



NOAA
WEATHER
PROGRAM OFFICE



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January 26, 2023

Activity Area 3:

Advancement and Transition of

Weather Research

Dr. Aaron Pratt, JTTI Program Coordinator



Activity Area 3: Advancement and Transition of Weather Research

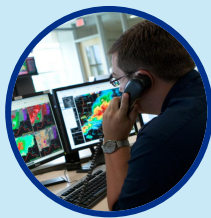
The Weather Program Office seeks recommendations regarding our mechanisms to find, fund, and transition research for use by operational stakeholders both within the National Weather Service and the broader Weather Enterprise.

The WPO activities included in this area are:



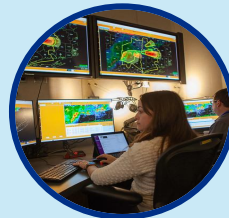
Air Quality & Fire Weather

WPO funds projects to test and demonstrate new, cutting-edge forecast capabilities to improve NOAA's air quality services.



Joint Technology Transfer Initiative

JTTI ensures the continuous, cost effect development and transition of the latest technological advancements to operations.



Weather Testbeds

WPO funds projects in NOAA weather testbeds to accelerate the transition of research to operations.

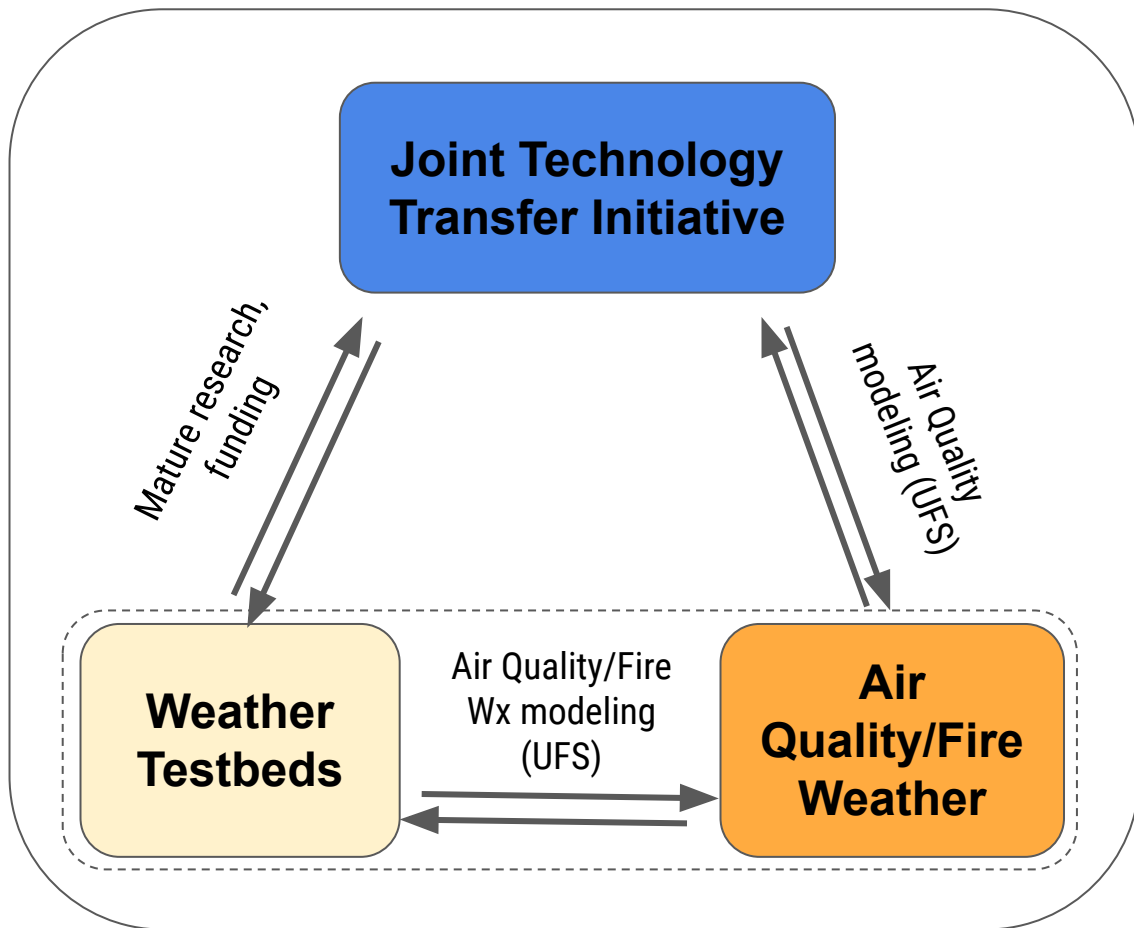


Research Transitions & Evaluation

WPO provides transition management and oversight that is closely coordinated with operational stakeholders.

