Oil Spill Research and Oil Spill Modeling

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Environmental Studies Program

- Develops and oversees applied scientific studies required for making responsible decisions for managing energy and marine mineral resources on the U.S. Outer Continental Shelf
Oil Spill Research Programs
Ohmsett: Oil Spill Response and Renewable Energy Facility

667 feet long
65 feet wide
8 feet deep

2.6 million gallons of water

Tow bridge speeds 6.5 knots max.
Types of Activities at Ohmsett

- Testing response equipment and oil spill clean up technology
- Training in oil spill response technology (English and Spanish classes)
- Testing renewable energy wave equipment
- Develop testing protocol
Development of a Portable Aerial Thickness Sensor

Objective: Develop a portable aerial sensor to map the thickness & distribution of spilled oil.
Three Options for Oil Spill Response For Arctic Environments

- Mechanical Containment and Recovery
- In Situ Burning of Oil
- Chemical Dispersants
Remote Detection of Oil in and Under Ice

November 2004 - Successful test program with ground penetrating radar detecting crude oil under 40 cm ice in CRREL test tank

April 2005 - Successful Prudhoe Bay, AK radar trials in 2 meters ice, -20°C (April 2005) - no oil

March 2006 – Intentional oil spill at Spitsbergen, Norway to test airborne ground penetrating radar, ethane flux, and acoustics (3,500 liters of crude oil were used)

Phase 2 Funding Partners (8) MMS, ADEC, ACS, Statoil, Shell Technology, ConocoPhillips Canada, ExxonMobil, Store Norske Spitsbergen Kulkompani
Physical Oceanography and Meteorology Studies
Fate and Effects Studies of Oil Spills
Ocean Circulation Modeling
Remote Sensing of Ocean Properties
Princeton Ocean Model sub-domain
Oil Spill Modeling Program

- Bureau-wide Modeling of hypothetical Oil Spills: the OSRA model
- Uses the results of Physical Oceanography and Meteorology Studies and Ocean Circulation Modeling
Oils and Floating Chemicals

Wind

Volatilization

Dispersant

Turbulent Dispersion and Dissolution

Current Transport

Entrainment

Adsorption and Adherence to Particulates

Sediment Surface

Water Surface

Sedimentation

Sheens

Resurfacing

Current Transport

Oils and Floating Chemicals
OSRA Process

- Spill Launch Areas
- Winds and Ocean Currents
- Trajectory Estimation
- Environmental Resources
- Conditional Probabilities
- Combined Probabilities
- Historical Spill Rates
- Estimated Spill Rates
- Oil Volume Estimates
Gulf of Mexico
County Land Segments

County Boundary Land Segments
Gulf of Mexico
Environmental Resources

- Flower Gardens
- Big Bend Seagrass Beds
- Florida Middle Grounds
Gulf of Mexico
Environmental Resources

Sargassum
Gulf of Mexico
Example
OSRA Trajectories

1993, 10 days travel time
OSRA Trajectory Probabilities

1993, 10 day travel time
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