



Tom Graziano
Ed Clark
Trey Flowers

AGU FALL MEETING
Online Everywhere | 1–17 December 2020

NOAA's National Water Center: Programmatic Update and Opportunities for Collaboration

December 8, 2020





What organization or sector are you from?



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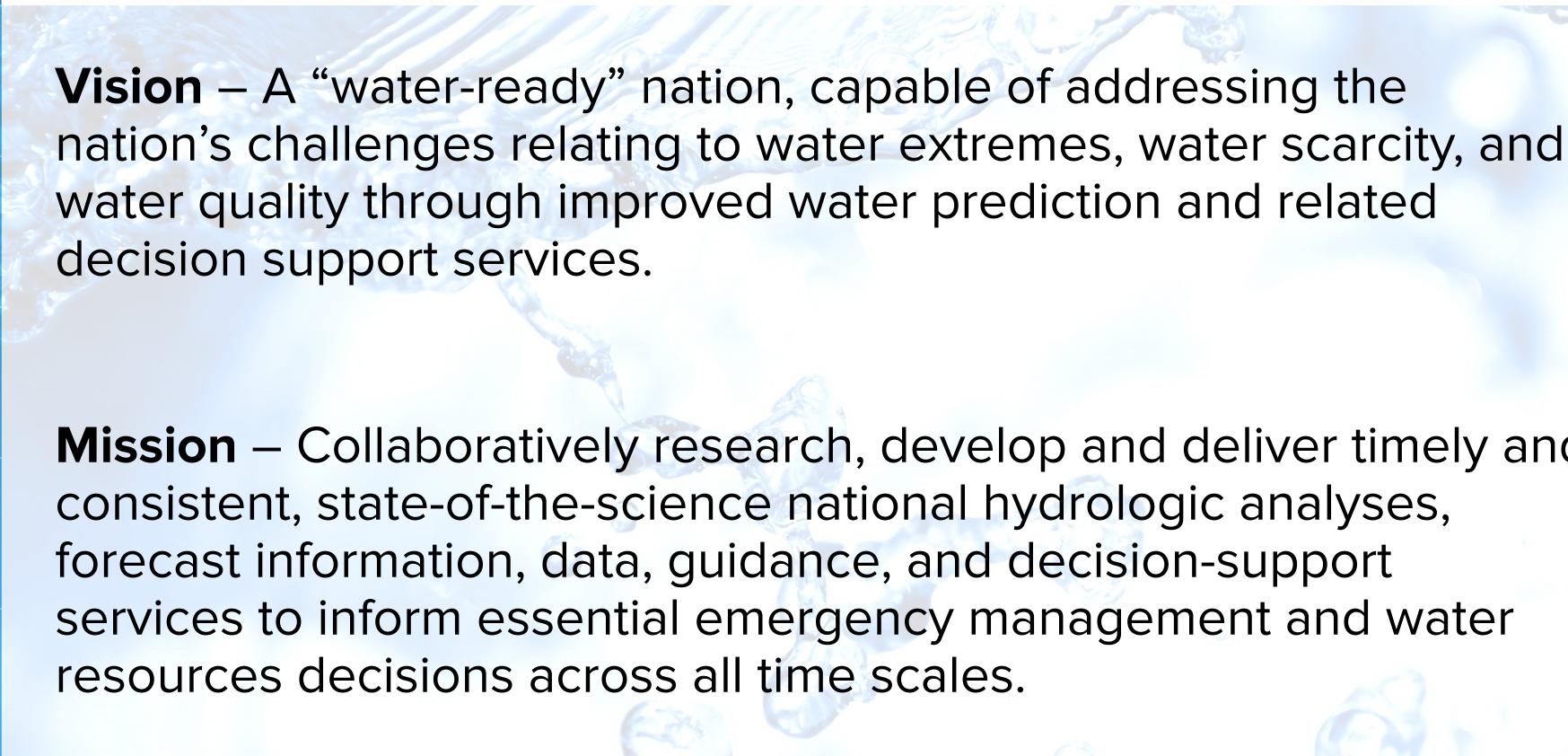


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OWP Vision and Mission



Vision – A “water-ready” nation, capable of addressing the nation’s challenges relating to water extremes, water scarcity, and water quality through improved water prediction and related decision support services.

