

Interspill 2015 – Amsterdam, March 2015
Conference Stream: Emerging Technologies and Strategies

GIS, Spill Models, and Metocean Data Services Converge to Support the Common Operational Platform Requirements and Improve Oil Spill Trajectory Forecasting

Andrew Menton, Eric Comerma (** Presenter*), Nicole Whittier Mulanaphy
RPS ASA
55 Village Square Drive
South Kingstown, RI 02879, USA
Tel: +1 401 789 6224
Fax: +1 401 789 1932

Andrew Menton AMenton@asascience.com
Eric Comerma ecomerma@asascience.com

Abstract:

New technologies, including mobile devices, public GIS sites such as ArcGIS Online and the dramatic increase in accessibility of ocean data, are changing the way oil spill responders can leverage Common Operational Platform (COP) tools to integrate and disseminate a wide variety of data for decision makers. OILMAP has been used as an advanced oil spill modeling system by industry and governments for over 20 years. The latest generation of OILMAP tools includes mobile and tablet accessibility, the use of web services to publish results to ArcGIS Online, and direct access to global metocean information via the Environmental Data Server (EDS) to support deterministic and ensemble spill trajectory modeling. EDS can also provide environmental data such as ice coverage, wave height, water temperature and others to bring better situational awareness to the way we prepare and react to oil spills. As industry standards evolve it is important to implement best practices and standards as defined by international and regional groups like the OGP. As a community, it is essential that we bring the best technologies and 'on-demand' data services to decision makers so that we have accurate and prompt information for operational response.

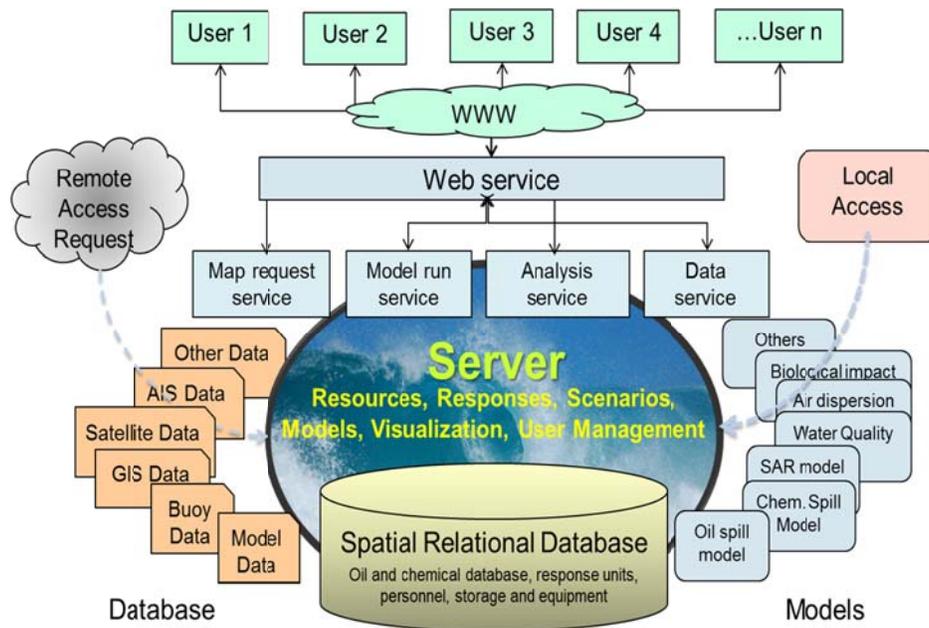
Background – Defining a Common Operational Picture (COP)

In the event of an oil spill the gathering of vital response information and the executing of response plans are the foremost activities. The concept of a Response COP is a vital resource that is used during oil spill response. The necessity for a centralized data management system that would include response resources, GIS data management, metocean data visualization with integrated decisions tools was prevalent. Also, with increased access to multiple data types, a platform for effectively displaying, integrating and managing these datasets simultaneously was needed. The advent of advanced web based technologies has facilitated the transition to web based COP platforms allowing for collaborative response, increased data access and information sharing.

The RPS ASA COP Platform provides a system to efficiently manage a wide range of dataset and helps the decision making process during emergency response. By including response options in the modeling tools it facilitates reducing the incident potential impact.