COMMON THEMES

- Interdisciplinary nature of the programs discussed in this activity area.
- Significant synergy between programs.
- Projects concentrated in the development and demonstration sections of the research funnel.





AIR QUALITY & FIRE WEATHER

WPO's Air Quality Program & Fire Weather Activities funds research to transition new, cutting-edge forecast capabilities to NWS air quality forecast operations and improving NOAA's air quality services to the public.

Fire Weather activities include work to develop components related to a next generation coupled wildfire-weather Unified Forecast System.





JOINT TECHNOLOGY TRANSFER INITIATIVE (JTTI)

JTTI works to transition the latest scientific and technological advances into National Weather Service operations.

JTTI is the result of years (and even decades) of discussions regarding the challenge of creating a pathway for promising research to flow into operations.





WEATHER TESTBEDS

The Weather Testbeds Program fund projects to test and demonstrate new forecast technology in the NOAA testbeds.

Testbeds are collaborative spaces where forecasters and weather researchers work alongside each other to integrate solutions into operational weather forecasts.

Testbeds are a critical part of demonstrating research in a quasi-operational environment in order to advance and transition research





TRANSITIONS AND EVALUATIONS (R2X)

Successful transition of research to a specialized use (R2X) requires strong and consistent coordination within NOAA and across the weather enterprise.

The R2X team within WPO works to coordinate the policy, planning and execution of the transition of science from OAR to NOAA Line Offices, and beyond.

R2X acts as the glue for this activity area, binding together the other programs that will be discussed in this activity area





UPCOMING PRESENTATIONS

Activity Area 3: Advancement and Transition of Weather Research

Air Quality & Fire Weather

Jordan Dale



20 Minutes

Joint Technology Transfer Initiative

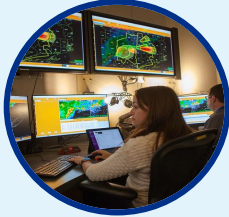
Chandra Kondragunta



20 Minutes

Weather Testbeds

Jordan Dale



20 Minutes

Research Transitions & Evaluation

Matt Mahalik

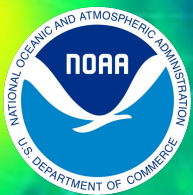


20 Minutes

Q&A Session



11:30–12:30pm



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THANK YOU

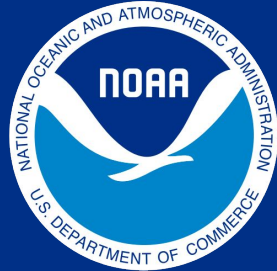


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Air Quality Program & Fire Weather

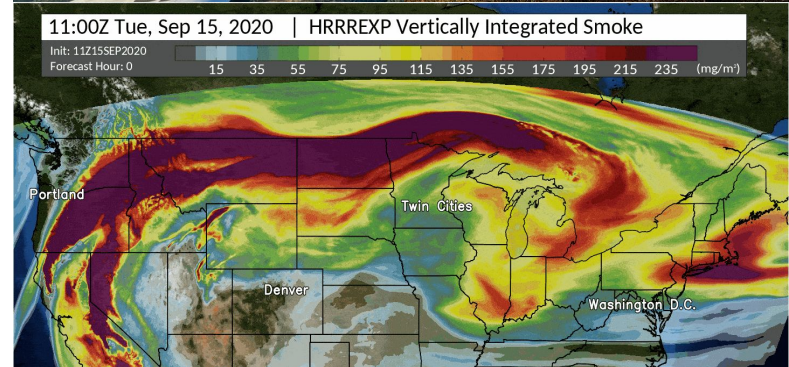
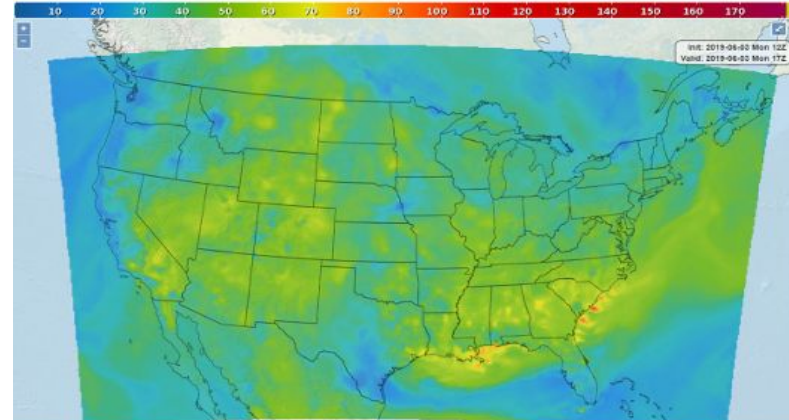
Jordan Dale, Air Quality Program Manager

Activity Area 3: Advancement and Transition of Weather Research



AIR QUALITY & FIRE WEATHER OVERVIEW

- The Air Quality Program funds projects that align with WPO priorities and aim to transition products into air quality and fire weather operations.
- With the development of NOAA's Unified Forecast System (UFS), research is heavily focused on the development and enhancement of air quality and fire models in UFS.



