Operational Awareness Dashboard for ADCIRC
Surge Guidance System

Brian Blanton
Lisa Stillwell
Phil Owen
RENCI
Operational Awareness Dashboard for ADCIRC Surge Guidance System

It is **difficult** to know the status of each/all running ASGS systems:

- **Up/down**
- **Running/waiting on inputs**
- **Sitting in queue waiting on resources**
Operational Awareness Dashboard for ADCIRC Surge Guidance System

But it is **critical** to know

- Up/down
- Running/waiting on inputs
- Sitting in queue waiting on resources
Operational Awareness Dashboard for ADCIRC Surge Guidance System

Let’s build a monitoring system for ASGS that:

- Alerts to problems
- Shows simulation status
- Predicts forecast availability time
Operational Awareness Dashboard for ADCIRC Surge Guidance System

Coastal Emergency Risk Assessment
Operational Awareness Dashboard for ADCIRC Surge Guidance System

Coastal Emergency Risk Assessment
Operational Awareness System Examples

- NOAA/NCEP Central Operations

- Operational Modeling Branch
  - [https://www.nco.ncep.noaa.gov/omb/](https://www.nco.ncep.noaa.gov/omb/)

- Compute NOAA/NCEP operational models for climate, weather, ocean, space and environmental hazard products

- Manage the flow of data and products
- Dozens of model runs per cycle
- Hundreds of pre/post operations per cycle
Operational Awareness System Examples

- **NOAA/NCEP Central Operations**

  - **Current Status of the NCEP Production Suite**
    - Event: Current Status
    - Time: 12 UTC GPS

  - **Legend**
    - SCHEDULED: Time next to it is today's start time.
    - COMPLETED/START DELAYED: Time next to it is today's end time.

  - **Examples**
    - **Data Dump and Prep**
      - Start Time: 14:47:12
      - End Time: 14:55:28
      - Status: COMPLETE-14:55:45
      - Comments: ON-TIME
    - **Analysis**
      - Start Time: 14:55:35
      - End Time: 15:10:24
      - Status: COMPLETE-15:17:39
      - Comments: ON-TIME
    - **T254 Forecast**: Scheduled
      - Start Time: 16:36:33
      - End Time: 16:48:52
      - Status: SCHEDULED
      - Comments: ON-TIME
    - **24h Products**
      - Start Time: 15:18:22
      - End Time: 15:33:38
      - Status: COMPLETE-15:32:43
      - Comments: ON-TIME
    - **36h Products**
      - Start Time: 15:38:45
      - End Time: 15:49:58
      - Status: COMPLETE-15:59:17
      - Comments: ON-TIME
    - **48h Products**
      - Start Time: 15:42:24
      - End Time: 15:44:41
      - Status: COMPLETE-15:43:19
      - Comments: ON-TIME
    - **864h Products**
      - Start Time: 15:09:51
      - End Time: 15:22:05
      - Status: COMPLETE-15:58:09
      - Comments: ON-TIME
    - **Selected Products**
      - Start Time: 10:38:30
      - End Time: 10:49:40
      - Status: RUNNING 10:49:38
      - Comments: ON-TIME
    - **12h NOS Forecast**
      - Start Time: 10:36:22
      - End Time: 10:47:05
      - Status: RUNNING 10:46:38
      - Comments: ON-TIME

  - **For questions or comments related to this website, send email to [email].**
  - **Subscribe to the NCEP Production Suite change notification mailing list [here].**

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**NCEP Primary Server Site**

<table>
<thead>
<tr>
<th>IDP Application</th>
<th>ORL</th>
<th>RSTN</th>
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<tbody>
<tr>
<td>MCDSY PRD</td>
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<td>HYRIS</td>
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**Dozens of model runs per day**

**Hundreds of pre/post operations**
Operational Awareness System Examples

➢ Air Traffic Control
Research Work and Accomplishments

- Software/technology project to develop a web viewer for ASGS outputs
- Technology implementation relatively straight-forward (by software engineers/experts)

