R2O experience on the National Water Model: Research Community Perspective
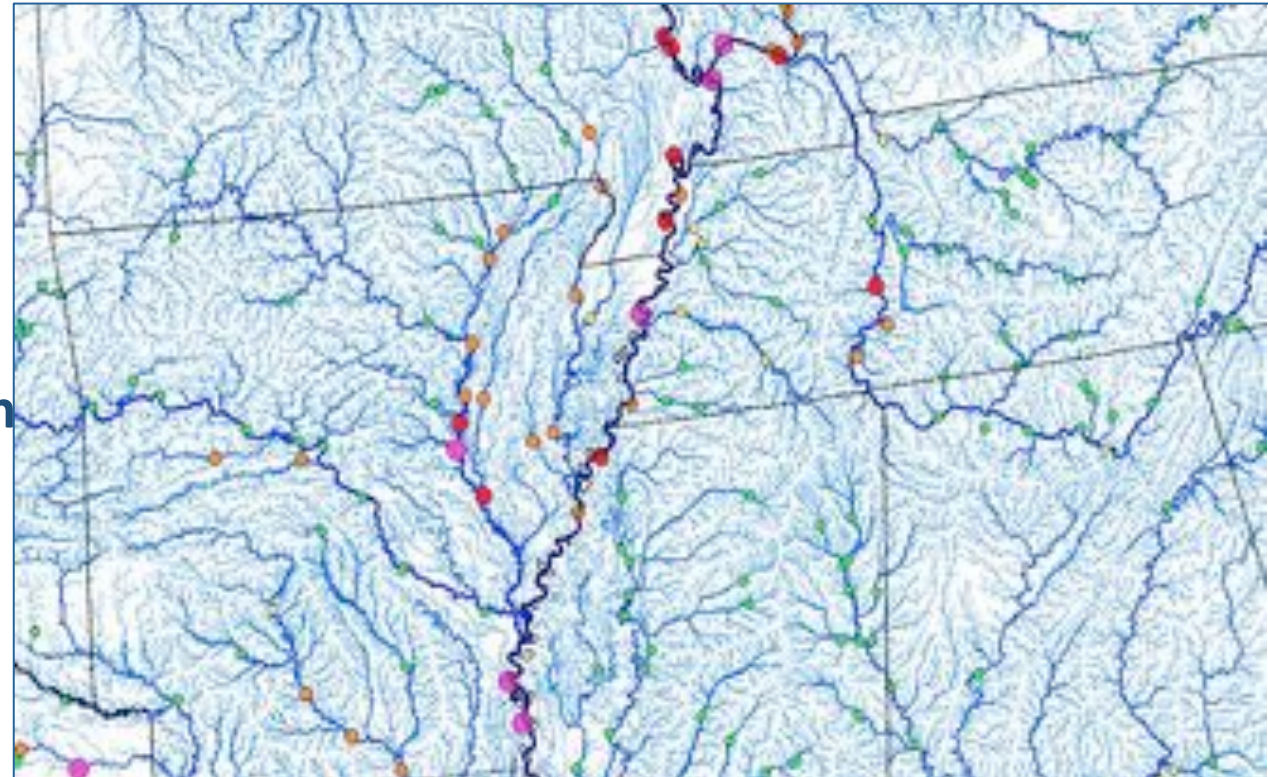
Dr. Jerad Bales

Executive Director, CUAHSI

1 November, 2017

Building a Weather-Ready Nation by Transitioning Academic Research into Operations Workshop

National Center for Weather and Climate Prediction

College Park, MD

Gochis et al., 2017, The NOAA National Water Model, Research to Operations to Research

What is CUAHSI?

- **CUAHSI is a 501(c)3 Non-Profit Consortium of about 130 U.S. Academic Institutions, Non-Profits, and International Universities**

- **Mission is to shape the future of water science by:**
  - **Strengthening collaboration**
  - **Developing and delivering data, models, instrumentation and technologies**
  - **Promoting education**

- **15-Member Board of Directors with three Standing Committees**
  - **Hydroinformatics**
  - **Education and Outreach**
  - **Instrumentation**

Characteristics of Research and Operations

Research: Untested technologies, new knowledge of uncertain or distant future application valued

Operations: Robust technologies, continuity, practicality valued

Research	Operations
Funding supports entirely new topics.	Funding limits ability to do new things.
Products primarily are papers, published episodically.	Routine/rigid delivery of products.
Code standards, documentation often of secondary importance.	Code standards and documentation are essential.
Driven by scientific curiosity, funding and quest for new results and publications.	Driven by system security and reliability considerations.
Research personnel is cost is high.	Software maintenance cost is high.
Narrow, highly-trained user community.	Broad user base, often untrained, requiring support.

R2O Challenges

- **Cultural differences between the research and operational communities (Role of agency vs. university research).**

- Organizational issues, including competing priorities.

- **Poor communication and coordination between the research and operational communities.**

- Lack of adequate financial or educated human resources.

- **Absence of effective long-range planning.**

- Inadequate scientific knowledge or technological capability.

