

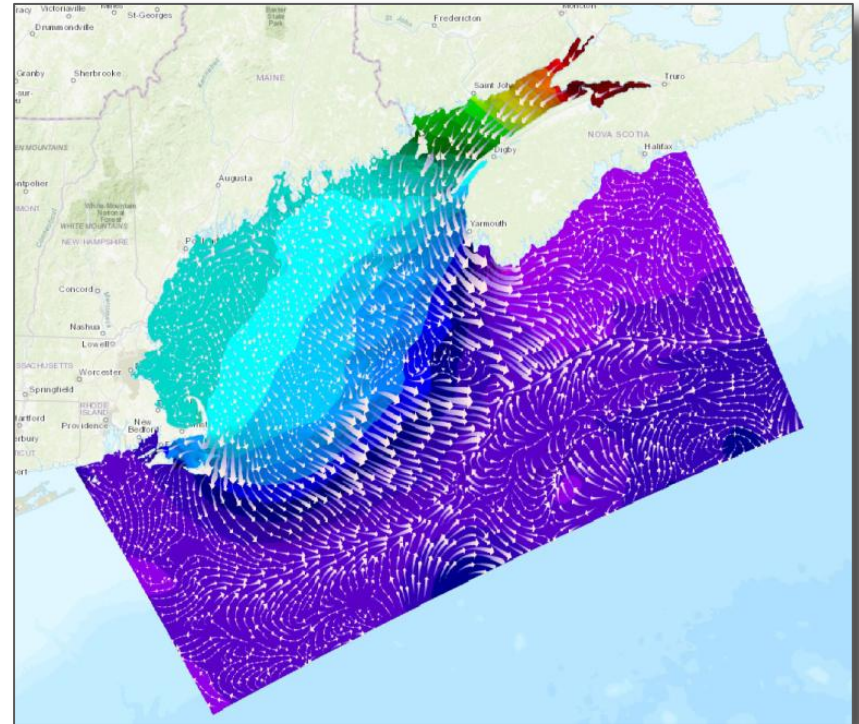
Charting the Course: National Ocean Service: Modeling Evolution and Strategic Alignment

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Agenda

- Overview of NOS Modeling
- Core Models
- Use Cases
 - *Precision Marine Navigation*
 - *Harmful Algal Bloom Forecasting*
 - *Spill Trajectory*
- Future of NOS Modeling

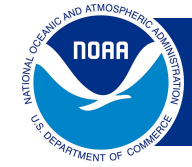


NOS Modeling Foundation and Strategy

Enhance NOS model interoperability, expand operational forecasting, and support data-driven decisions.

1. Address NOS Mission needs through Sustained **Community Engagement** and Partnerships
2. **Develop Ocean and Coastal Models** through Community Modeling
3. **Issue National Ocean Service Forecasts** through Accurate and Reliable Operational Models





NOS Modeling Suite

**Hazardous Spill
Response & Search
and Rescue**



**Coastal Management
& Flood Risk
Reduction**

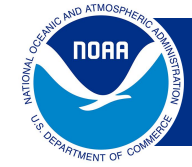


**Protecting Human
Health**



**Safe, Efficient
Marine Navigation**





NOS Core Modeling Codes



(Advanced Circulation Model)

What: Storm surge & coastal water levels

Superpower: Resolves overland flooding/drying

Used for: Coastal flooding including overland flooding

- University of Notre Dame, University of North Carolina



(Semi-implicit Cross-scale Hydroscience Integrated System)

What: Coastal and Inland hydrodynamics

Superpower: Integrated ocean-coast-estuary-riverine

Used for: Riverine inflow incl. linkages with NOAA National Water Model

- Virginia Institute of Marine Science, University of South Florida (COMIT)



(Regional Ocean Modeling System)

What: Offshore ocean circulation incl. continental shelf

Superpower: Complex vertical and lateral topography and flow

Used for: Upwelling systems, shelf-slope exchange, layered ocean processes

- Rutgers University, University of California Santa Cruz



(Finite Volume Community Ocean Model)

