National Ocean Service

Coastal Ocean Modeling Program within the Unified Foreasting System
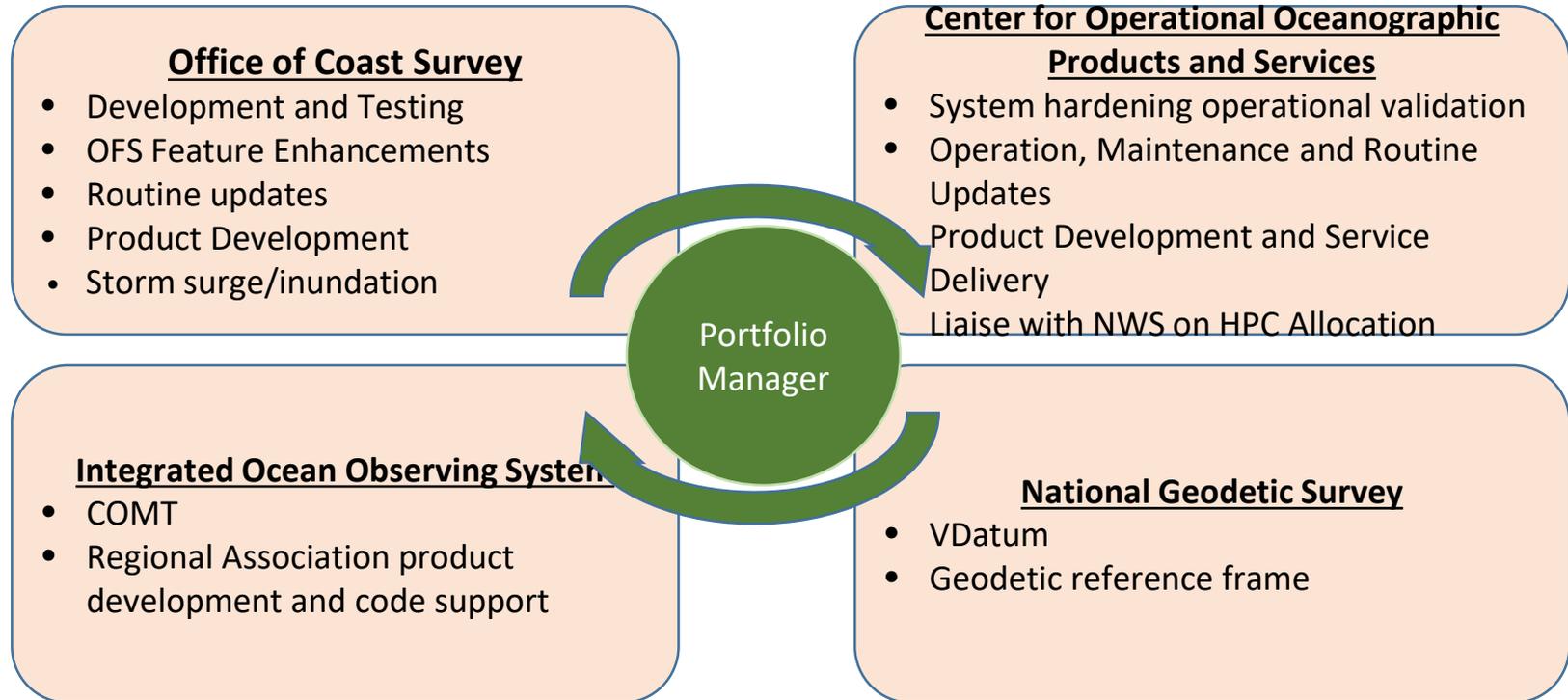
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[2]National Ocean Service/Office of Coast Survey

What is the NOS Coastal Ocean Modeling Program?

Office of Coast Survey
- Development and Testing
- OFS Feature Enhancements
- Routine updates
- Product Development
- Storm surge/inundation

Center for Operational Oceanographic Products and Services
- System hardening operational validation
- Operation, Maintenance and Routine Updates

Product Development and Service Delivery

Liaise with NWS on HPC Allocation

Portfolio Manager

Integrated Ocean Observing System
- COMT
- Regional Association product development and code support

National Geodetic Survey
- VDatum
- Geodetic reference frame

Requirements for Ocean Predictions at the Coast

Coastal challenges

Port congestion and navigation hazards

Coastal storms, flooding, erosion, and spills

Habitat loss and degradation

NOS priorities

Safe and efficient transportation and commerce

Preparedness and risk reduction

Stewardship, recreation, and tourism

Credit: G. Seroka

Storm Surge and Inundation (2D)

