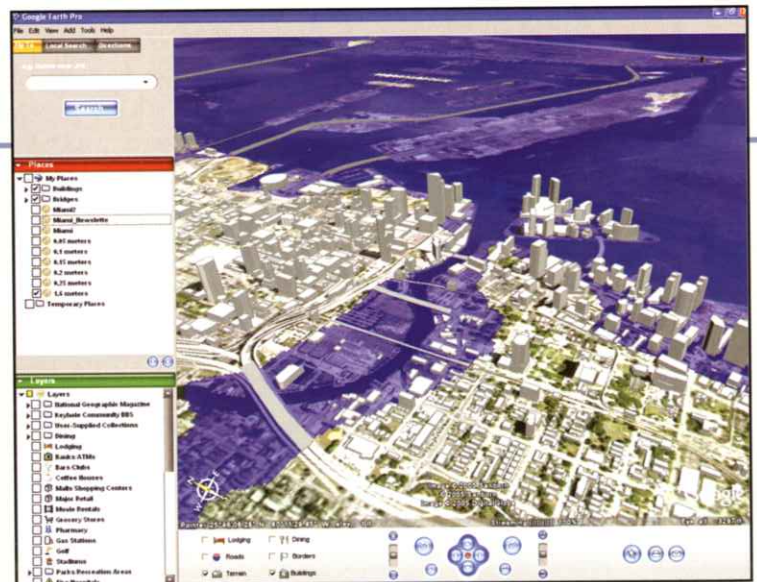
Final position of the buoy compared to SARMAP predicted search area.

Wave rider buoy rescued during SAR operation



ASA Studies Sea Level Rise and Flooding

ASA has been working for the National Environmental Trust to predict flooding for Miami, New York, and Washington DC. The figure to the right represents flooding from a 100 yr storm in 2100 (with 0.6 meters of sea level rise) for Miami. The translucent blue represents land features that would be underwater. At the top of the figure is Miami's South Beach area; almost all of South Beach area could potentially be flooded. The flooding visualization has been animated using tools available with Google Earth Professional (www.earth.google.com). For more information contact Kelly Knee, KKnee@appsci.com



PERSONNEL

Craig Swanson presented results of the recently completed study of Southport Harbor on the Connecticut coast to a regional meeting of TMDL representatives from state and federal agencies at the New England Interstate Water Pollution Control Commission offices in Lowell, MA on 14 June. Along with Harry Zhang of Parsons, Craig discussed running computer models backwards to assist in tracking pollution to its source.

During the week of 15 August, **Nicole Whittier** conducted an ATOM and AIRMAP training course for Alyeska Pipeline in Valdez, AK. The course was held over a three-day period and included hands-on training with ATOM's oil trajectory and fate (surface and 3-D) and atmospheric dispersion models using the link to AIRMAP. Alyeska uses ATOM and AIRMAP in their oil spill response in Prince William Sound, AK.



Craig Swanson participated in the Dredging Operations Subcommittee of the American Society of Civil Engineers Coasts, Oceans, Ports, and Rivers Institute Waterways Committee at the recent Western Dredging Association XXV Technical Conference in New Orleans 20-22 June.

23-25 August **Deborah French McCay** attended the 8th International Marine Environmental Modelling Seminar in Helsinki Finland, where she presented ASA's modeling analysis of the potential impacts of dispersant use entitled: "Use of Probabilistic Trajectory and Impact Modeling to Assess Consequences of Oil Spills with Various Response Strategies".



Craig Swanson presented a paper, "Southport Harbor Hydrodynamic and Pollutant Transport Modeling Study", at the 2005 TMDL conference of the Water Environment Federation 26-29 June in Philadelphia. The paper focused on the use of backward tracking models to estimate source locations.

In September, in the Buenos Aires XVII Half-Marathon, **Eduardo Yassuda** completed the 21.1 km with his best time of 1:51:34.

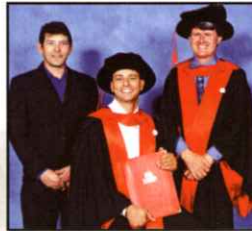
Sasha Zigic provided training to ConocoPhillips Indonesia on 25-26 August, titled "Oil Spill Trajectory and Man-Overboard Tracking". The session provided participants with knowledge and hands on practice predicting the movement of oil on water in ConocoPhillips offshore operating areas. The session also examined how the modelling technique can be used to support other emergency response incidents, such as man-overboard or aircraft down.

Linda Nolan Gagne, ASA's contracting officer, along with her daughter Alexis completed a 2 day, 60km walk through Montreal 27-28 August to raise funds for breast cancer research. The two have raised \$20,000 for the cause through participation in 4 walks. Linda and Alexis were also interviewed by Susan Bell of the CBC (Canadian Broadcasting Company).



Craig Swanson and **Nicole Whittier** participated in a workshop, LNG: The Environmental and Safety Agenda, sponsored by the American Institute of Chemical Engineers and its Canadian counterpart, the CSCHE, in Vancouver, Canada 11-14 September. Craig presented "LNGMAP: A State-of-the-Art, LNG Release, Transport, and Fate Model System for Marine Biota from Construction and Operation of Offshore LNG Facilities". Nicole presented "Potential Effects on Marine Biota from Construction and Operation of Offshore LNG Facilities".

Sasha Zigic was awarded a PhD degree on 16 September by Griffith University after the successful submission of his thesis titled: "A methodology to calculate the time-varying flow through a hydraulic structure connecting two water bodies". ASA staff would like to extend congratulations to Sasha!



