BOEM and the Bureau of Safety and Environmental Enforcement (BSEE) Pacific Region conduct oil spill risk analyses to determine potential impacts to environmental resources. Oil spill trajectory modeling is conducted to predict the movement and fate of spilled oil, as a precaution in case of a spill, from existing offshore oil and gas operations in southern California. To improve BOEM and BSEE Pacific Region’s ability to conduct oil spill risk analyses for southern California, BOEM partnered with UCLA to run a multi-year hindcast (re-analysis) of winds, waves, and currents along the coast of California. BOEM is subsequently partnering with NOAA, to utilize the surface currents and winds from UCLA’s Regional Ocean Modeling System (ROMS) hindcast analysis with NOAA’s General NOAA Operational Modeling Environment (GNOME) to produce multiple trajectories for NOAA’s Trajectory Analysis Planner (TAP). Using realistic oil spill scenarios over a range of different regional oceanographic regimes (such as upwelling, relaxation, and eddy-driven flow), TAP will calculate the probabilities of oil contacting parcels of water and shoreline were any oil to spill from southern California oil platforms. This will enable analysts to understand where an oil spill may travel, how long it could take to get there, and the likelihood of spilled oil contacting their resource area.

**Objectives**

- Create a 10-year hindcast of winds, currents, and waves using ROMS, WRF (Weather Research & Forecasting), and SWAN (Simulating Waves Nearshore) models.
- Utilize these hindcast data in oil spill models.
- Pilot a three-dimensional (3-D) GNOME at one platform location offshore southern California.
- Ascertain potential environmental impacts on the marine and coastal environments of the outer continental shelf through hypothetical oil spills from ongoing operations.

**Methods**

- **10 Year Hindcast**
  - 1 km ROMS hindcast for 10 year period (2004–2013)
  - Surface winds calculated at high horizontal and temporal resolution and validated using existing datasets
  - Wave model forced by the wind model results and validated through in situ measurements
  - Ocean model run at high resolution and including temperature, salinity, and currents; it assimilated in situ data and was forced by the hindcast atmospheric model results

- **Oil Spill Modeling**
  - 23 start sites
  - Each start site will have it’s own set of oil properties for the oil fate computations
  - Approximately 500 independent spills from each start site
  - 5–72 hours continuous release
  - 2–3 week model simulation
  - 4–5 km grid resolution of the oil spill model ( GNOME & TAP)
  - 1 km winds and currents ingested into oil spill models

**Results**

- ROMS Model Domain: South of Monterey Bay to the United States/Mexico Border

**Model Domain**

- 1 km grid resolution of surface currents around the Channel Islands, Santa Barbara Channel

**References**


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