- Extratropical Surge + Tide Operational Forecast System (ESTOFS)
- Computes surge *with* tides for forecasting and for coupling to Nearshore Wave Prediction System
- NOS developed using ADCIRC
  - Coastal resolution up to ~80-120m, GFS forcing, 6-hr nowcast followed by 180-hr forecast
- Atlantic operational October 2012, Pacific operational June 2014, Micronesia operational February 2018, Global (below) expected operational October 2020
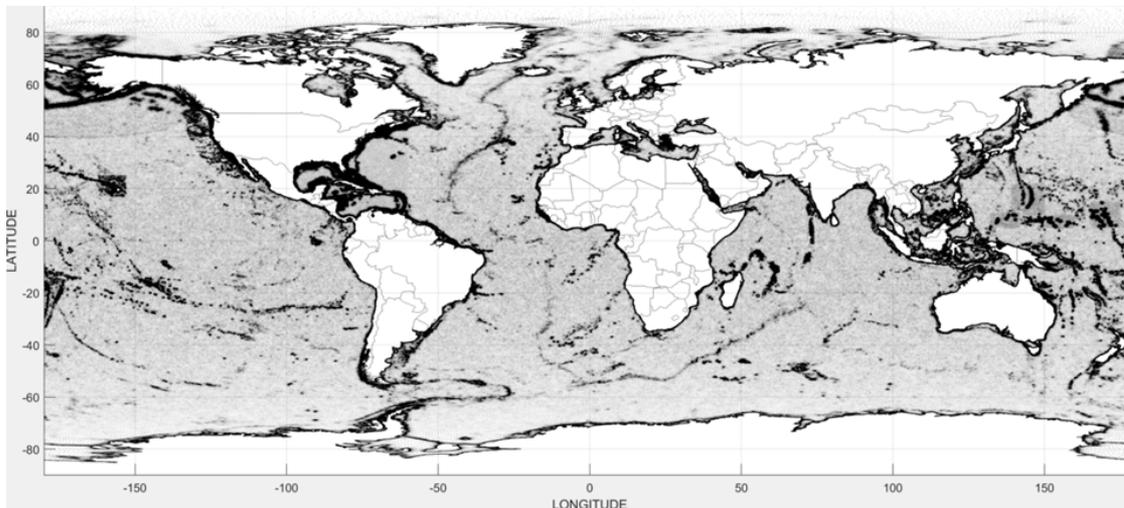
National Operational Framework (3D)

- Forecast guidance for high priority ports and approaches to **ensure safe and efficient navigation** to head of tide (high-resolution 3-D forecast guidance of total water levels, currents, water temperature and salinity)
  - Water levels for under keel clearance
  - Currents for USCG right-of-way decision-making and pilot maneuverability
- Establish modular infrastructure to enable other types of forecasts – *"national backbone"*
  - Ecological, water quality modeling (EFR, NWI)
  - Search and rescue, particle trajectory applications (USCG, NOS ORR)
- All models meet an accepted standard of performance and stability

NOS Coastal Ocean Modeling: 5-Year Plan FY20 – 24

FY20	West Coast OFS Integrated NGOFS
FY21	NCEP MORATORIUM CY21 (NO IMPLEMENTATIONS PLANNED)
FY22	Lake Superior OFS Lake Ontario OFS Great Lakes OFS ice forecast
FY23	Lake Huron Erie Corridor OFS New York Harbor OFS
FY24	South East Atlantic OFS Puget Sound and Columbia River OFS

NOS engagement with external partners

Community Ocean Modeling:

- ROMS
  - 5 coastal OFS in operations and 1 in development are ROMS based
- FVCOM
  - 4 coastal OFS in operations and 2 in development are FVCOM based
- ADCIRC
  - Global ESTOFS is scheduled for operations in 10/2020. VDatum tide modeling

Coastal Ocean Modeling Testbed:

- *Mission: To use applied research and development to accelerate the transition of scientific and technical advances from the coastal ocean modeling research community to improved operational ocean products and services (i.e. via research to operations and also operations to research).*

NOS engagement with external partners

NOAA Hurricane Supplemental
- Leveraging Flooding priority to
  - Fund community development and operational testing of coastal ocean modeling capabilities in the Southeast
  - Fund community development and operational testing of coupling software capability

OTTI/JOTTI
- Support from NOAA/OAR to
  - Develop and implement an FVCOM ice capability in the Great Lakes
  - Implement an FVCOM based HAB capability in Lake Erie