From left: Dr Brian King (supervisor, Asia-Pacific ASA), Dr Sasha Zigic (Graduate, Asia-Pacific ASA), Dr Charles Lemckert (supervisor, Griffith University)

Craig Swanson was an invited speaker at the Transportation Research Board 2005 Summer Conference in Boston on 11-12 July. He spoke on LNG Transport Safety and Security and assisted during a tour of Boston Harbor by discussing LNG operations and facilities in the harbor.

On 22 September **Eric Anderson** conducted an OILMAP training course for PESCO in Cairo, Egypt. Eric worked with three of PESCO's personnel, Ayman Naguib, Sameh Samir, and Karim D'Alessandro. The course covered OILMAP capabilities, environmental data, outputs for both Mediterranean and Red Sea coverage, and response and contingency planning.

On 20 September, **Roger Lim**, ASA's representative in Singapore, participated in a CHEMMAP training course conducted by Michael Zelenka from ExxonMobil Biomedical Science for East Asian Response Limited (EARL).



Eric Anderson conducted an OILMAP training course on 24 September for PDO Oman, in Muscat, Oman. PDO uses OILMAP for directing response in the event of a spill from the loading area off Muscat (all of Oman's oil is exported through three single point moorings off Muscat) and for mystery spills.

Sasha Zigic and **Eric Anderson** presented at the International Chemical and Oil Pollution Conference and Exhibition (ICOPE), 29 September, Singapore. Sasha presented "Lytton pipeline oil spill, Brisbane Australia, March 2003", co-authored by **Brian King** and Stephen Victory (Queensland EPA). The paper outlined the nature of the oil spill incident and the use of OILMAP to quantify the "potential environmental harm" under various wind and tidal conditions to provide measures of whether the environmental harm could have been more wide spread, if the conditions were different on the day. Eric presented his paper on CMS Training system for TSA Port Security Training Program.

In a joint effort with Martin Rutherford from the Royal Australian Navy, **Eoin Howlett** presented a paper at the JCOMM-II Scientific Conference in Halifax, Canada, "Operational Oceanography and Marine Meteorology for the 21st century". The presentation discussed the use of COASTMAP to integrate meteorological and oceanographic data with GIS.

Brian King, from the Asia-Pacific ASA office, assisted Dibbs Barker Gosling Lawyers and the Sydney Ports Corporation in a court case by providing two methods for quantifying the amount of oil spilled from a ship within Botany Bay Australia. The court accepted the two methodologies. This now provides a reference case for fuel oil spills involving two independent methodologies. Details on the court case can be found at <http://www.austlii.edu.au/au/cases/nsw/NSWLEC/2005/159.html>.

April Leigh Rowe was born to ASA's **Jill Rowe** and her husband Greg on 26 August. Mom, Dad and Baby are doing wonderfully!



Our warm congratulations to Kelly Knee who married Rob Daly on 12 August in Narragansett, RI. The couple honeymooned in Vancouver, Canada.



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New Faces

Ann Borowik has joined ASA as a GIS Analyst. Ann received her BA in Environmental Studies in 2003 from Gettysburg College and spent the last few years supporting NOAA's GIS needs in Washington, DC. At ASA, Ann will be working with various GIS and web-based informational products.

Nidhi Bansal has joined ASA as a Programmer. Nidhi is originally from India and came to the U.S. in 2003 to pursue her Masters in Computer Science from the University of Rhode Island (URI). While at URI she worked as a research assistant for an ongoing GIS project and as a teaching assistant for Java classes. Nidhi's specialty is web-based and database technology.

Jacqueline Daly is ASA's new office manager. Jacqueline comes to us from Blue Cross & Blue Shield's office in Providence, Rhode Island.



From left to right: Nidhi, Jacqueline, Ann.

Upcoming Conferences

Ana Carolina Lammardo and **Mauricio Lammardo** will be presenting at the 3rd Research and Development Congress in Oil and Gas, in Salvador (Bahia), Brazil on 2-5 October. The congress is being organized by IBP, the Brazilian Institute of Petroleum. Ana Carolina will present *Drill cuttings and mud discharge modeling as a tool to support Environmental Impact Studies for drill activities in the sea* and Mauricio will present a poster about *Numeric modeling as a tool to support Environmental Impact Studies for outfalls discharges*.

Nicole Whittier will be presenting at the American Institute of Chemical Engineers Annual Meeting in Cincinnati, OH from 31 October to 4 November. The paper, coauthored by **Deborah French McCay**, is entitled *Evaluation of Drinking Water Contaminants Using Modeling*. Nicole will be presenting on Monday 31 October, at 0930.

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The 9th International Conference on Estuarine and Coastal Modeling (ECM9) will be held from 31 October to 2 November in Charleston, SC. The meeting will feature the presentation of 120 papers covering the breadth of estuarine and coastal modeling. The conference program, paper abstracts, and registration information can be found at the conference web site www.oce.uri.edu/ecm9. **Tatsu Isaji**, **Malcolm Spaulding**, **Craig Swanson**, **Sankar Subbayya**, and **Matt Ward** will be presenting at the conference.

Craig Swanson was lead author of a paper with Kelly Streich of Connecticut Department of Environmental Protection, Mary Garren of US Environmental Protection Agency and Harry Zhang of Parsons to be presented at the upcoming Water Environment Federation annual technical exhibition and conference, WEFTEC05, in Washington, DC from 29 October to 2 November. Harry will be presenting the paper, *Locating Potential Bacterial Sources Using a Computer Modeling Approach*, on Wednesday, 2 November, at 1100.



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