RPS ASA Solution: OceansMap

OceansMap, developed by RPS ASA, is a web-based GIS mapping system that includes GIS data management, met ocean data visualization and customized user data integration. Additionally, OceansMap integrates RPS ASA's suite of modeling components that includes OILMAPWeb, CHEMMAPWeb and SARMAPWeb. OceansMap has been implemented operationally for different users and its modularity facilitates its flexibility and adaptability to client's needs.



RPS ASA's OceansMap system architecture

OILMAPWeb provides oil spill rapid predictions in response situations allowing for fast decision making with a variety of integrated data sources such as local weather data, GIS resources, response strategies and vessel traffic information (AIS). Met Ocean data visualization is provided through the RPS ASA Environmental Data Server (EDS). The EDS collects and disseminates many different environmental data products from public and private sources, and allows users to simply specify the

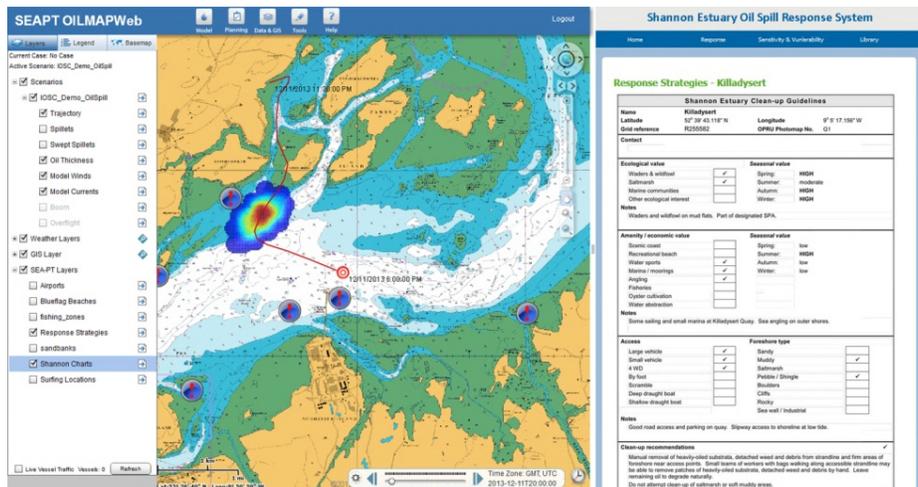
region and time of interest, receiving as a result the corresponding metocean data subset. This 24/7 on-line data service allows for example the user to obtain wind and currents historic or forecast data for the area of interest and for a particular time range. This data is then visualized within OceansMap and is used to provide rapid predictions of spill trajectory. OceansMap can also share spill trajectory information through mobile devices and tablets which supports faster response in the field and improves decision making.

The system is presented as a web application using browser/server architecture. The integrated components include GIS enabled Flex user graphic interface, spatial relational database powered by POSTGRES/POSTGIS, and ASA model services. The system is hosted by RPS ASA's map server but it has been also hosted within client's IT infrastructures.

Below are presented some successful applications of OceansMap: the Shannon Estuary Anti-Pollution Team Response System (SEA-PT Ireland), The Yangtze River Estuary Response System (China), and ADNOC OceansMap (UAE) are recent examples of RPS ASA's web based COP framework with implementations customized to client specifications.

SEA-PT Response System - Ireland

The SEA-PT Response System was developed for The Shannon Estuary Anti-Pollution Team. This group of local stakeholders is responsible for the environmental management of the Shannon Estuary and the protection of its natural resources. The system was developed to present all information necessary to carry out this task. The system includes the web versions of RPS ASA modeling systems, OILMAP and CHEMMAP that enables rapid predictions for spill trajectory and fates along with an extensive suite of GIS data, local met ocean data, Nautical charts, local WMS basemap visualization and a multimedia reference library.