What: Tidal circulation, estuarine processes, and biological modeling

Superpower: 3D native circulation in complex areas

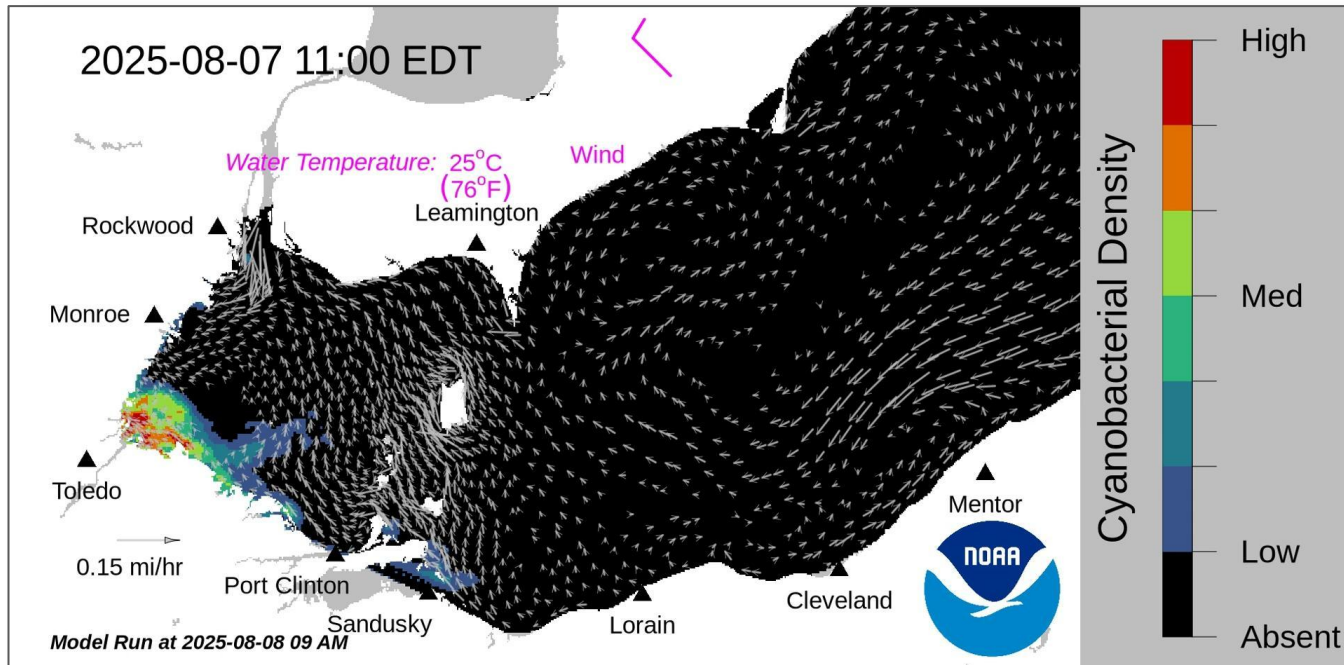
Used for: Tidal currents, pollutant fate/transport