Mission – Collaboratively research, develop and deliver timely and consistent, state-of-the-science national hydrologic analyses, forecast information, data, guidance, and decision-support services to inform essential emergency management and water resources decisions across all time scales.





NOAA-NWS Office of Water Prediction

Next-Generation Water Resources Modeling: A Community Research, Development, Testing and Operations Software Framework

Fred L. Ogden

IBSS Corporation
Affiliate, NOAA-NWS Office of Water Prediction

Fred.Ogden@noaa.gov

2020 AGU Fall Meeting, NOAA-NWS Office of Water Prediction Community Town Hall, Dec. 8, 2020





Hydrologic Prediction: Truisms from the literature

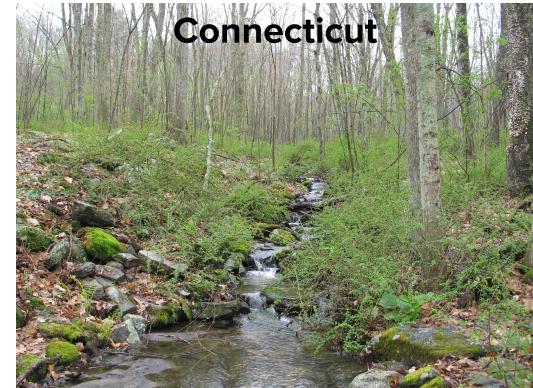
- Environmental prediction- wicked problem
- Uniqueness of place - process uncertainty
- Parsimony - parameter uncertainty
- Space/time limits on predictability - forcing, seasonality, anthropogenics, ...
- There is no “one model to rule them all”



Sierra Nevada



Wyoming



Connecticut

Modeling Challenges

- Legacy models present challenges:
 - Setup workflow
 - Data model/standards
 - Run time environment & coupling
- We continue to re-write code to solve common problems:
 - Duplicitous
 - Re-producing bugs

Standards provide many benefits



By John O'Neill - (wikimedia), CC0,
<https://commons.wikimedia.org/w/index.php?curid=24925504>





In one word, name the greatest need in developing a collaborative computational environment to advance hydrologic prediction.



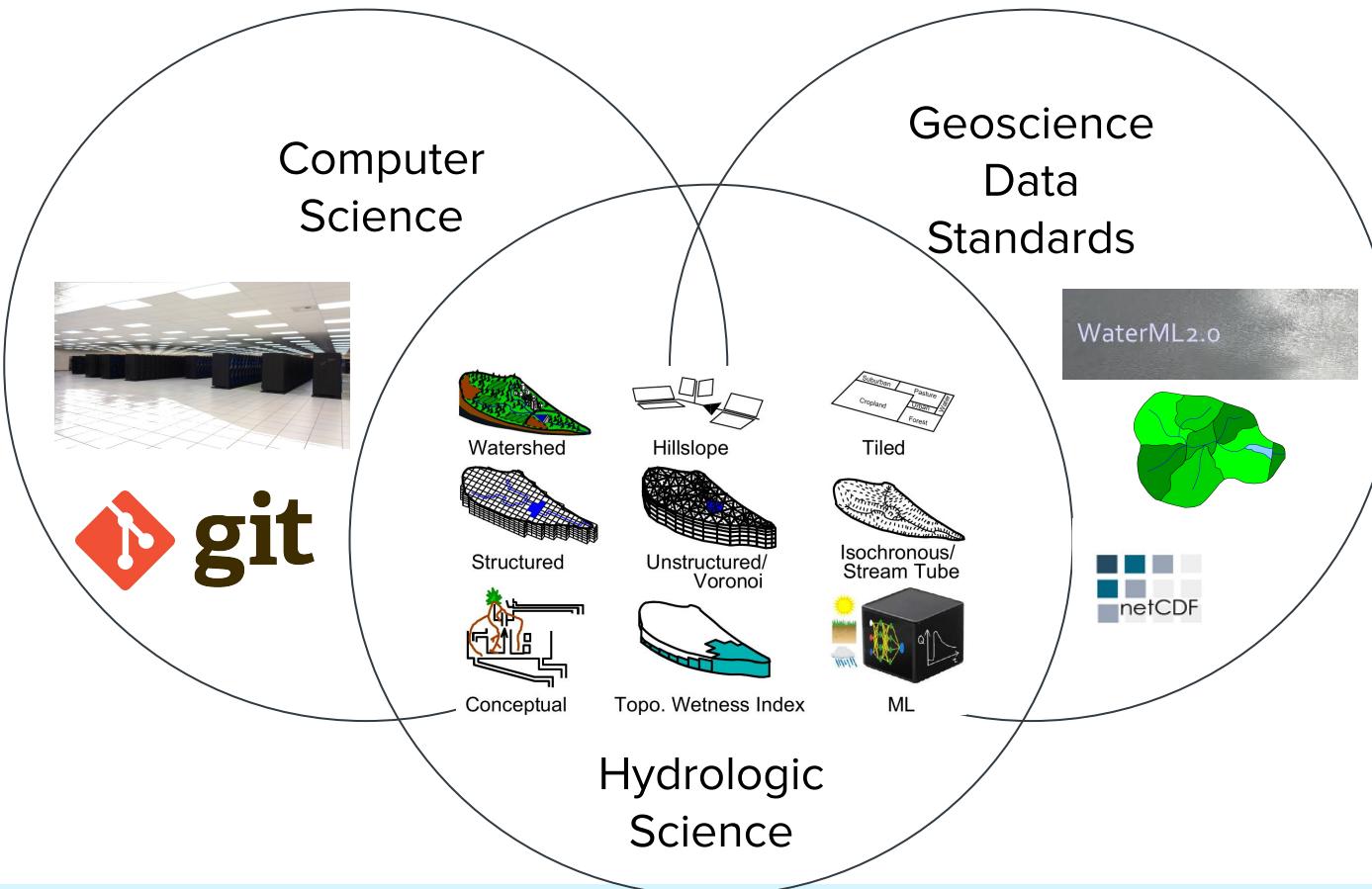
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Next Generation Framework Motivations/Enablers