SEA-PT Response System

Yangtze River Estuary Response System - China

The Yangtze River estuary is one of the busiest shipping corridors in the world connecting China to the world and coast to inner China. In the middle of the Yangtze River estuary, there is a Qing Cao Sha reservoir providing drinking water to more than 10 million people in Shanghai. Frequent spills near the estuary imply a great threat to drinking water safety to the megacity. Scientists in RPS ASA

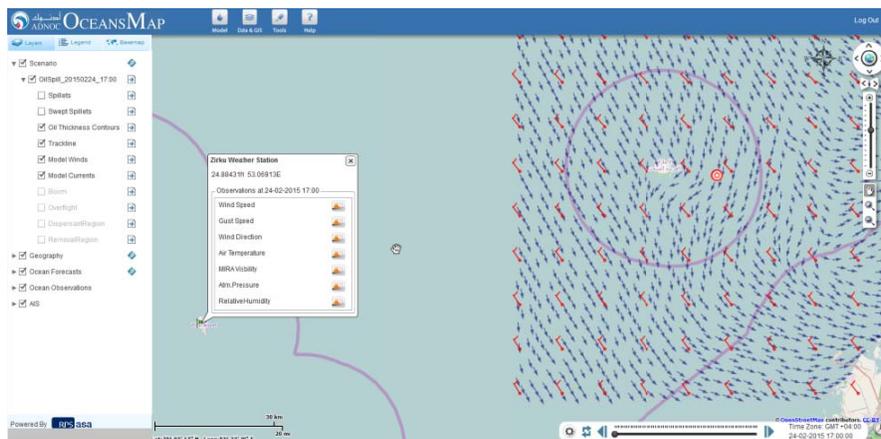
and SAES developed an online spill simulation and response management system for the Yangtze River Estuary. The online system integrates oil/chemical spill models, operational hydrodynamic model, online met-ocean data, response and resource database with an interactive mapping system. It has been successfully used to simulate the spill trajectory and fate of the spill to coordinate with spill response team.



Yangtze River Estuary Response System

ADNOC OceansMap - UAE

Developed for the Abu Dhabi National Oil Company this system was designed to incorporate a variety of local data with OILMAPWeb and SARMAPWeb. The system integrates weather data from local weather stations. It also presents near real time and historical AIS data as well as GIS resources. The system acts as a response data repository for ADNOC improving data management and response procedures.



ADNOC OceansMap

COP Integration:

As data availability increases and the offered platforms for managing those products expands it is vital to develop a suite of services that can be integrated in multiple COP platforms. OILMAP is integrated within numerous online platforms around the world. ESRI’s ArgGIS Online, Mariner’s CommandBridge, and TerraBase are a couple recent examples that provide access to oil spill trajectories within seconds of an incident.

ESRI’s ArcGIS Online

OILMAP for ArcGIS Online is the web-based version of OILMAP Desktop fit for the Common Operational Platform. OILMAP for AGOL is a user friendly modeling system suitable for use in marine emergency response and pollution control. It includes simple graphical procedures for entering input data such as wind and currents in the area of interest, and the information about the spill / emergency scenario. Users can share, access and manage oil spill scenario and add other spatial GIS data layers to the map based on the ArcGIS Online Platform. Each user is able to run scenarios and collaborate through online information sharing. All data and files are stored on the ArcGIS Online servers and accessible only to users granted permission to use the system. Various permissions are also available to AGOL users based on the administrator’s configurations. Access to the web maps can also be leveraged on mobile devices using the ArcGIS Mobile Apps.

Mariner’s CommandBridge

OILMAP is integrated within the Mariner’s CommandBridge to provide oil spill trajectories within seconds of an incident. The integration is designed for the zero hour response, allowing novice users the ability to determine the immediate path the spilled oil may travel. Mariner’s CommandBridge platform assimilates sensor feeds, such as AIS, cameras, radar, sonar, access control and alarm systems in an easy to use fashion allowing command center personnel, intelligence analysts, and others to quickly interpret information, collaborate, and make actionable recommendations.



Mariner’s CommandBridge

TerraBase

Terrabase is a database application designed for environmental professionals and managers who need to assess and manage chemical, geological and spatial data at one or more sites. Connection to the OILMAP Web Service Suite adds additional tools for chemical and oil based contamination control for decisions makers. With both historical and real-time data, Terrabase provides one platform for both day-to-day operational data management as well as emergency response capabilities.

