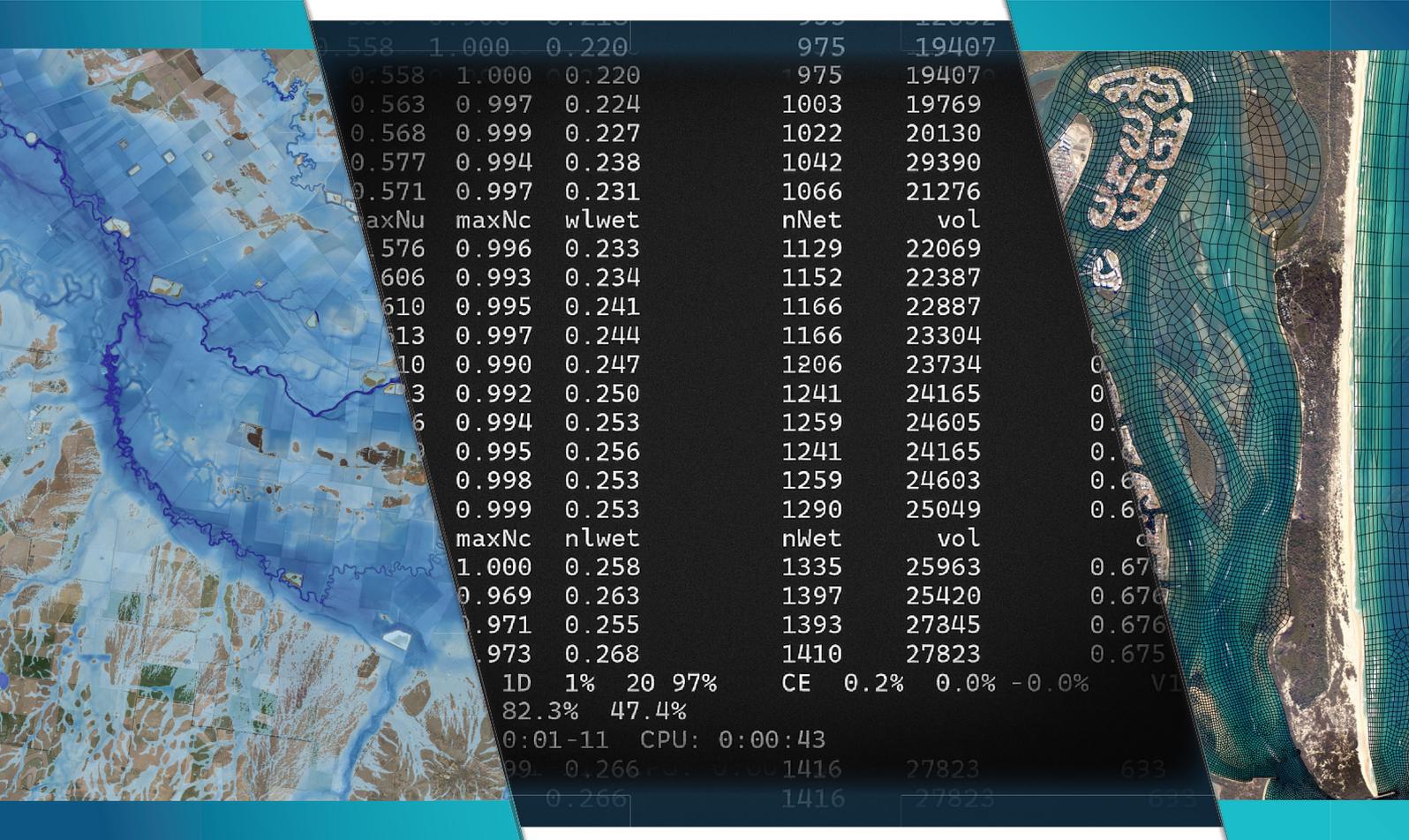
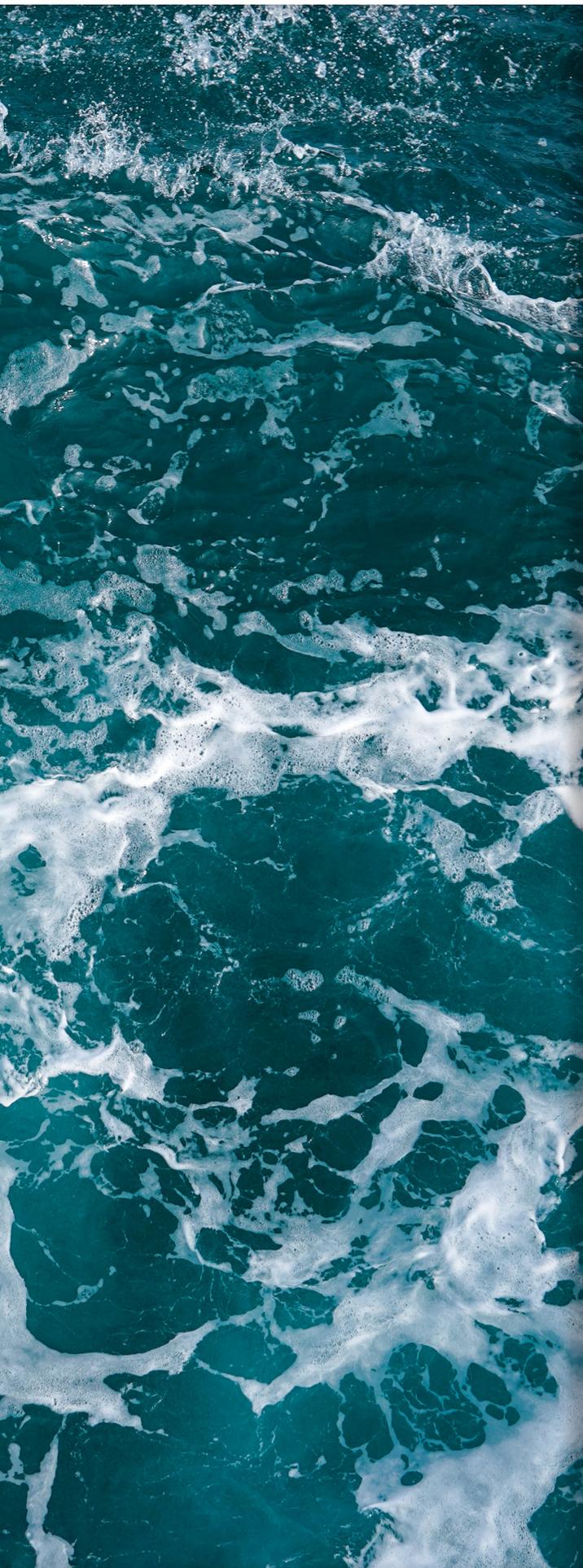


Catchment, Flood, Urban Stormwater, Coastal and Offshore Ocean Simulation Software





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OVERVIEW

— ABOUT TUFLOW

TUFLOW is a comprehensive hydrodynamic modelling software suite. Since the 1970s, TUFLOW has been at the forefront of the water modelling industry, beginning with the development of its pioneering 1D engine. Over the decades since inception TUFLOW has been continuously enhanced, achieving numerous world firsts along the way. Today, TUFLOW stands as one of the most accurate, high-performance, and feature-rich hydrodynamic modelling suites available. It empowers users to:

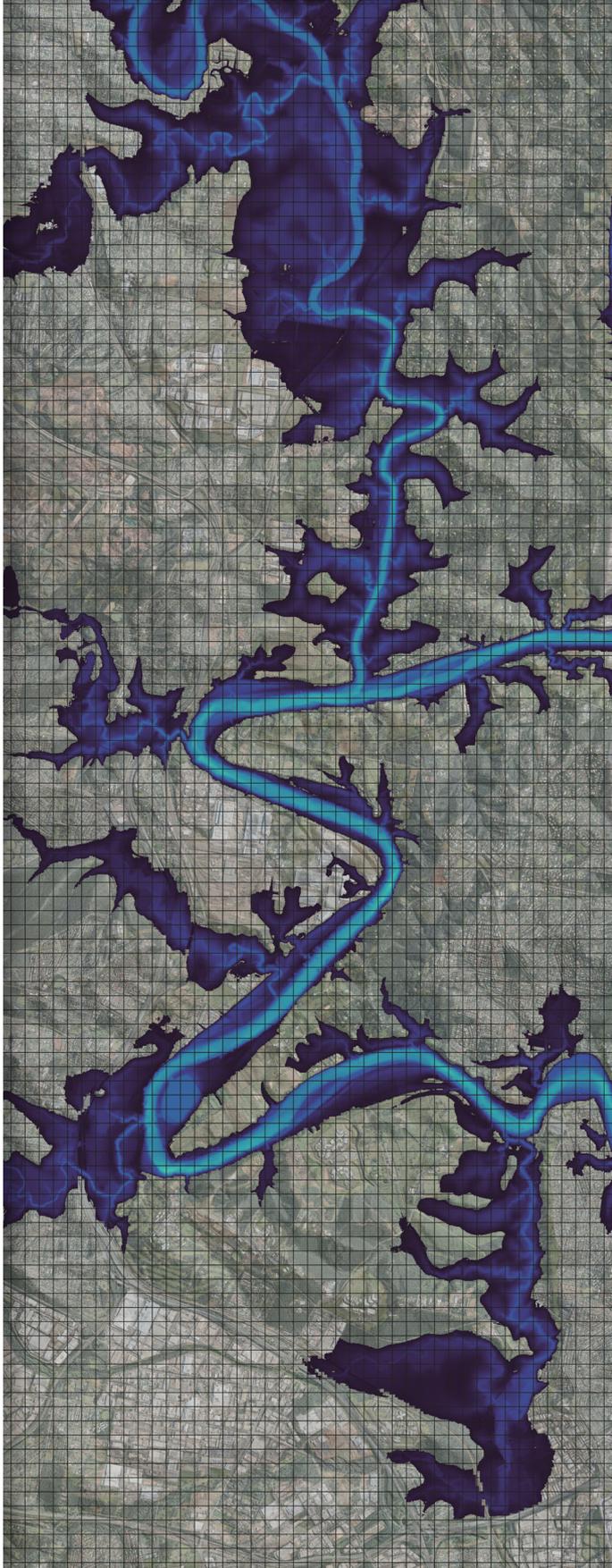
- Simulate one, two and three-dimensional processes.
- Conduct detailed and integrated assessments across catchments, floodplains, urban stormwater systems, lakes, rivers, estuaries, and coastal environments.
- Enhance hydrodynamic simulations with add-on modules for broader environmental analysis, including sediment transport and water quality.
- Leverage cutting-edge GPU computing technology to accelerate simulations by up to 100 times compared to traditional CPU processing.



TUFLOW offers unmatched working environment / user interface flexibility. Its integration with multiple Geographic Information Systems (GIS) and Graphical User Interfaces (GUI) allows users to work within familiar environments, ensuring a seamless and efficient modelling experience.

Product Use Cases

TUFLOW offers two product branches, and a module that facilitates linkage between both:



— Fixed Grid Modelling (TUFLOW Classic/HPC)

- Flood Hydraulics
- Infrastructure Flood Impact Assessment
- Flood Risk Management
- Flood Disaster Emergency Response
- Flood Forecasting
- Levee or Dam Failure Flood Hazard
- Urban Stormwater Drainage
- Urban Development Assessment
- Water Supply and Tailings Dam Failure Hazard
- Groundwater Recharge, Storage and Surface Discharge

— TUFLOW CATCH Module

- Automates boundary condition information transfer between TUFLOW HPC and TUFLOW FV for fully integrated catchment and 3D receiving water modelling.
- Functions as a central simulation coordination platform for dynamically linked TUFLOW HPC to TUFLOW FV simulations.
- Enables constituent (e.g. sediment, nutrients, pollutants, pathogens) generation, transport and intervention / mitigation features in TUFLOW HPC.

Flexible Mesh Modelling (TUFLOW FV)

- Coastal Infrastructure Design, Offshore Energy and Ports
- Storm Tide, Tsunami and Metocean
- Estuary and Wetland Restoration and Management
- Environmental Impact Assessment
- Dredging and Navigation
- Coastal and Estuarine Sediment Transport
- River Sediment Transport, Morphology and Bed Scour
- Coastal and Estuarine Water Quality and Outfalls
- Operational Structures and Flow Control
- Freshwater Lake/Reservoir Water Quality Management
- Salvage, Search and Rescue Analysis



Hydraulic Engines



Fixed Grid Modelling – TUFLOW Classic and HPC

Floods, storms, dam failures, and coastal surges can cause devastating damage and disruption. Understanding and managing these risks requires software that delivers fast, accurate simulations of riverine, urban stormwater, and floodplain inundation. TUFLOW's fixed grid software, TUFLOW Classic and HPC have been designed for this purpose.

TUFLOW is a versatile modelling platform that has been continuously enhanced, based on users' needs, since the 1990s. Key features of the fixed grid software are:

Choice of Solver Technology



2D Shallow Water

Equations: Choose between the finite difference solver (Classic – CPU) or the more-modern finite volume solver (HPC – GPU), both delivering industry-leading accuracy and speed.



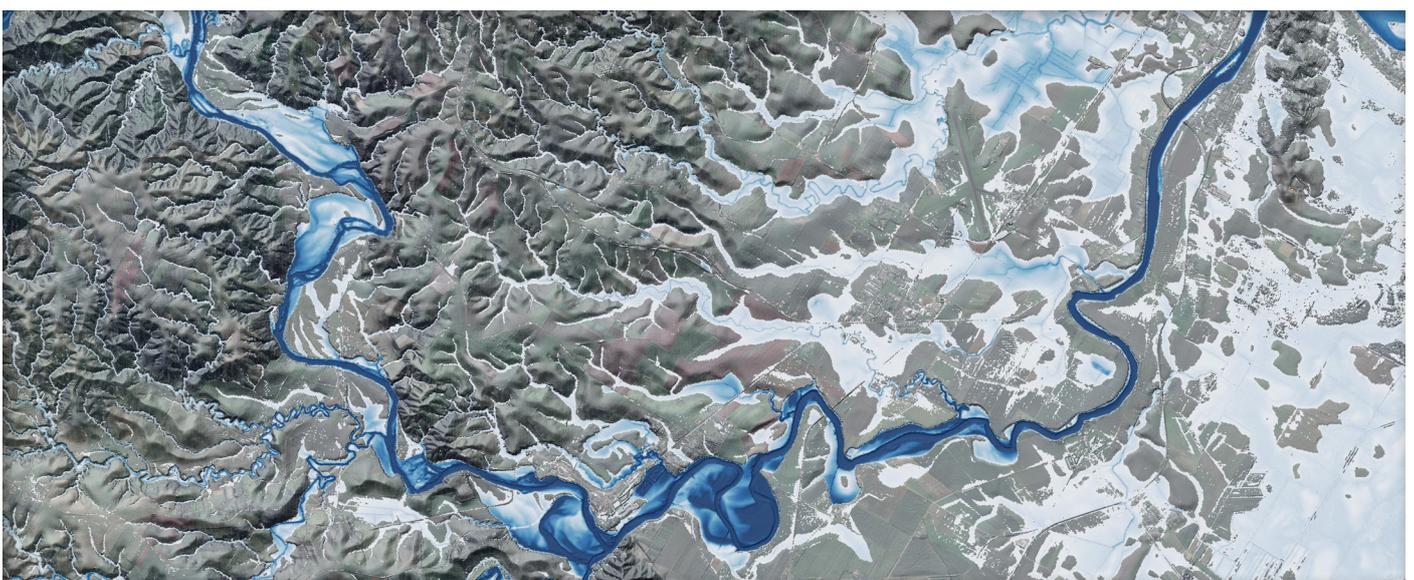
1D Solutions: Model

stormwater networks and channels using ESTRY (TUFLOW developed since 1972) or EPA SWMM.



Advanced Tailings Flow

Dynamics: Simulate non-Newtonian and dynamic mixing of water/non-Newtonian flows.



Exceptional Accuracy and Speed - TUFLOW achieves high fidelity results at larger cell sizes, reducing simulation time without compromising precision. Key innovations include:

- ✓ Higher-order solvers that fully resolve all terms in the shallow water equations
- ✓ Automatic handling of supercritical, subcritical, and weir flow transitions
- ✓ Industry-best 1D/2D linking for seamless hydraulic connectivity
- ✓ Sub-Grid Sampled (SGS) topography and advanced turbulence modelling



Designed for Workflow Efficiency - TUFLOW's architecture is built for productivity:

- ✓ Model inputs are independent of grid size, extent, and orientation
- ✓ Layered GIS data structure avoids duplication across models
- ✓ Manage multiple events and scenarios from a single control file
- ✓ Integrates smoothly with GIS platforms and third-party GUIs

Packed with Powerful Features

- ✓ In-built topography editing tools - no need for external CAD software
- ✓ Comprehensive support for hydraulic structures in 1D and 2D
- ✓ Extensive output options for detailed flood hazard and risk analysis
- ✓ Complete underground stormwater infrastructure geometry, including circular, rectangular (box), irregular- shaped and SWMM standard culverts; a wide range of inlet options and advance dynamic junction/manhole loss treatment.
- ✓ Flow management options such as weirs, spillways, pumps, radial and sluice gates and more, all with real-time operational controls.
- ✓ 3D groundwater flows coupled to surface flows.