Coastal ACT, NOAA Water Initiative, JTTI, COMT
- Coupled surge-wave-hydrology hindcasting of hurricane events
- Enhanced capabilities of ADCIRC to couple with National Water Model
- High resolution, high-fidelity storm surge modeling capabilities

NOS Models are being integrated into the Unified Forecast System Strategic Implementation Plan
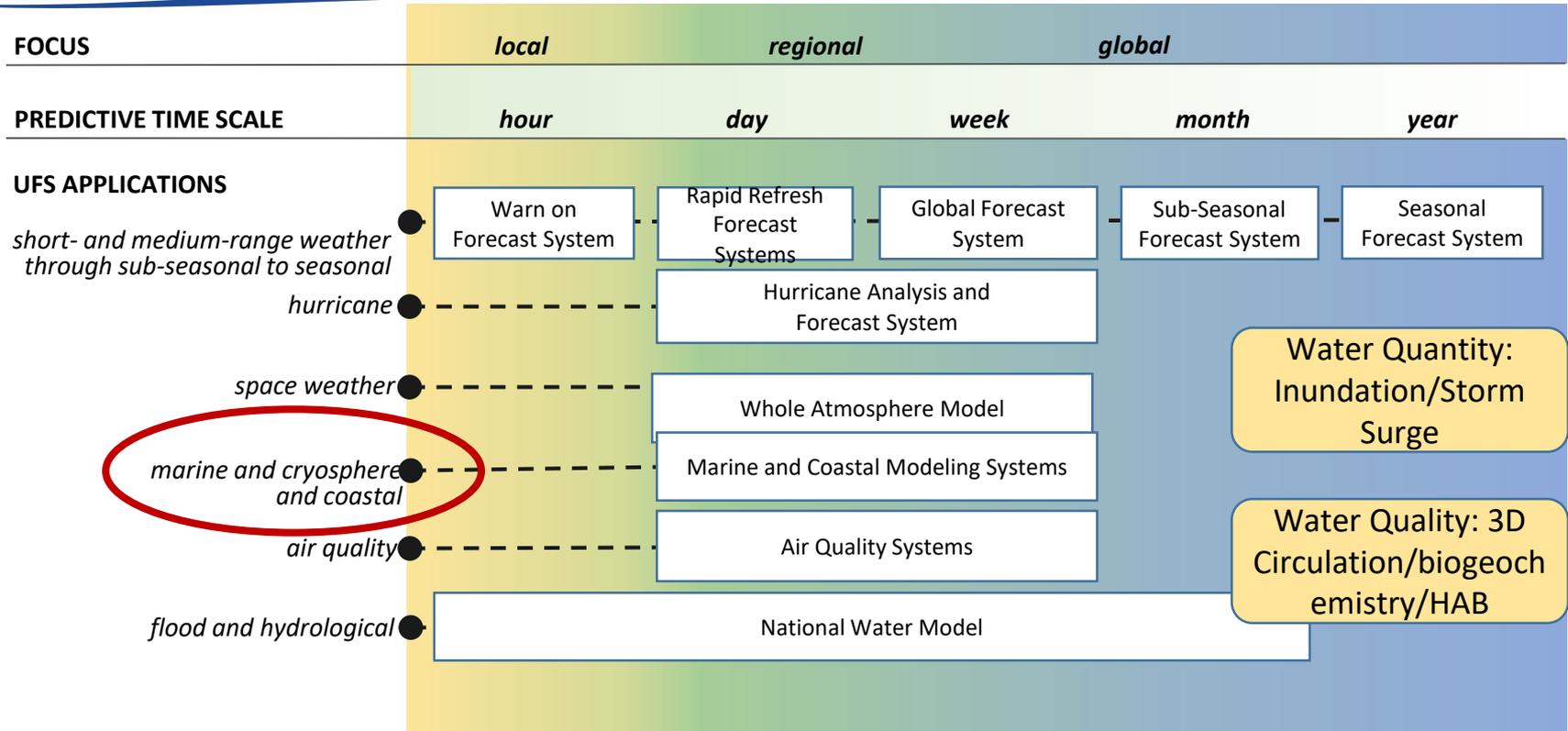
Credit: D. Snowden