- University of Massachusetts-Dartmouth, U. of Washington/PNNL

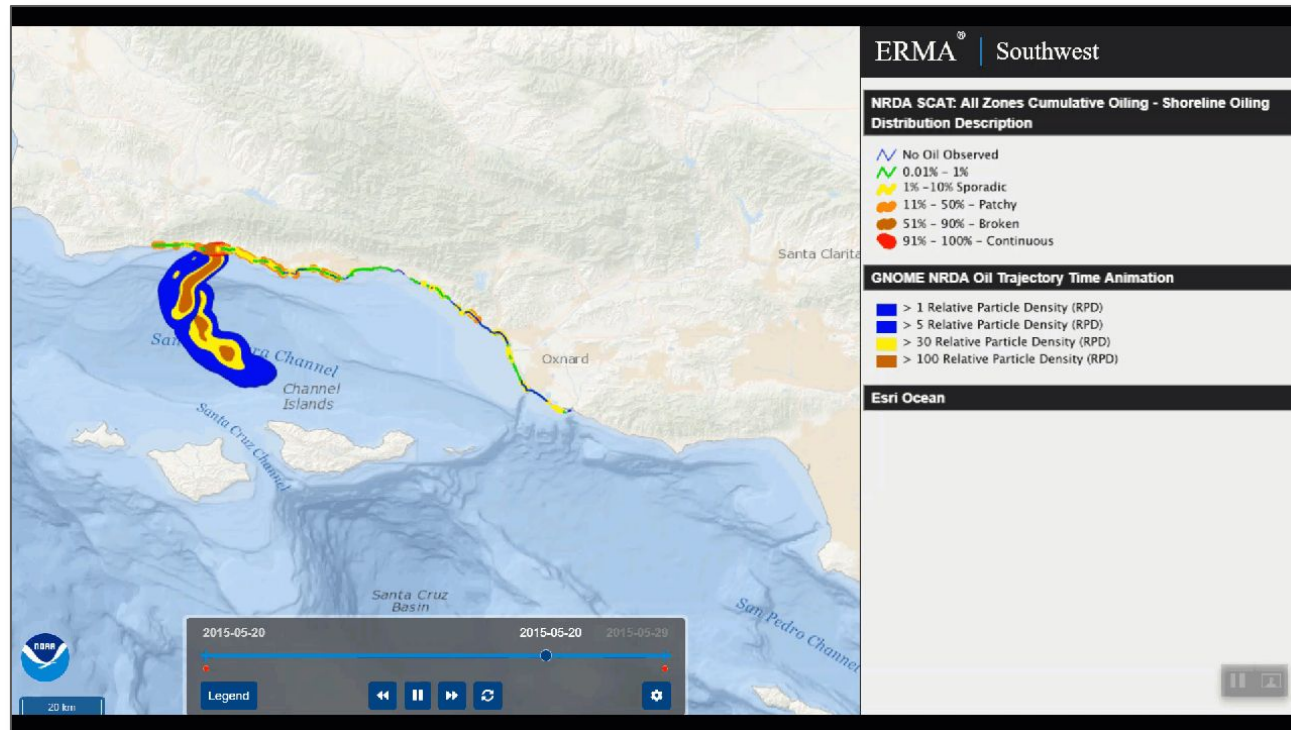
***Open Source - Community Developed Code
Expansive Network of Users and Developers
Community Advancements Benefit NOS Operations***

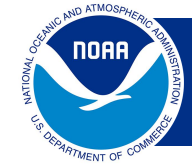
Use Case: Lake Erie Harmful Algal Bloom (HAB) Forecast

*HAB models predict and monitor dangerous algal or cyanobacteria blooms
Allow local leaders to minimize impacts to public health and coastal economies*



*Federal Coordinator for oil and hazardous spills in US coastal waters
Average 170 events a year, with 135 being Oil Spills*





NOS Modeling: Advancing Coastal Prediction

Strategic Priorities:

- Further consolidation of the NOS operational modeling suite
- Build coupled systems for compound threats (in coordination with the NWS e.g., atmospheric + rainfall + HABs).
- Integrate the UFS framework for NOS operational models

Embracing Emerging Technology:

- Develop **AI/ML capabilities** to dramatically increase model efficiency and enhance data access
- Leverage **GPU computing** to enable faster, higher-resolution, and probabilistic forecasts
- Increased use of **Cloud operations**

What NOS Needs:

- Sustained investment in observations and advanced technology
- Continued collaboration and alignment across federal agencies and the broader modeling community
- Continued advocacy to champion a unified, strategic modeling direction across NOAA