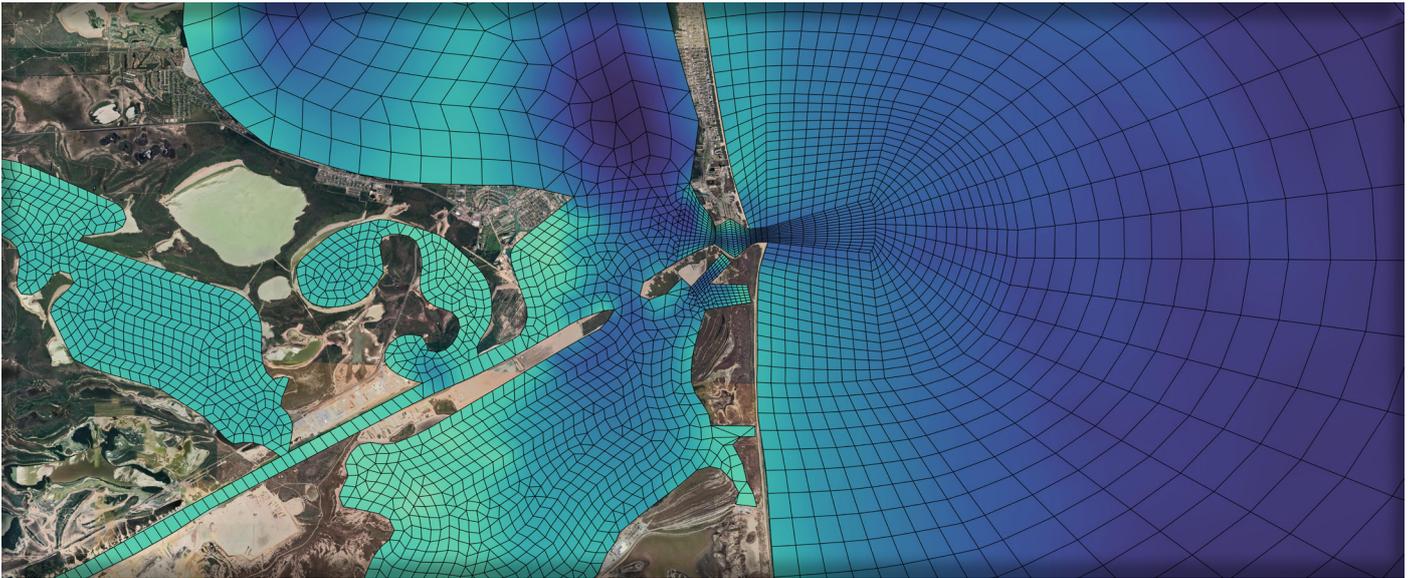
Impactful optional add-on Modules

- ✓ Nested 2D cell sizes using the Quadtree Module.
- ✓ Supercomputer acceleration using a desktop computer via the GPU Module.
- ✓ Integrated catchment pollutant export modelling using the CATCH and AD Module.

Flexible Mesh Modelling – TUFLOW FV

TUFLOW FV is a powerful 2D/3D finite volume model built on a flexible mesh framework. Designed for high-performance hydrodynamic simulations, it offers native support for complex flow modelling and can be extended with a suite of advanced acceleration and environmental modules, including:

- ✓ GPU Acceleration
- ✓ 3D Hydrodynamics
- ✓ Particle Tracking
- ✓ Sediment Transport
- ✓ Water Quality



The flexible mesh structure of TUFLOW FV and its modular design via the add-on modules makes TUFLOW FV the recommended solution for a wide range of applications, including:

Environmental Assessments:

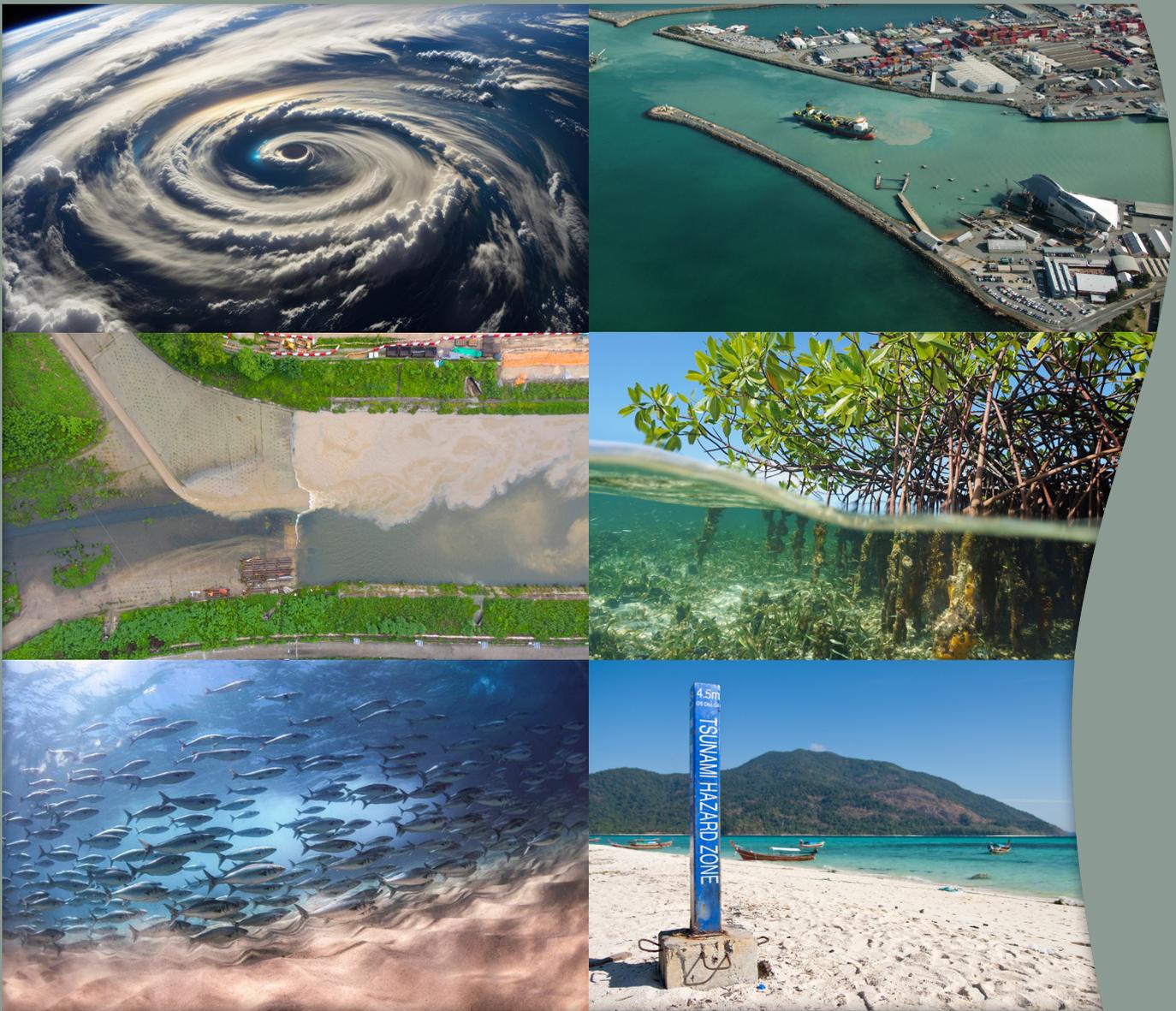
- ✓ Model the movement and transformation of pollutants, nutrients, sediments, and water quality parameters (e.g. oxygen, salinity, temperature and more) to support ecosystem impact or compliance studies.

3D Stratified Systems:

- ✓ Simulate density-driven layering in water bodies like such as reservoirs, capturing temperature, salinity, and other vertical variations with precision.

Complex Hydrodynamic Analysis:

- ✓ Ideal for scenarios requiring resolution of vertical velocity gradients in a range of settings - such as environmental shear flows.



Coastal Engineering:

- ✓ All coastal engineering applications, whether they be hydrodynamic assessments associated with port development, sediment transport analysis driven by tidal currents, wave radiation stresses or associated with dredging activities, or other environmental assessments which require more details water quality considerations. The flexible mesh design of FV makes it particularly well suited to these coastal applications, where a fine computational mesh resolution in the nearshore, transitioning to a coarser mesh offshore in deeper water is more computationally efficient than a fixed grid framework.