Next Generation Water Resources Modeling Framework

- The stage is set:
 - Open source code development paradigm
 - Standard geospatial data models & libraries
 - CSDMS Basic Model Interface
 - Agency need to promote science and interoperability





Framework Design

- Use data/library standards where available
- Develop HPC capable model coupling standard
- Apply WaterML 2.0 Hy_Features data model to unify model setup workflows

Objectives

- Weeks not months or years to add functionality
- Rapid prototyping and scientific evaluation
- Promote interoperability
- Facilitate authoritative/repeatable modeling
- Run on laptops and supercomputers
- Domain scientist/engineer friendly

Prototype: <https://github.com/NOAA-OWP/ngen>

Contact: Fred.Ogden@noaa.gov





USACE NATIONAL WATER MODEL COLLABORATION

Jane McKee Smith, PE, PhD, D.CE

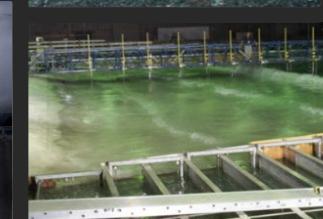
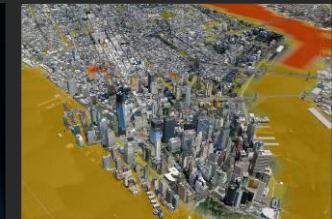
Senior Research Scientist, Hydrodynamic Phenomenon

Mark Wahl, John Eylander, Ahmad Tavakoly, Chris Massey,

Joseph Gutenson, Matthew Farthing, Ty Wamsley, Cary Talbot

AGU

8 Dec 2020



US Army Corps
of Engineers®



Decisions USACE Supports

- Risk/Vulnerability Assessments (economic, social and environmental impacts)
- Planning & Design (flood, drought, navigation, ecosystems)
- Disaster Support (flood, debris flow)
- Reservoir Operations
- Key Infrastructure – Operations, Safety
 - Navigation
 - Flood Control
 - Power Generation/Transmission
- Military Planning
 - Logistics
 - Mobility
- Food, Water and Power Security
- Conflict, Migration, Treaty Monitoring

Ranges of temporal
and spatial scales of
processes, responses
and decision making



Coupled Inland, Estuary & Coastal Environment

Dr. Ehab Meselhe



Professor in the Department of
River-Coastal Science and Engineering at
Tulane University

