NOS Modeling Update

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NCEP Production Suite Review

Operational Forecast Systems (OFS)

- 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

Storm Surge Modeling

- Extratropical Surge and Tide Operational Forecast System (ESTOFS) provides storm surge and tide guidance (2-D) to provide:
  - Offshore marine forecast information to forecasters at OPC and NHC's Tropical Analysis and Forecast Branch
  - Coastal inundation forecast information to WFOs
  - Water level boundary conditions to EMC's NWPS for coastal wave predictions

- Hurricane Surge On-Demand Forecast System (HSOFS) provides total water level information for evaluation within NWS to support response and recovery activities

FY19 Program Accomplishments

- ## OFS

  - ✓ Completed the transition of the Coastal Ocean Modeling Framework (COMF) which supports 12 Operational Forecast Systems from Phase 2 to Phase 3 (July 2019)

  - ✓ Completed implementation of the Cook Inlet Operational Forecast system in conjunction with the transition to Phase 3 (July 2019)

  - ✓ Completed implementation of the Lake Michigan Huron Operational Forecast system in conjunction with the transition to Phase 3 (July 2019)

- ## Storm Surge

  - ✓ Completed transition to operations of Hurricane Surge On-demand Forecast System (HSOFS) Version 2

  - ✓ Completed transition of the Extratropical Surge and Tide Operational Forecast System Pacific (ESTOFS-Pacific) to Phase 3

FY20 Program Priorities

- ▪ 3D OFS
  - • Hire NOS Coastal Modeling Portfolio Manager
  - • Deliver NOS Coastal Modeling Strategy to support diverse water missions
  - • Implement the West Coast Operational Forecast System and the Integrated Northern Gulf of Mexico Operational Forecast System prior to the FY21 moratorium
  - • Develop sustainable operational framework to support data assimilation for coastal ocean models (WCOFS, Marine JEDI, Hurricane Supplemental)
  - • Investigate coupling of 3D OFS (ROMS and FVCOM) with the National Water Model (COMT, NWI)
  - • Evaluate freshwater ice forecasting capabilities in in the Great Lakes and continue collaboration with NWS (OPC) and the NIC on service delivery for ice forecasts

FY20 Program Priorities

- Storm Surge
  - Bundle ESTOFS-Atlantic, ESTOFS-Pacific, and ESTOFS-Micronesia into single package
  - Evaluate developing a global ESTOFS grid with high resolution in US waters
  - Continue work towards coupling of ESTOFS with WAVEWATCH III and the National Water Model
  - Coordinate with universities on Water Initiative, Hurricane Supplemental, Coastal Ocean Modeling Testbed, Joint Technology Transfer Initiative, and Ocean Technology Transition projects to advance modeling capabilities and transition them into operations. Projects are addressing topics such as:
    - Model and grid improvements to connect ESTOFS with NWM
    - Evaluation of different coupling mechanisms between NOS coastal models and NWM
    - 3D model connections to NWM
    - Alaska storm surge modeling
    - Improved efficiency of model run times

Programmatic Challenges

- Deliver models as scheduled to meet the National Ocean Service's mission priorities (Precision Navigation, Coastal Coupling, DA) prior to start of FY21 HPC moratorium
- Collecting stakeholder requirements to ensure models meet user needs
- Availability of observations for model skill assessment and data assimilation
- Uninterrupted access to R&D and WCOSS supercomputing resources to support mission requirements
- Ability to support user needs for storm surge, especially during an event (ongoing 2-year evaluation)

Programmatic Opportunities

- NOAA Water Initiative/COASTAL Act
  - Coupling of coastal models with the National Wave Model to predict combined effects of surge, tide, wave action and freshwater in coastal zone, and improve water quality forecasts
- NOAA Precision Navigation/Integrated Navigation Services
- Data assimilation (Marine JEDI, Hurricane Supplemental, SIP)
- Invest in key technologies, such as critical observation systems and cloud computing (EPIC)
- Coastal Ocean Modeling Testbed (COMT)

Unified Forecast System (UFS)

- An established community model development approach

- Funding modeling community to develop code repositories to better enable community code management (Github)

- Experience with cloud computing to enable and facilitate development

- Software engineering to enable coastal ocean operational forecast system community model (ROMS and FVCOM) codes into the UFS

- Coastal ocean modeling systems not addressed in the UFS strategic plan
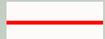
THANK YOU

NOS OFS Existing Geographic Coverage

Existing NOS OFS Coverage

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NOAA National Ocean Service

Storm Surge Modeling

HSOFS:
- FY2017 Q4 upgrade
- afterwards, annual Q3 upgrades

ESTOFS-Atlantic:
- FY2017 Q3 upgrade
- starting in FY2019, Q2 upgrades every 2 years

ESTOFS-Pacific:
- starting in 2018, Q1 upgrades every 2 years

ESTOFS-Micronesia:
- FY2017 Q4 implementation
- starting in FY2017, Q4 upgrades every 2 years