

# Metocean Analysis & Assessment

Metocean analysis refers to the design estimation and prediction of meteorological and physical oceanographic conditions. The analyses are essential for risk minimalization and economical design of marine facilities, from initial concept feasibility, to final detailed design, and to on-going operations. Using historical metocean databases, specialized numerical modeling and statistical analysis, metocean tools and service advisors can enable the optimal design of vessels, subsea infrastructure, offshore structures, and coastal facilities from the deep ocean to nearshore.

For near-field conditions to be correctly analyzed, accurate hydrodynamic modeling integrated with metocean modeling is essential.

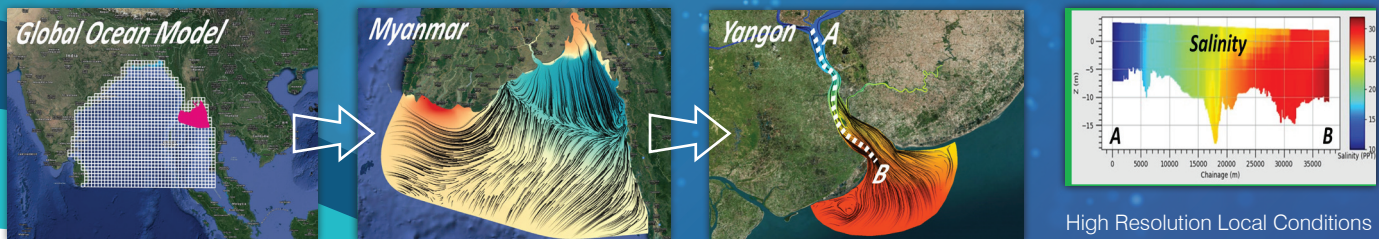
TUFLOW offers advanced near-field numerical modeling tools that can be embedded within metocean modeling, providing outputs that directly integrate with your project. The analyses can range from simple tidal current statistical assessments to offshore pipeline operations to complex oceanographic studies supporting feasibility, detailed engineering and vessel manoeuvrability assessment during site selection, development, and operation of a port.

As researchers, scientists and engineers we work in a range of industries that solve complex environmental problems. Our assessments span scales from the molecular, to the global, from the instantaneous to the inter-decadal. Our projects require flexible, accurate, fast and powerful tools backed up by research, benchmarking and support.

# High resolution analysis of local hydrodynamics driven by global datasets

## TUFLOW Feature Focus

- Nesting of high resolution TUFLOW 2D/3D hydrodynamic models into global hindcast meteorological/climatological datasets, wave models and oceanographic circulation current/density/sea surface anomaly datasets such as HYCOM, WAVEWATCH III and CFSR.
- TUFLOW's flexible mesh solution enables refined high-resolution assessment where desired without compromising accuracy or simulation speed.
- Freedom to use either a 2D and/or 3D solution. Use 2D in the nearshore when a depth averaged solution is appropriate or move to 3D where density stratification or counter currents play a significant role.
- Couple hydraulics with advanced Advection Dispersion (AD), Sediment Transport (ST) and Particle Tracking (PT) features.
- Achieve supercomputer simulation speed from your desktop using GPU acceleration.
- Integrate spectral wave modeling and hydrodynamics with TUFLOW's external dynamic wave coupling.



High Resolution Local Conditions  
Driven by Regional and Global Datasets

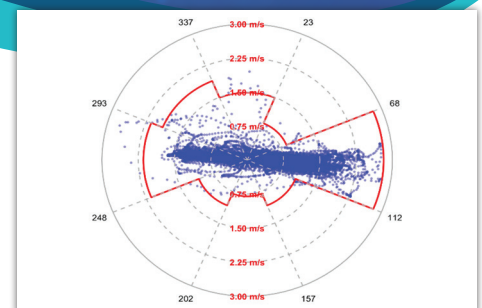
TUFLOW's 2D and 3D flexible mesh solver has a proven track record in the high-resolution analysis of local hydrodynamics driven by regional metocean forcing. It has been successfully applied, validated, and calibrated for applications around the globe.

- Investigate complex interactions of ocean currents, tides, waves, winds, atmospheric pressure, and local bathymetry effects.
- Study 3D current fields in high resolution in your specific area of interest.
- Assess ambient and extreme conditions.
- Consider the halocline and associated forces resulting from solitons in your deep-water analysis.
- Model complex vortex shedding current behavior due to broadscale meteorological and astronomical influences interacting with local bathymetry.
- Model ocean upwelling events associated with the Ekman effect by modeling in 3D.

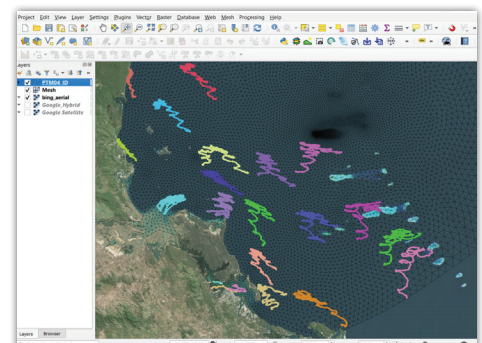
TUFLOW software is developed with three primary goals in mind: accuracy, simulation speed and useability. TUFLOW hydraulic modeling software is uniquely integrated with numerous GIS and GUI software such as ArcGIS, QGIS, SMS and Blue Kenue. Develop models and view results in your choice of development environment. These complimentary GIS and GUI software are supported by program specific plugins and free Matlab and Python script toolboxes to increase model build productivity, 2D and 3D result visualization and analysis, and reporting efficiency. TUFLOW is the complete package for coastal assessment applications.

For more information:

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Cyclonic Extreme Current Analysis



Vessel Drift Particle Tracking