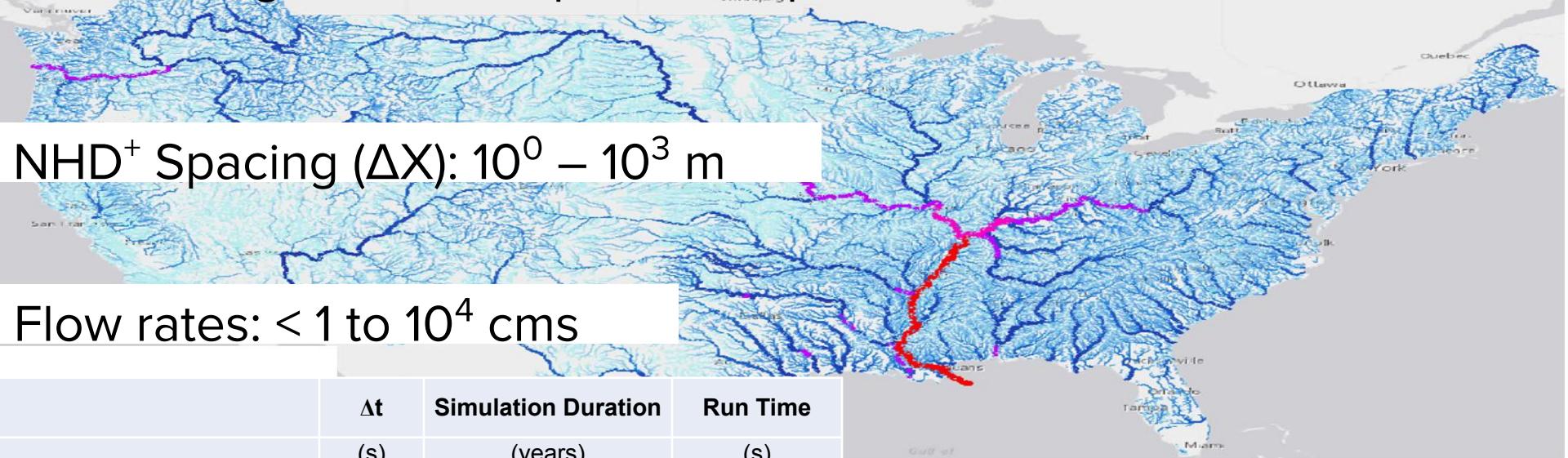


Heterogeneous Channel Routing Strategy for the National Water Model

National Water Model

Broad range of bed slopes

Depths: few cm to 10s of m



	Δt	Simulation Duration	Run Time
	(s)	(years)	(s)
Dynamic Wave	240	11	1,590
Diffusive Wave	Var	11	370
Muskingum Cunge	240	11	536

Tulane: E. Meselhe, N Beg

NWC: J. Halgren, D. Kim, F. Ogden, T. Flowers



Fernando Salas
NOAA National Water Center



Austin Raney
The University of Alabama
NOAA Affiliate

OWP | OFFICE OF
WATER
PREDICTION





The 6th National Water Center Innovators Program: Summer Institute (SI)

- Established in 2015 as a partnership between CUAHSI and the National Weather Service to help engage the academic research community in the enhancement of the National Water Model
- Intensive summer program in which graduate students conduct group projects on a “theme” that involve rapid prototyping of new ideas, culminating in a capstone presentation and usually a publication
- 147 students at 77 universities have been trained on the National Water Model
- Theme leaders from US universities and staff at the National Water Center advise on projects throughout the summer

Accepting Applications Now

APPLICATION PERIOD CLOSES JANUARY 19TH

- Eligibility: current graduate student affiliated with a US university
- Students will participate virtually for the entire program June 7th - July 23rd
- Students earn a stipend (new for 2021)
- Must have letter of endorsement from a faculty advisor
- Apply now through Proposal Space:
cuahsi.org/education/summerinstitute/



Contact Julia at CUAHSI with any questions: jmasterman@cuahsi.org



➡ Respond at **PollEv.com/noaanational117**

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In one word, name the greatest need in developing a collaborative computational environment to advance hydrologic prediction.



community funding
standards standardization backgrounds
common cooperation
interoperability
tools noaa/nws humility
variety governance participation



Thank you for attending our Town Hall!
Be sure to connect with us on
GitHub, Twitter, and YouTube or contact us at
nws.nwc@noaa.gov

