
TOLOSA : a high-performance open-source library for marine flooding simulation

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The Tolosa library

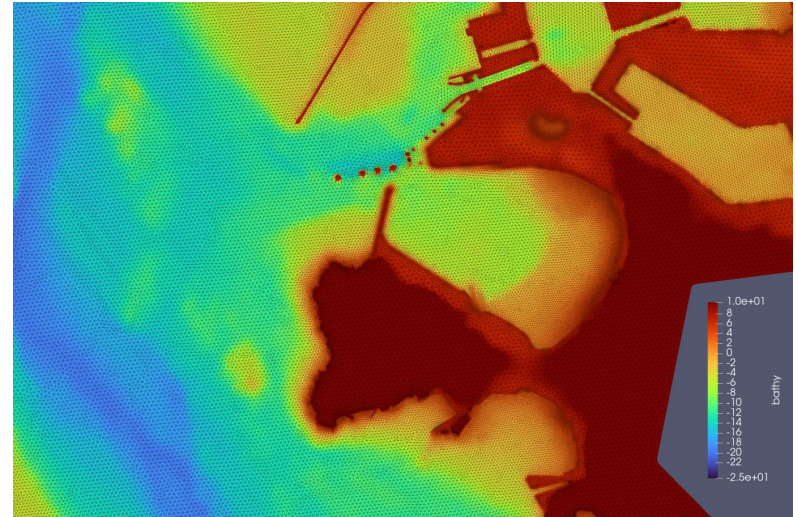


Core library + modules: shallow-water, phase resolved, two-fluid Euler...

Unstructured grids

Developed in Fortran 2008 with object-oriented features

High computational efficiency



High resolution mesh and bathymetry example, at the entry of the Saint-Malo harbor

Shallow-water module: Tolosa-sw

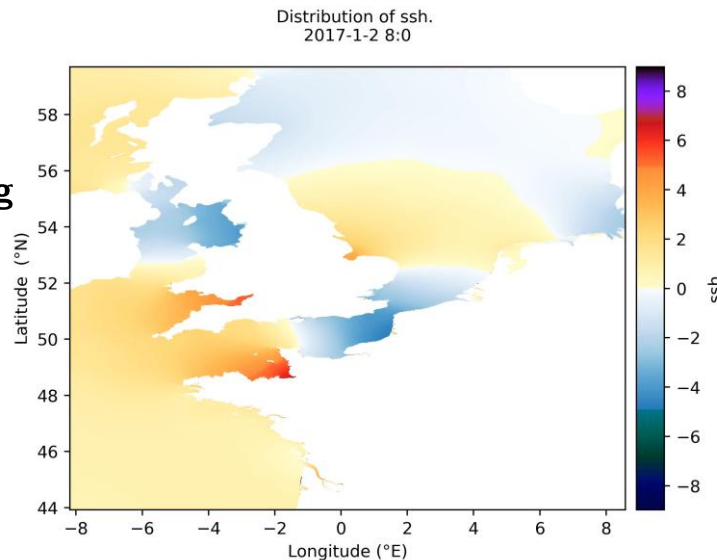
Based on a novel numerical scheme

Tolosa-sw runs in operational as the **French coastal flooding warning system** at Météo-France, since end of 2024 (for Atlantic coast)

Performances: **1 week simulated = 5 min runtime** (896 CPU cores)

Accuracy improvements as well, compared to previous model

→ see poster



Tolosa-sw simulation on the French Atlantic coast

2D phase resolved module: Tolosa-lct

Fully hyperbolic model

Accurate representation of waves nearshore, useful for simulating coastal flooding by overtopping

Very high-resolution mesh required → metric resolution at the coastline

Realistic validations on-going:
Île de Ré and Saint-Malo bay (France)



Wave overtopping in Saint-Malo



Tolosa-lct simulation in the Saint-Malo bay