Key features of TUFLOW FV, along with its complimentary add-on modules include:

- ✓ 1st or 2nd order Explicit Finite Volume solver
- ✓ Various turbulence closure schemes, sediment transport and water quality solutions
- ✓ Includes higher-order solvers that fully resolve all terms in the shallow water equations
- ✓ Automatic handling of supercritical, subcritical, and weir flow transitions
- ✓ Options to model all significant water quality drivers:
 - Simulation of vertical and horizontal density gradients due to salinity or temperature.
 - Atmospheric light and heat exchange with density effects.
 - Key nutrient, carbon and oxygen cycles, and interrelationships.
 - Phytoplankton and pathogen dynamics (e.g. mortality behavior)

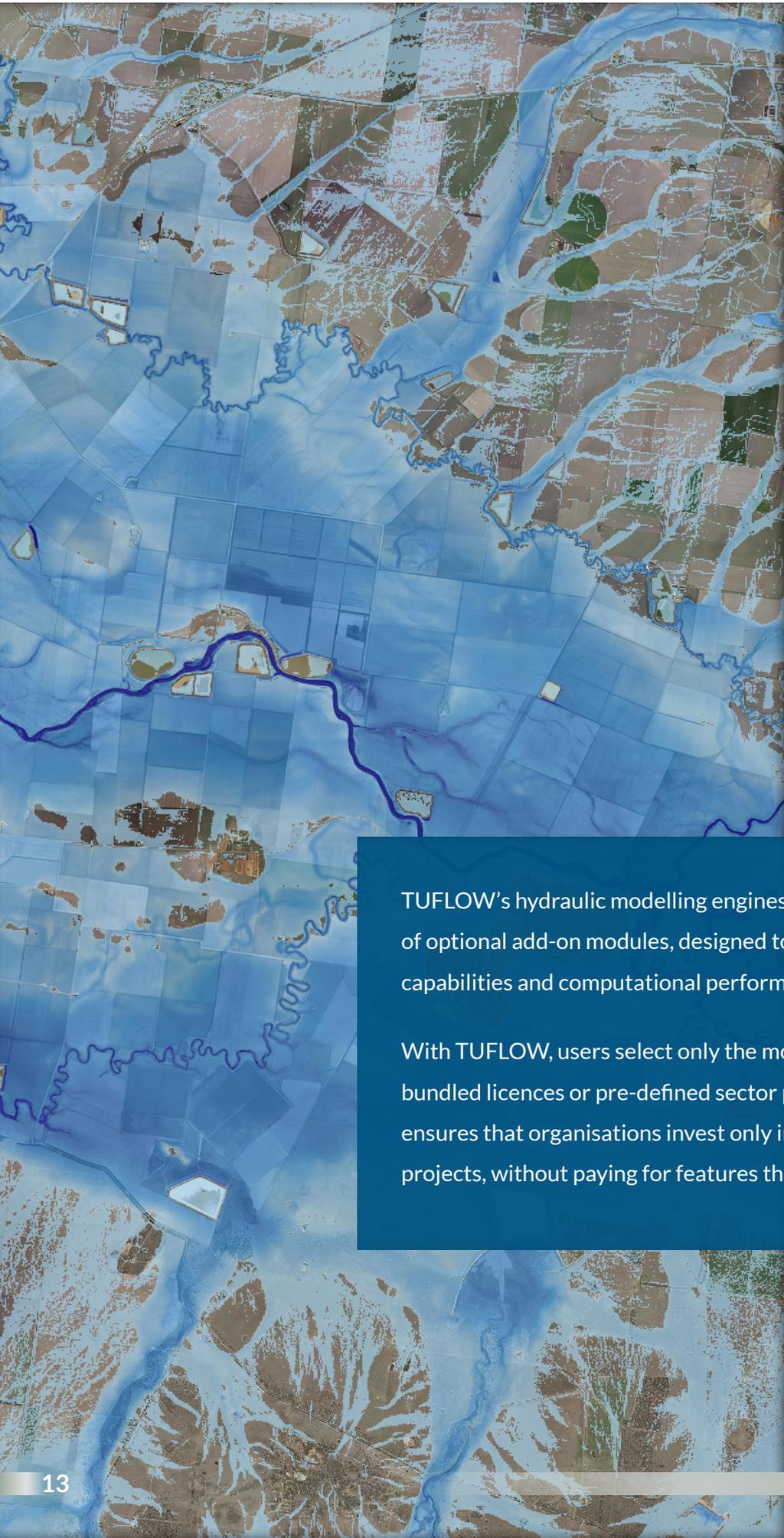


- ▼ Sediment transport and water quality mass flux (change) outputs. Understanding the fluxes that are driving changes in modelled sediment volume or water quality concentration is essential to ensuring models are accurately replicating reality. This output type is unique to TUFLOW FV. It is extremely useful for supporting efficient model calibration and fine tuning.

- ▼ Unique complete sediment transport modelling within a single simulation:
 - Multiple sediment fractions (cohesive and non-cohesive) at once.
 - Water column - bed sediment exchange.
 - Advection and dispersion of sediment by currents and/or waves.
 - Flocculation and hindered sediment settling.
 - Bed load transport (saltation), bed slumping, consolidation and armoring processes.
 - Morphological (bed) evolution and feedback to hydrodynamics.



Optional Add-on Modules



TUFLOW's hydraulic modelling engines are supported by a full suite of optional add-on modules, designed to enhance both assessment capabilities and computational performance.

With TUFLOW, users select only the modules they need. There are no bundled licences or pre-defined sector packages. This flexible approach ensures that organisations invest only in the tools most relevant to their projects, without paying for features they do not intend to use.

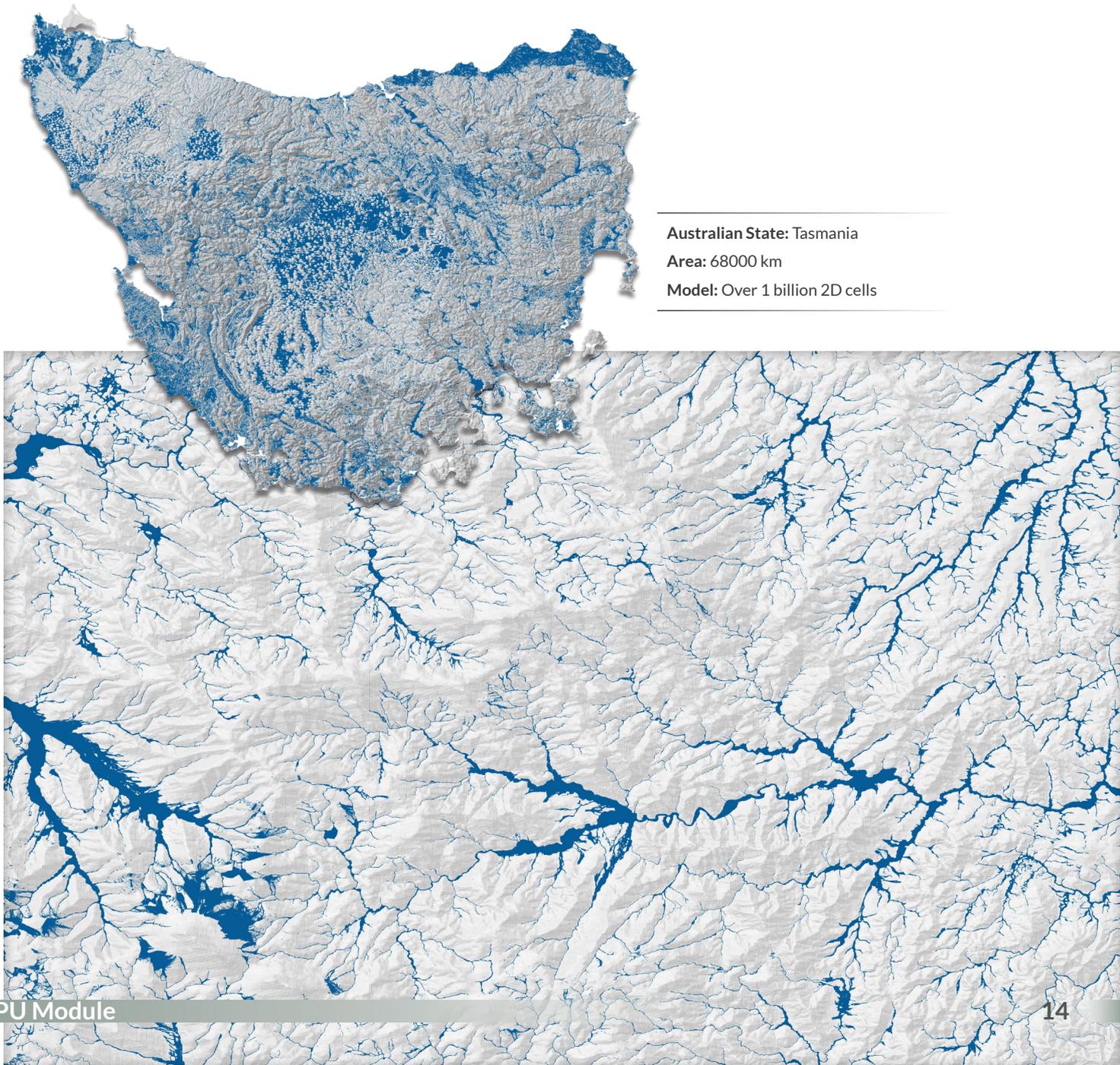
GPU Module – Extreme Simulation Acceleration

(TUFLOW HPC and TUFLOW FV add-on)

The TUFLOW GPU Module harnesses the power of NVIDIA GPU cards to dramatically speed up computations. By shifting processing from the computer's CPU to the GPU's thousands of parallel CUDA cores, simulations run 10 to 100 times faster than traditional CPU-based models.

