Oil Spill Modeling: Response Modeling

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Mission:

The response modeling subgroup mission is to synthesize the present requirements, capabilities and gaps for effectively implementing models in oil spill incidents.

Background

Oil spill response modeling may be utilized as the basis to respond to numerous questions during a spill response. The modeling outputs may be utilized to predict the trajectory or path and future location of the oil slick. This information is also valuable in determining whether there are particular habitats or species that may be at risk from oil exposure or contamination. The modeling may be utilized to estimate oil weathering, the physical changes that result when oil is released into the environment. These are typically parameters that are not easily measured and include: spreading, evaporation, dissolution, and entrainment. Response modeling may be utilized to inform responders, stakeholders, and the public about the location of the oil slick. Response modeling may also be utilized to evaluate the performance of various response alternatives such as mechanical equipment and dispersant application. Since this can be performed at the initial stages of a spill and provides quantitative insights into the likely success of the response, the analysis can be used as the basis to acquire additional or alternative response equipment. Understanding user needs, balancing evolving technologies with realistic response capabilities, ensuring data access and integrating forecasts and analysis into operations are all areas for consideration in the response modeling subgroup.

- What is needed from the response modeler?
  - Trajectory and timetable predictions
  - Weathering estimates
  - Response performance analysis
  - Visual outputs and maps
  - Mass balance
  - Expected exposures/species effect

- What does the modeler need?
  - Environmental and Scenario Data
    - Observed distributions (visual, measured, remotely sensed)
    - Release location(s) and characteristics
    - Meteorology (climatology, observations, forecasts)
    - Oceanography/Hydrology (modeled/observed)
    - Location(s) of sensitive habitats and species – Local or internationally recognized in digital format
    - Unique environmental issues (ice types/distribution (historical, observed, forecast), submerged oil distribution (observed, forecast, bottom type, oil/bottom interaction, etc.)
  - Oil data
    - Oil type(s)
    - Oil volume (s)
    - Spill duration

- Response equipment
  - Type and quantity
  - Performance specifications
  - Efficiency
  - Location relative to slick
  - Travel speed
  - Storage volume and ability to decant
  - Swath width
  - Response speed
  - Performance limits (wave heights, darkness, etc.)

- Modeler Integration
  - Who does the information go to? (UC/IC, FOSC, Team Leads, etc.)
- Formats/Distribution (hardcopy, shape files, kmz, WMS, pictures, movies, web-distributed, etc.)Feedback needed from other response parties
  - Oil type
  - Oil volume
  - Recovered volumes
  - Dispersant details
  - Overflight feedback
  - Resource information

Areas of overlap of missions between subgroups

The response modeling subgroup links to all three other groups, the effective use of modeling in a response is the ultimate goal. Particular areas of overlap include:

1. Fate and Transport – availability and standards for data access, needed time/length scales of met/ocean data, non-transport modeling needs (i.e., wave or water level forecasts for salvage operations)
2. Oil Fate – how oil is represented as components, cleanup technologies interaction with f&t and representation to end user
3. Biology – biological metadata, integrating resources with fate and transport forecasts