# Commercial cloud as a platform for coastal ocean model development
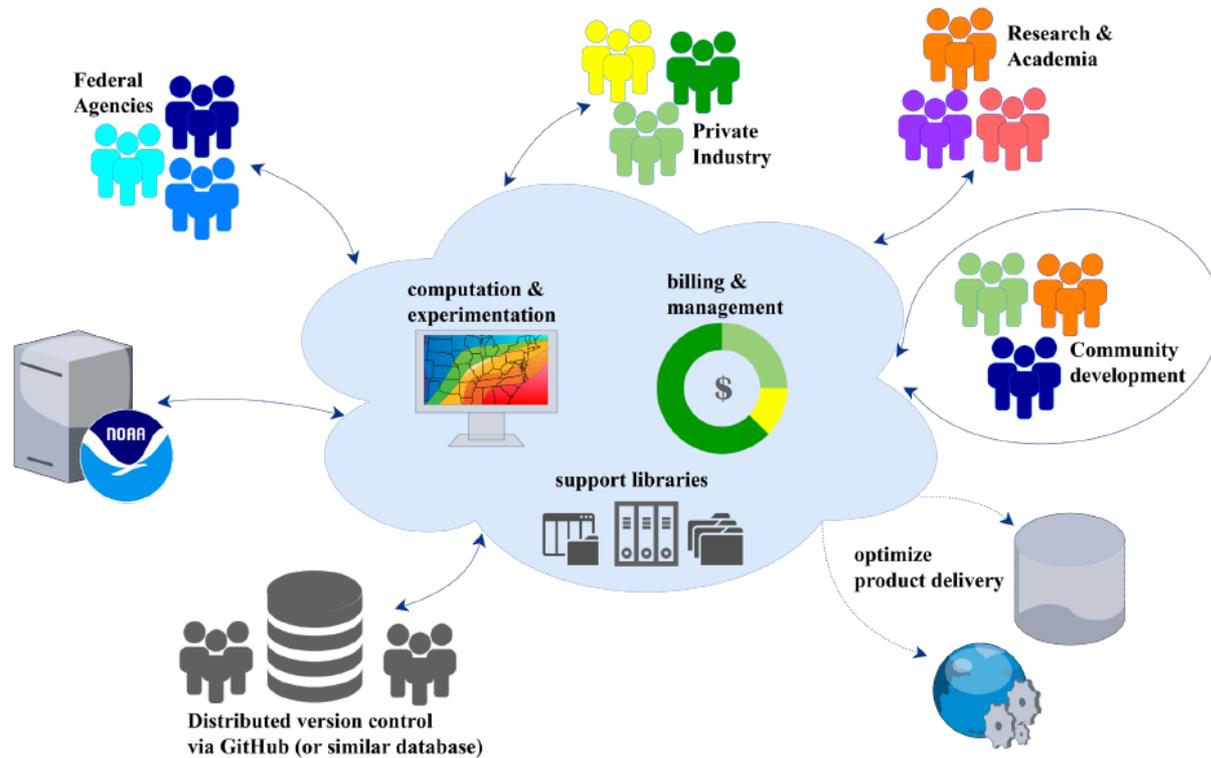
Credit: D. Snowden

Coastal Coupling initiatives

Community -based Coupled Coastal Modeling in Support of Total Water Prediction

- Mission:
  - To enable
    - Coupling of models across the coastal zone
    - Actionable information provided to stakeholders in accessible and user-friendly formats
    - Accelerated national coverage of integrated water prediction capabilities

Credit: C. Dean, AGU Fall Meeting 2019
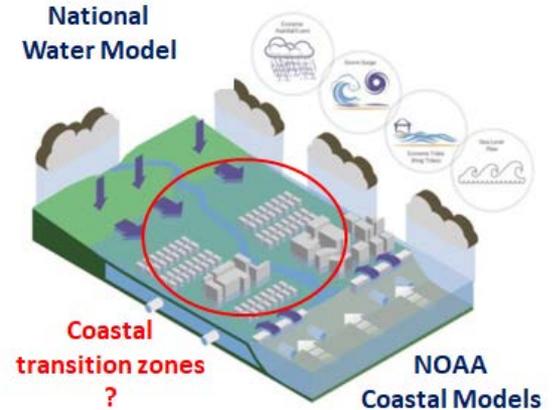
Data Assimilation