This breakthrough in performance enables users to tackle previously impractical modelling projects with ease, simulate larger areas at finer resolutions, and run extensive ensemble scenarios without compromise. It gives organisations the freedom to model more, faster, and smarter through TUFLOW's cutting-edge GPU technology.

The GPU Module is available for both TUFLOW HPC and FV and can be paired with all other Modules to increase computational speed, and hence project execution efficiency.

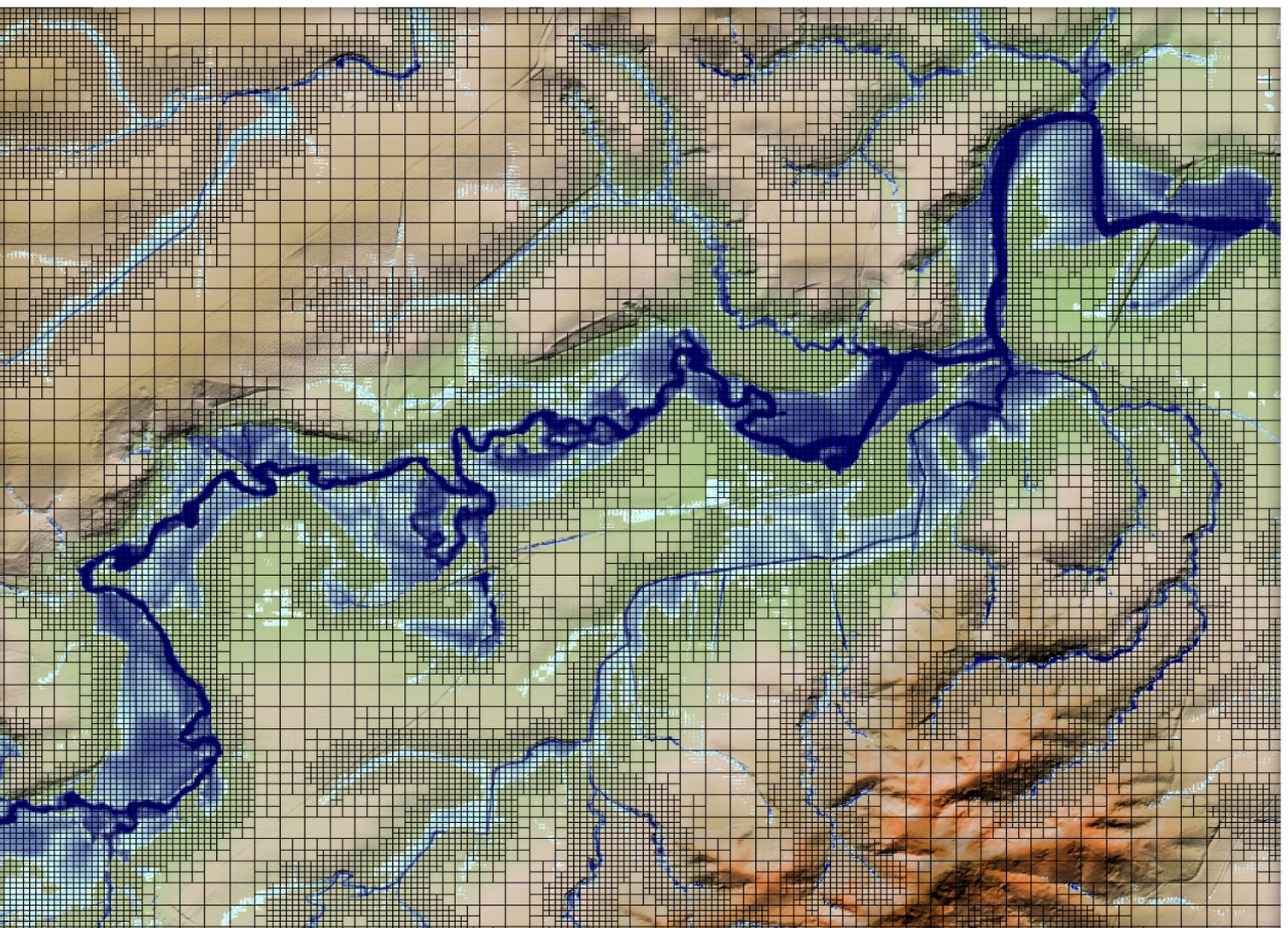


— Quadtree (QT) / Multiple 2D Domain (M2D) Module

(TUFLOW HPC / Classic add-on)

TUFLOW's Quadtree (HPC) / M2D (Classic) Module allows for variable 2D cell sizing across your model domain, delivering resolution where it matters most. With a single licence, you can access either feature depending on your chosen parent hydraulic engine. Key benefits of this module include:

- ✓ **Faster Simulations:** Lower total cell counts relative to models built at the target finest resolution over the entire model area result in significantly quicker run times, making complex models more manageable.
- ✓ **Enhanced Accuracy:** Achieve finer computational detail in areas requiring higher resolution calculations and outputs.



CATCH Module - Integrated Fixed Grid / Flexible Mesh Modelling

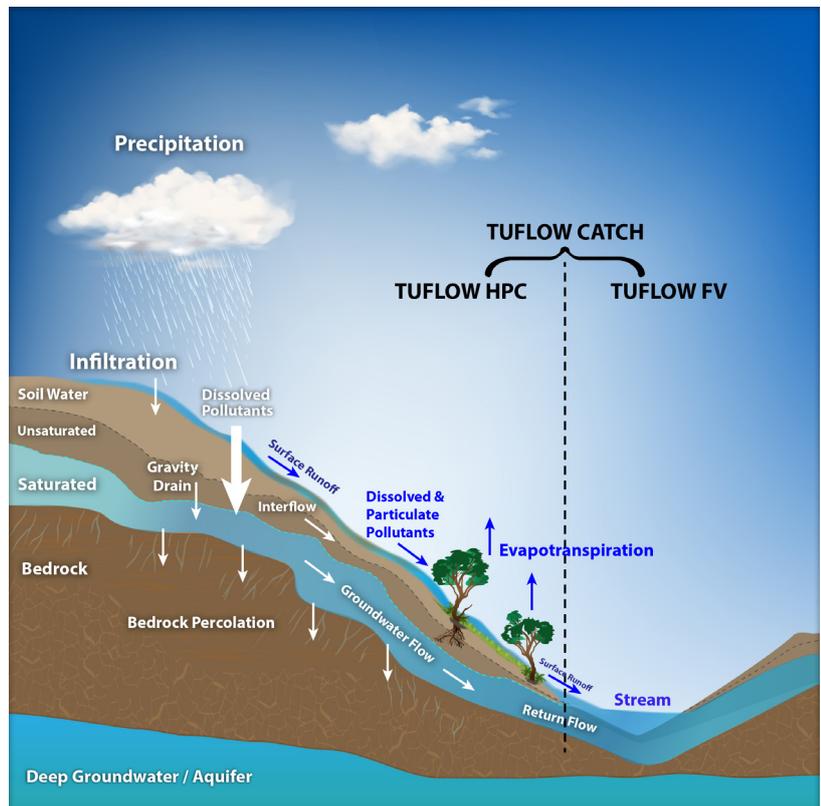
(TUFLOW HPC and TUFLOW FV add-on)

TUFLOW CATCH is an add-on module for both TUFLOW HPC and TUFLOW FV, designed to enhance environmental modelling capabilities across catchments and receiving waters. In essence, it:

- ✓ Enables simulation of constituent processes, such as sediment, nutrient, pollutant, and pathogen generation, transport, and mitigation within TUFLOW HPC.
- ✓ Automates the transfer of boundary condition data between TUFLOW HPC and TUFLOW FV, supporting fully integrated catchment-to-3D receiving water modelling.
- ✓ Acts as a central coordination platform for dynamically linked simulations between TUFLOW HPC and TUFLOW FV.

Assess the effectiveness of interventions, such as water quality constructed wetlands. This functionality unlocks a unique and powerful tool for assessing water quantity and quality from catchment to coast. Unlike traditional approaches, TUFLOW CATCH supports detailed, bottom-up, holistic environmental assessments at the whole-of-catchment scale. It seamlessly integrates surface and subsurface hydrodynamic modelling with pollutant export and receiving water simulations-eliminating the need for simplified, top-down (lumped) assumptions.

By solving motion and transport equations at high spatial and temporal resolution on a cell-by-cell basis, TUFLOW CATCH enables accurate simulation of environmental processes where they naturally occur, on land and within waterways.



