

Plume modelling with OSCAR/Plume3D

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When a subsurface blowout happens, oil and gas under pressure is released near the sea bed and an intense mixing between oil, gas and ambient water occurs, causing the formation of oil droplets and gas bubbles. The oil and gas release will generate a rising plume of entrained water driven by the buoyancy of the dispersed gas bubbles and oil droplets. With the OSCAR/Plume3D model, blowouts can be simulated for analysis and planning purposes.

Key features include:

- **Multi-phase model**
 - Water (formation water and sea water)
 - Oil (dispersed droplets)
 - Natural gas
 - Free gas (bubbles)
 - Gas dissolved in sea water
- **Simulation input**
 - Discharge data
 - Outlet depth
 - Flow rate
 - Outlet diameter
 - Gas-to-oil ratio (GOR)
 - Outlet temperature
 - Environmental conditions
 - Vertical profiles for sea temperature and salinity
- **Simulation output**
 - Plume profiling
 - Trajectory, dimensions, velocity
 - Plume rise time
 - Mass balance
 - Separated gas (bubbles)
 - Dissolved gas
 - Remaining gas
 - Plume strength
 - Surface velocities in the radial outflow
 - Explosion risk analysis based on LEL computations
 - “Fountain height” (water elevation profile)

Typical applications:

- Safety analysis
- Contingency planning

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