ROMS 4DVAR within Marine JEDI (Funded by FY19 Hurricane Supplemental)
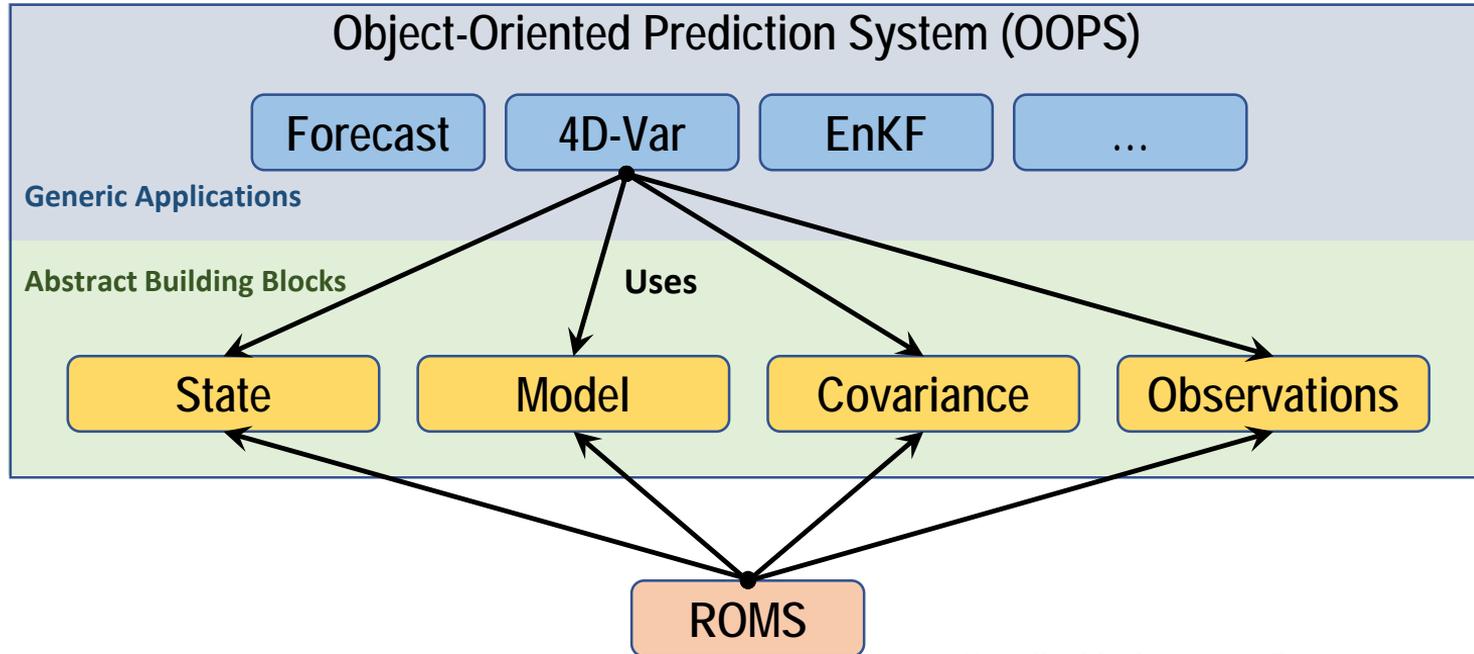
Credit: H. Arango, Rutgers
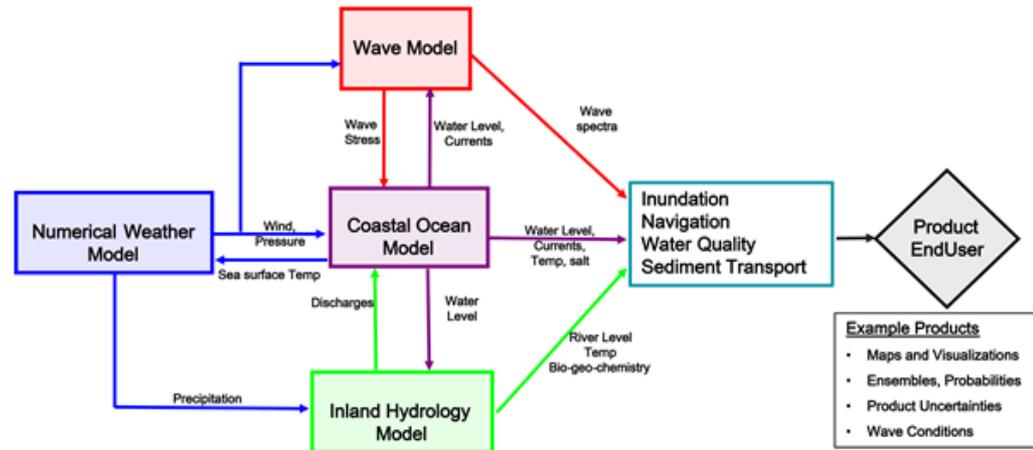
2 Coastal Applications Teams within the SIP of the UFS

Water Quantity (2D)

- Storm Surge and Coastal Inundation

National Backbone of Coastal
Information (3D)

- Safe and efficient navigation
- Integrated water prediction (water quality)
- Environmental monitoring and emergency response
- Biogeochemical and ecological forecasting

Questions?