The impact of TUFLOW CATCH has been recognised through multiple industry awards in its inaugural year:

- ✓ Stormwater Australia 2024 National Award for Research and Innovation Winner
- ✓ Stormwater Queensland 2024 State Award for Research and Innovation Winner
- ✓ Water New Zealand 2024 Innovation Forum Finalist

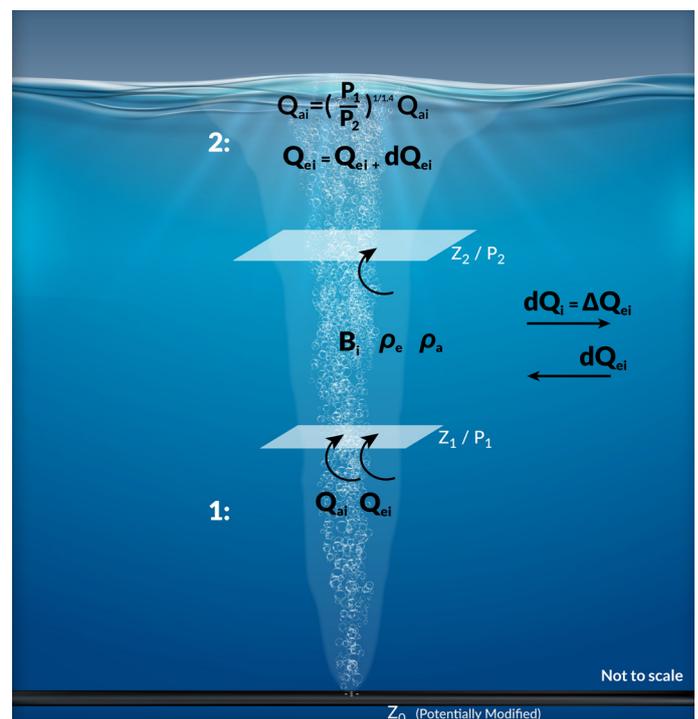


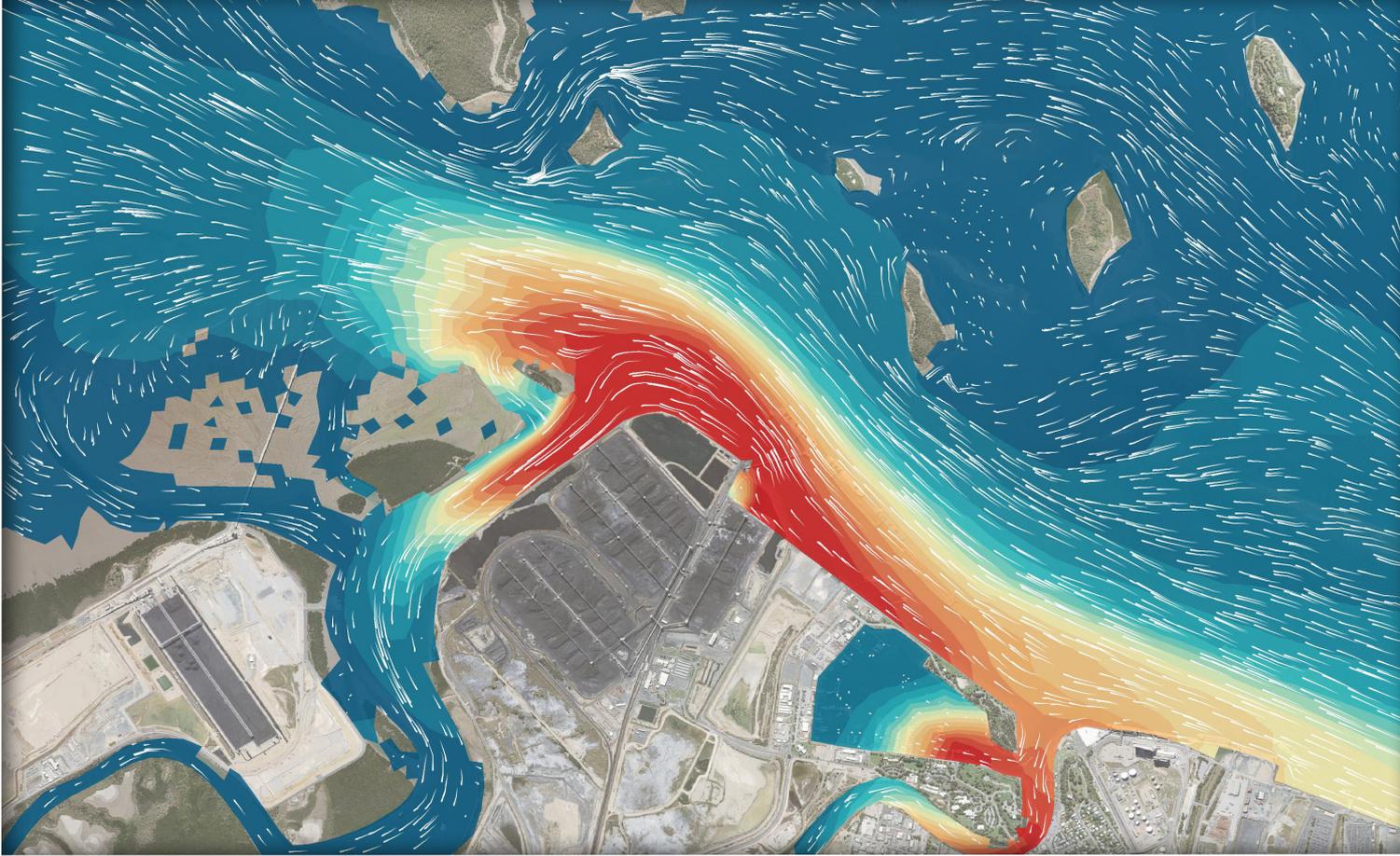
3D Module

(TUFLOW FV add-on)

In environmental water quality modelling, simulating flow in all three spatial dimensions is essential, especially in deeper waterbodies where vertical variations in velocity, density, and water quality can play a critical role in system processes. The TUFLOW FV 3D Module enables accurate representation of these vertical dynamics, whether or not density coupling is required. It's equally effective in:

- ▼ Stratified systems, when paired with modules like ST (Sediment Transport), or WQ (Water Quality), to simulate complex horizontal and vertical interactions involving temperature, salinity, sediment, and all combinations thereof if required.
- ▼ Unstratified, high-energy environments, where vertical velocity gradients are important to represent for design considerations.



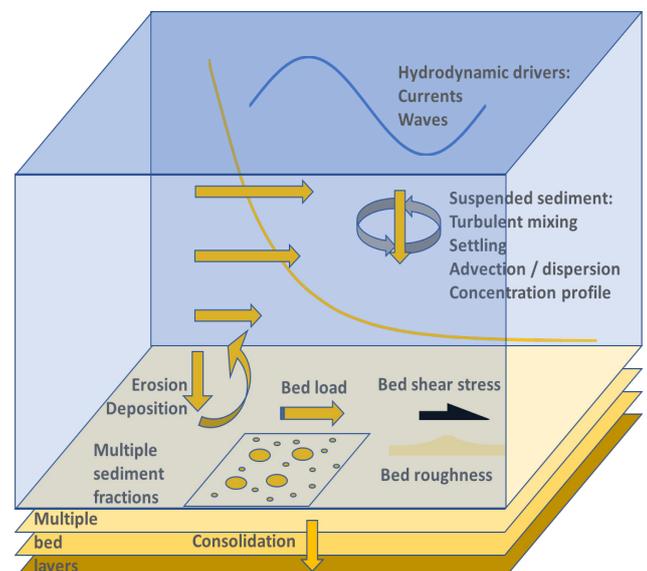


— ST Module

(TUFLOW FV add-on)

The Sediment Transport (ST) Module enhances TUFLOW's environmental modelling capabilities by simulating multiple sediment fractions with varying properties. Whether cohesive or non-cohesive, users can select from a range of transport models, equations, and parameterisations to suit their project needs. Core ST Module functionality includes simulation of:

- ✓ Multiple sediment fractions simultaneously.
- ✓ Sediment exchange between the water column and bed.
- ✓ Advection and dispersion of sediment driven by currents and waves.
- ✓ Flocculation and hindered sediment settling.
- ✓ Bed load transport, slumping, consolidation, and armouring processes.
- ✓ Track morphological changes and feedback to hydrodynamics.