- **Understanding the customer and customer expectations.**

- Resistance to a community model.

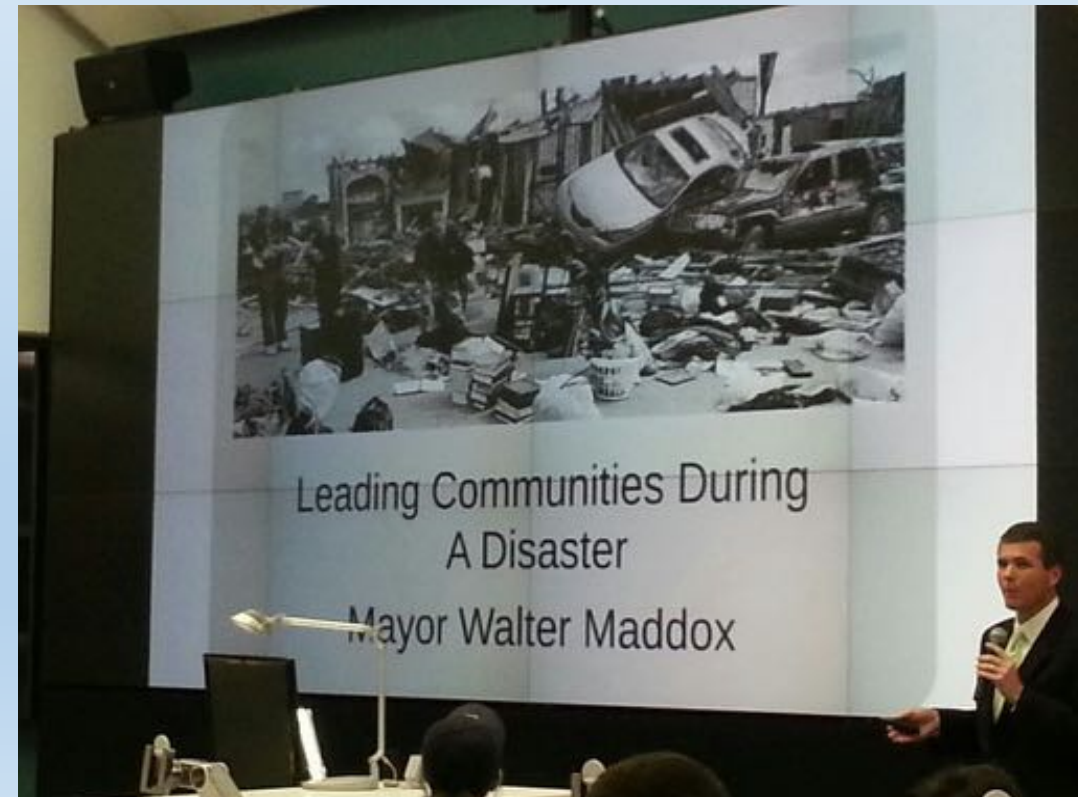CUAHSI
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CUAHSI's Summer Institute—Organization

- **Partnership between NWS and CUAHSI.**

- **Involvement of academic community, NCAR, DHS, US ACE, USGS, local orgs.**

- **Participants:**
  - Theme Leaders and their invitees (3+)
  - Student Course Coordinators (2 – 3)
  - Students (30 – 40 graduate students)
  - Student Advisors

- **Six-week on-site residential program**
  - Theme Leaders present first two weeks
  - Project teams of 3 – 4 students
  - Training at the beginning, then project execution.
  - Capstone

CUAHSI's Summer Institute—Outcomes and Challenges

- **More than 100 students trained on NWM creating next generation of researchers and users, more than half of their advisors engaged in the process.**

- **Advances in the NWM functionality and improved understanding of performance.**

- **Growing engagement of academic community.**

- **JAWRA Featured collections and CUAHSI – NOAA Technical Reports.**

- **Transformational educational experience.**

Leading Communities During A Disaster
Mayor Walter Maddox

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Next Steps—Meeting the Needs of NWM Users

- **Output users**
  - What should be archived and by whom (NCAR, NWC, CUAHSI)?
  - What is an acceptable output format?
  - Is NHD sufficient, or should NHDPlus be considered?
  - Documentation for execution.
- **Model users**
  - What is the relation between WRF-HYDRO and NWM, and how does that remain stable?
  - How can user mimic NWM simulations for further testing on a sub-continental scale?
  - Documentation for processes.
- **Developers**
  - Ensuring R2O, version control, official vs. unofficial (research) codes.

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Meeting the Needs of NWM Users—CUAHSI's Role

- Work with NCAR on governance.

- Provide community tools through HydroShare, including documentation and version control of apps and tools.

- Provide community data sets for selected use cases through CUAHSI Water Data Services. (Harvey/Irma and Maria RAPID awards).

- Continue with Summer Institute.

- Organize and host NWM Community Users Meetings.

Thank you
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Brochdale, England, 2001
http://www.euwfd.com/html/groundwater.html