<table>
<thead>
<tr>
<th>Component 1</th>
<th>Component 2</th>
<th>Component 3</th>
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</thead>
<tbody>
<tr>
<td>Instrument ASGS to send status messages</td>
<td>Collect messages into central database</td>
<td>Build a website to show ASGS statuses to end-users</td>
</tr>
<tr>
<td>Python/pika</td>
<td>RabbitMQ PostGres</td>
<td>Django</td>
</tr>
</tbody>
</table>
Research Work and Accomplishments

- Software/technology project to develop a web viewer for ASGS outputs
- Technology implementation relatively straight-forward (by software engineers/experts)
Research Work and Accomplishments

https://asgs-monitor.renci.org
Air Traffic Control Systems

Who are the End Users?

• Airplane passengers?
  ➢ NO
    ➢ They are not making decisions based on overall situation
    ➢ Don’t know (and don’t WANT to know) everything going on in the airspace.
    ➢ But they clearly, have a (substantial) interest in the success of the operational awareness system.
    ➢ They are stakeholders, not end users.

• It’s the pilots, airports, controllers
  ➢ Because they DO make decisions based on the overall situation
  ➢ Their awareness comes from a “dashboard”
End User Engagement

• **ASGS Operators themselves**
  - Jason Fleming, SCC
  - Matt Bilskie, LSU
  - Brian Blanton, RENCI
  - Nate Dill, Ransom
  - Rick Luettich, UNC/IMS/CRC
  - Brett Estrade

• **Those fielding calls from broader End User community (USCG, FEMA, NHC, etc).**

• Specific interactions to date:
  - Constant communication/updates via Slack Channel
  - Specific, in-depth demonstrations to J. Fleming, R. Luettich
  - Feature additions and clarification of presented content

• Upcoming demonstration e-meeting for all operators (late April 2019)
Transition

1. Recall: the ASGS OAD end users are the ASGS operators themselves.
   - But: the end users don’t run the software (i.e., OAD), rather they look at the dashboard webpage
   - The transition “data” is the information about the operating ASGS systems across HPC centers

2. The software infrastructure for OAD is available on GitHub repositories
   - RabbitMQ/PostGres/Django implementation @ https://github.com/RENCI/ASGS_Web
   - Messaging built in to ASGS @ https://github.com/jasonfleming/asgs
Anticipated Project Impact

(Direct) End-Users:
• Increased real-time awareness of all ASGS systems
• Increased ability to respond to warnings/alerts in the OAD
• Move ASGS simulations to other HPC resources
• More robust/fault-tolerant ADCIRC-based prediction system
• Marketing of activities to commercial end users
  • Increased confidence in products and ASGS as a bona fide forecasting operation system

(Indirect) End-Users:
• More reliable delivery of products to outlets (i.e., CERA systems)
• Increased confidence in products and ASGS as a bona fide forecasting operation system
Y5 development

- Move infrastructure to “the cloud” (AWS)
- Develop messaging to send cluster status/capacity/load
- Allow operators to configure/deploy ASGS via website
Compound Flooding

Co-occurrence of inland flooding and coastal surge

“The water piles up from both sides.”

Jeff Masters, Weather Underground.

Frequencies increasing (Wahl et al, 2015)

- Not necessarily tropical
- Increasing occurrence of storm surge events with higher precipitation rates


COUPLING INLAND HYDROLOGIC MODEL TO COASTAL STORM SURGE MODEL

Brian Blanton¹, Rick Luettich¹, Youcan Feng¹
Clint Dawson², Jason Fleming³

¹The University of North Carolina at Chapel Hill
²The University of Texas at Austin
³Seahorse Coastal Consulting

CRC 4th Annual Meeting
March 27-28, 2019
The University of North Carolina at Chapel Hill
Direct ingestion of Nat’l Water Model flows into NOAA’s ADCIRC prediction system

Different element types in ADCIRC
Lower Cape Fear River
Wilmington area

GSSHA Domain
Channel Flows
Inundation Depths
Benefits/Outcomes

- Improved decision support products for compound flooding events
- New capabilities and functionality in ADCIRC/ASGS and transition of software into operational environments.
- Better understanding of coupling “requirements” for inland/river to coastal models (ADCIRC)