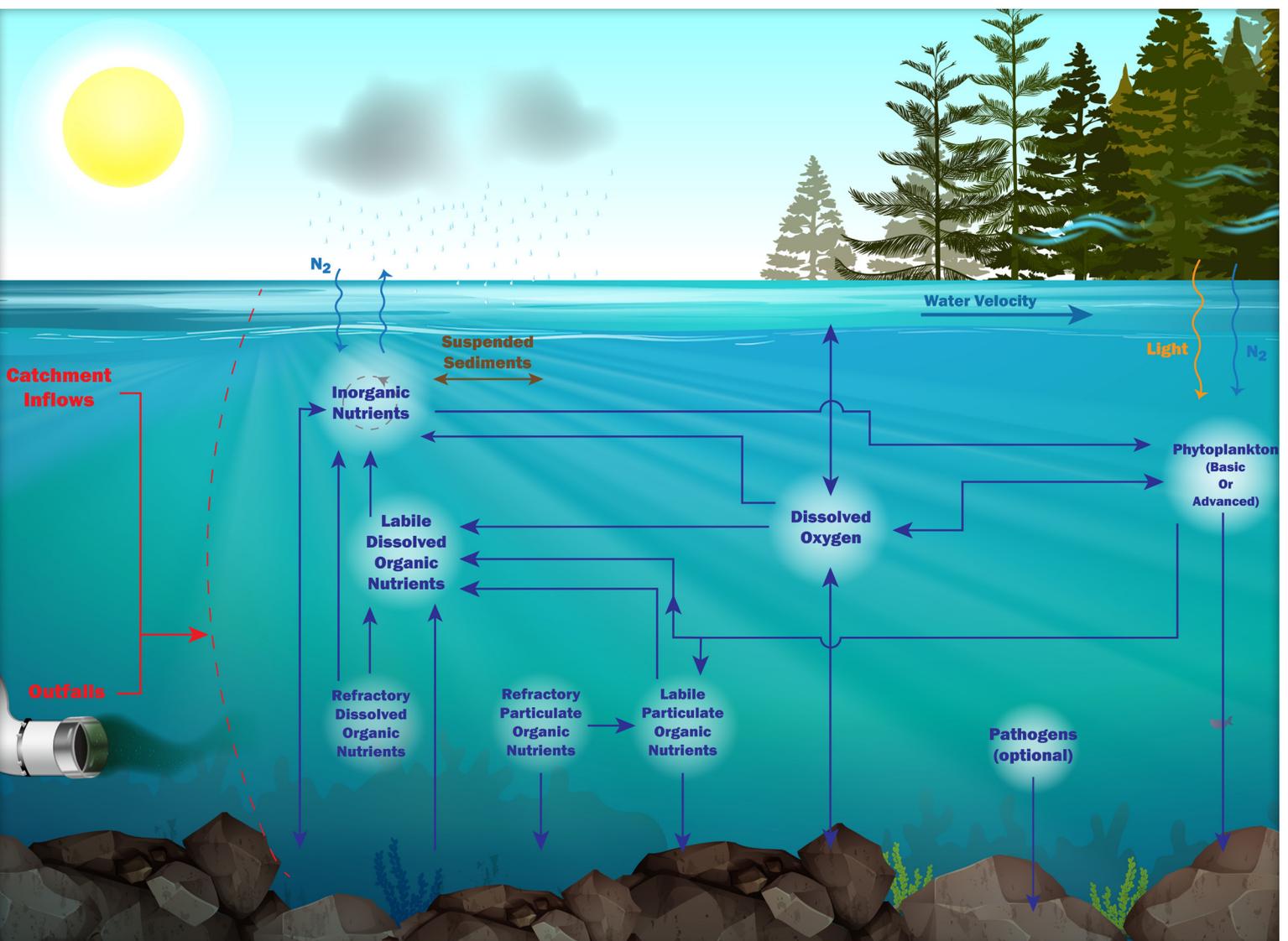


Water Quality (WQ) Module

(TUFLOW FV add-on)

The WQ Module supports dynamic simulation of a range of commonly measured water quality constituents, including dissolved oxygen, silicate, inorganic and organic nutrients, phytoplankton and pathogens. The module includes simulation of environmental processes such as sediment flux, atmospheric exchange, nutrient transformation and phytoplankton growth and mortality. Importantly, the WQ Module reports the flux of mass of every simulated constituent through every process computed, and in doing so allows users to understand why the WQ model is predicting the concentrations that it is, and therefore expedite calibration processes.

The WQ Module can optionally be linked with the GPU, 3D and/or ST Modules.



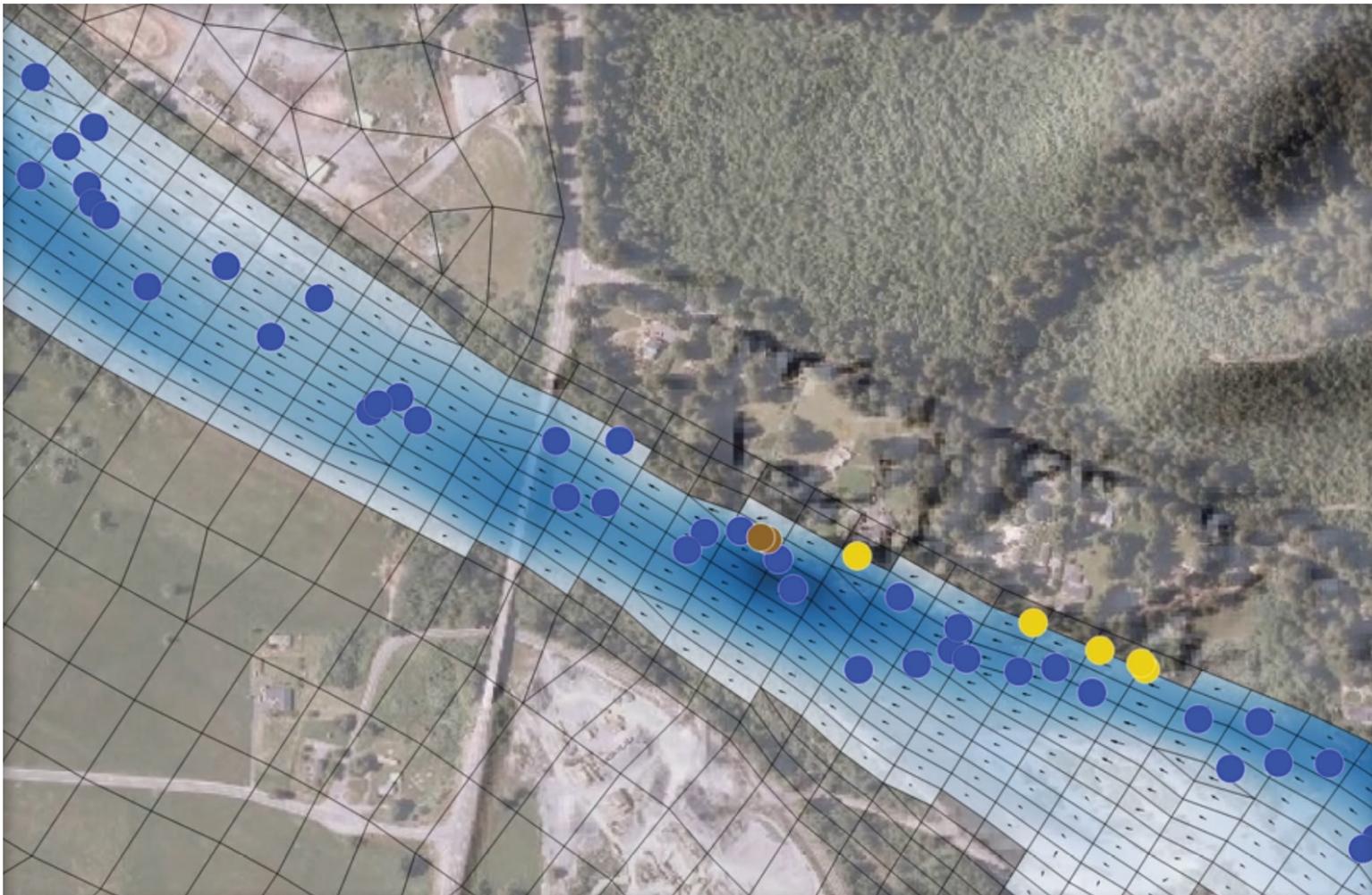
Particle Tracking (PT) Module

(TUFLOW FV add-on)

The PT Module deploys a Lagrangian model that solves the 2D/3D transport equations of discrete particles. This scheme allows particles to be tracked semi-independently of the model mesh. Key features include:

- Particle tracking of multiple particle groups with different properties
- Fixed and moving particle source terms
- Particle horizontal and vertical advection and random walk diffusion
- Particle buoyancy, settling, deposition and resuspension
- Particle motility (response to environmental stimuli). Using this feature the PT Module has been used to simulate the fate and transport of numerous aquatic fauna, such as snapper larvae and turtle hatchlings.

The PT Module can optionally be paired with the GPU and/or 3D Modules.



