CI-FLOW Outline
(Coastal and Inland Flood Observation Warning)

Relevance

- Floods are responsible for the highest number of storm related fatalities

- Hydrologic extremes (drought and flood) are responsible for billions of dollars of economic loss annually

- Over half of the nation’s population lives in coastal areas of the United States

- CI-FLOW will demonstrate the capacity to track a raindrop from the sky-to the summit-to the sea to increase NOAA’s capabilities in providing water quality and quantity information to residents of coastal watersheds
Downstream of Greenville, the NWS does not produce any river forecasts and does not disseminate river stages or forecasts.

In non-flood situations, the only river information for yellow triangle locations from the NOAA NWS SERFC or NWS forecast office in Raleigh or Morehead City is a stage reading taken at 8AM and a 24 hour change.

Enfield is the only forecast point in the entire basin which the SERFC produces a 5 day forecast for river stage.
Increasing Need For Hydrologic Information As Coastal and Migratory Populations Increase

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Dare County population has increased almost 5 times since 1970

Brunswick County (Wilmington, NC Area) accounts for the largest number of seasonal housing (16,376) followed by Carteret and Dare Counties

Over half of the housing units in Dare County are seasonal

Inland counties of the Tar River Basin have some of the largest population densities in the region

Pitt County has nearly doubled its population and has the highest population density
Future Evacuations For Coastal Storms Moves Increasing Numbers of Citizens Inland To Growing Centers Of Population

By 2030, at the height of the tourist season, it would take 46 hours to clear U.S. 158 and 31 hours to clear U.S. 64 through Columbia.

Number of evacuating vehicles for a Cat. 3 hurricane during high (95%) occupancy

<table>
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<th>Location</th>
<th>2004</th>
<th>2030</th>
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<tr>
<td>N.C. 12 through Southern Shores</td>
<td>10,627</td>
<td>17,133</td>
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<td>Wright Memorial Bridge off Outer Banks</td>
<td>36,875</td>
<td>58,183</td>
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<td>US 158 at US 17 in Elizabeth City</td>
<td>14,541</td>
<td>22,749</td>
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<tr>
<td>US 64 from Manns Harbor to Columbia</td>
<td>20,599</td>
<td>32,389</td>
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CI-FLOW State of the Science QPE-NSSL, OHD, NESDIS, and RFC Stage 4 Precipitation Estimates Using Radar, Satellite, Lightning, Gauge, and Atmospheric Sounding Data Fields

CI-FLOW River Model Suite Provides Streamflow Simulations for Streams and Mainstem Rivers-

1) NWS Hydrology Lab Research Distributed Model (HL-RDHM) and
2) Academic Research Models
CI-FLOW Ocean Model Suite Provides Storm Surge Simulations (Water Levels) for coastline and for coastal streams, tidal creeks, and bays-

1) University of North Carolina- Chapel Hill and University of Oklahoma ADCIRC (IOOS Funding)

2) North Carolina State University Estuary-Lower River Flood Modeling System
CI-FLOW Will Demonstrate the Capability For A Coupled System Joining The Inland River Model Ensemble and Coastal Ocean Model Ensemble To Provide Simulations of Water Quantity
National and Regional Teams and Programs

Bringing CI-FLOW into Neighborhoods

NOAA in the Carolinas

CI-FLOW in the Tar-Pamlico and Neuse Watersheds

North Carolina Sea Grant

South Carolina Sea Grant

University of Oklahoma Sea Grant
Summary

- April milestone: Demonstrate a coupled inland-coastal ocean model system suitable for real-time CI-FLOW demo in tropical season

- An ensemble modeling approach will be used

  Sea Grant and other NOAA outreach and engagement activities is critical to capitalize on interdisciplinary expertise

- CI-FLOW will demonstrate the capacity to address a NOAA service gap in providing water quality and quantity information to residents of coastal watersheds which can be carried forward through emerging NOAA coastal programming efforts
Questions:

www.nssl.noaa.gov/ciflow

CI-FLOW
Leverage NOAA Visualization Tools To Provide Citizens Hydrologic Hazard Information (Illustration Purposes Only)
The Interdisciplinary, Multi-Agency, Multi NOAA Line Offices CI-FLOW Team (Educators, Social Scientists, CI-FLOW Researchers) Will Leverage NOAA Visualization Tools To Sustain A Dialog With Stakeholders To Increase Utility of CI-FLOW Tidal Zone Demonstration Information
Heavy Rainfall Ahead and During Coastal Storms Floods Inland Portions of Coastal Watersheds

Coastal Evacuations Transport Large Numbers Of Summer Visitors Out Of The Storm Surge Zone But Into Communities Threatened By Floodwaters Increasing A Region’s Exposure To Risk


- Freshwater Flooding: 59%
- Wind: 12%
- Surf: 11%
- Offshore: 11%
- Tornado: 4%
- Other: 2%
- Surge: 1%

Source: Edward Rappaport—Chief, Technical Support Branch, Tropical Prediction Center