Working Environment Options



TUFLOW is designed with unmatched flexibility, allowing you to tailor your modelling environment to suit your experience, workflow preferences, and project needs.

Using a car analogy, think of TUFLOW's powerful numerical solvers and add-on modules as the engine, delivering high-performance computations, while the work environment options form the chassis, completing a robust and adaptable modelling system. Choose your preferred working environment from a variety of industry-standard Geographic Information System (GIS) platforms.

— QGIS

A globally adopted, free and open-source GIS platform, QGIS offers seamless integration with TUFLOW. It natively supports all TUFLOW input and result data types, making it an ideal choice for both model development and result analysis.

To further enhance its capabilities, we've developed the TUFLOW Plugin for QGIS, available free from the public QGIS plugin repository. With over 160,000 downloads and a consistent 5-star rating, the TUFLOW Plugin is a trusted tool among modellers. It offers a comprehensive suite of features that streamline model building tasks and provide dynamic, fully featured result viewing tools (including animation creation).

Whether you're building models or analysing results, QGIS with the TUFLOW Plugin empowers you to do it all within a single, integrated software package. ArcGIS and ArcPro

— ArcGIS and ArcPro

Developed by ESRI, ArcGIS and ArcPro are widely used proprietary GIS platforms. TUFLOW is fully compatible with ESRI's Shapefile, GeoPackage, and Raster formats.

To support users working in these environments, we offer the ArcGIS TUFLOW Toolbox, a free add-on that streamlines model setup, execution, and result plotting. At the time of writing, the ESRI products do not contain a dynamic library that is suitable for complete dynamic viewing of spatial results. In lieu of this ArcGIS and ArcPro users typically use QGIS or SMS (free community edition) for dynamic result viewing and analysis tasks.

— MapInfo Professional (MI Pro)

Developed by Precisely, MapInfo is a widely used proprietary GIS platform. TUFLOW fully supports MapInfo's MIF/MID, GeoPackage, and raster formats for model input, ensuring smooth integration with your existing workflows.

To boost productivity, we offer miTools a free purpose-built suite of utilities that automates repetitive tasks, enhances data visualization, and supports quality assurance within the MapInfo environment. These tools help save time and improve modelling accuracy.

While MapInfo does not currently support dynamic spatial result viewing, users typically complement their MapInfo workflow with QGIS or SMS (Community Edition) for advanced result visualisation.

Workflow Efficiency Tools



At TUFLOW, workflow efficiency is a core focus. Beyond the wide range of GIS Plugins and Toolboxes outlined in the Working Environment Options section, we offer a suite of free pre- and post-processing utilities and supporting resources designed to streamline your modelling experience.

— Model Conversion

Looking to transition models from another platform to TUFLOW? We provide conversion tools and / or documented workflows to assist with the migration of models to TUFLOW from:

- ✓ FLO2D
- ✓ HEC-RAS
- ✓ InfoWorks ICM
- ✓ MIKE Flood
- ✓ XPSWMM

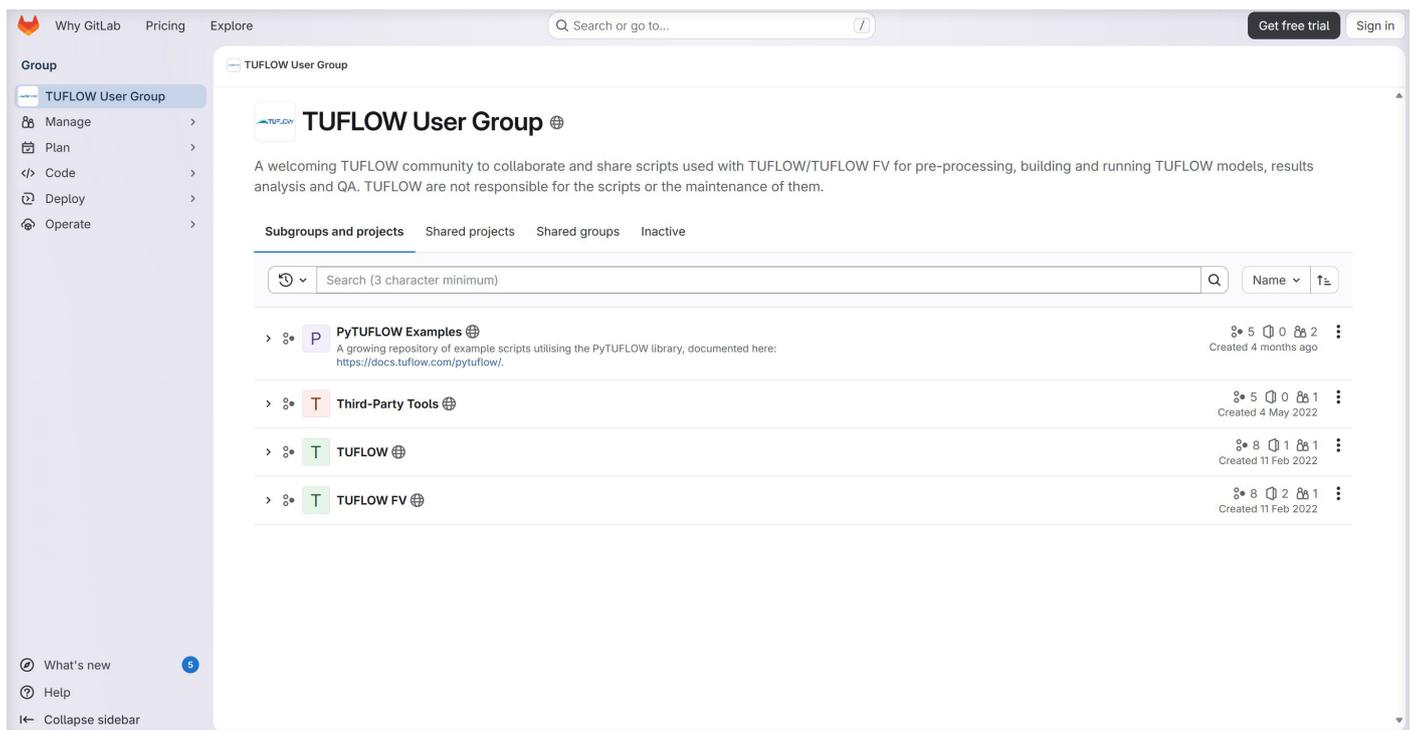
— Advanced Automation

TUFLOW uses open, non-proprietary input and output formats, giving advanced users the flexibility to integrate scripting and automation into their workflows. To support this, we've developed PyTUFLOW, a powerful Python library packed with routines for processing model inputs and outputs.

— Community Collaboration

Join the TUFLOW GitLab User Group, an online hub where users collaborate and share scripts for pre-processing, model building and execution, results analysis, and quality assurance automation.

This community-driven space fosters innovation and helps users maximize their modelling efficiency.



Software Training and User Education Resources



Unlock the full potential of TUFLOW with our flexible and practical training programs. Whether you're just starting out or looking to advance your skills, our training is designed to give you the confidence and capability to model with precision and efficiency.

— TUFLOW Training – Learn, Build, Excel

Training opportunities include:

- ✓ Hands-On Courses: From beginner to advanced levels, our practical training sessions are led by experienced TUFLOW modellers and our developers. Courses are offered throughout the year in multiple global locations and online.
- ✓ Project-Based Training: A customised option where our trainers work directly with your team to develop a working model tailored to your specific project needs.
- ✓ Workshops & Conferences: Stay up to date with our new release workshops and the popular UK/Europe TUFLOW User Conference, held every two years. These events offer insights into the latest features, future developments, and a chance to connect with fellow modellers and the TUFLOW developers.
- ✓ Self-Guided Learning: Prefer to learn at your own pace? Explore a wealth of free resources, including licence-free tutorials and example models, available on the TUFLOW Wiki and TUFLOW FV Wiki.

Contact us at training@tuflow.com



— Comprehensive User Education Resources

- ✓ Detailed up-to-date Manuals and Wikis.
- ✓ 100's of free TUFLOW tutorial/example models.
- ✓ eLearning platform with useful tips and tricks in a form of short videos.

Software Support and Bespoke Feature Development



— Software Support – Trusted Worldwide

At TUFLOW, our commitment to high-quality support sets us apart. Our responsive and knowledgeable assistance is delivered by experienced modellers and software developers who understand your challenges and are ready to help.

Our support team consistently earns 5-star service ratings, making support@tuflow.com the industry benchmark for excellence.

With team members located in various regions across the globe, we provide coverage in multiple languages and across all business hour time zones - ensuring help is available when you need it most.

— Bespoke New Feature Development

At TUFLOW, we're committed to helping our users meet the evolving demands of their clients and industry. That's why we offer bespoke feature development tailored to your organisation's specific needs. If there's a unique TUFLOW feature or functionality you need, our team is ready to collaborate with you to bring it to life. Contact support@tuflow.com

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