AIR QUALITY & FIRE WEATHER

OUR TEAM



**JORDAN
DALE**

Program Manager



**FELICIA
GUARRIELLO**

Program Coordinator

What We Do

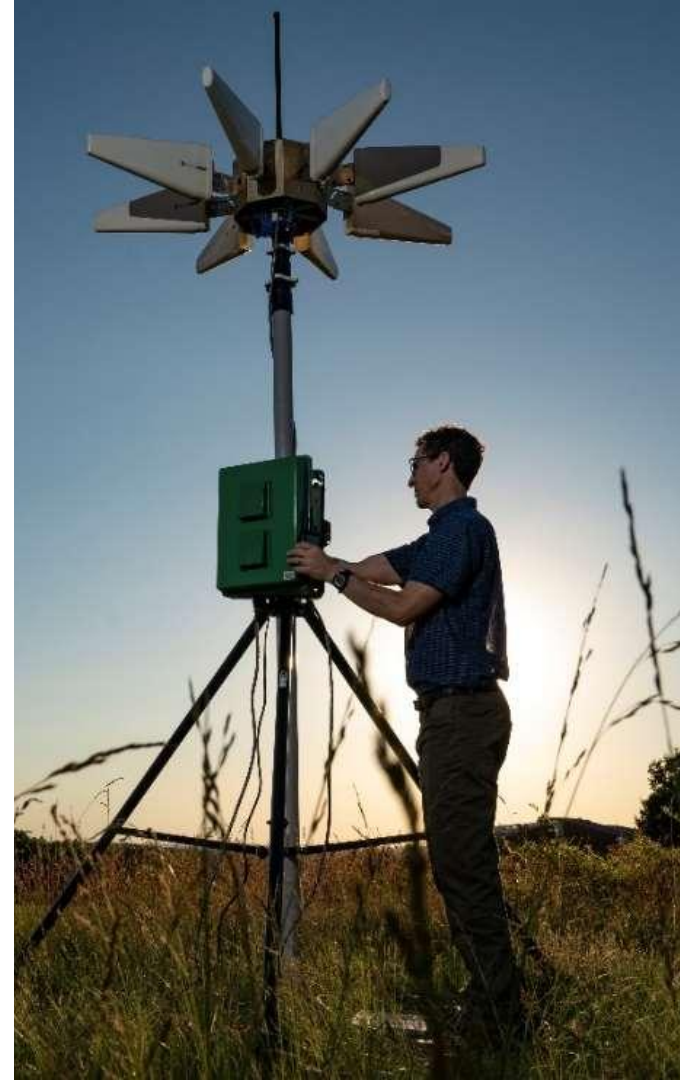
- Competitively fund academic partners, commercial industry, and NOAA laboratories through cooperative agreements to conduct research
- Projects test and demonstrate new cutting-edge air quality and fire weather forecast technologies (models, techniques, data, etc.) targeted for transitioning into National Weather Service (NWS) forecast operations



AIR QUALITY

RESEARCH PRIORITIES

- Development and evaluation of high-resolution air quality forecasting capabilities
- Improved spatial and temporal estimates of emissions
- Exploration and quantification of the potential value of ensemble model approaches, post processing and artificial intelligence to NOAA's operational air quality forecasting guidance
- Improved model accuracy using data assimilation of remotely-sensed products or in-situ observations



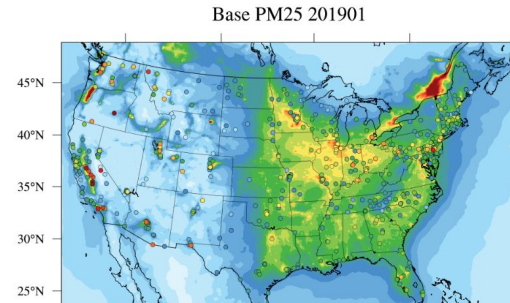
FY19 AIR QUALITY PROJECT HIGHLIGHT:

Developing a Testbed to Improve Air Quality Forecasts

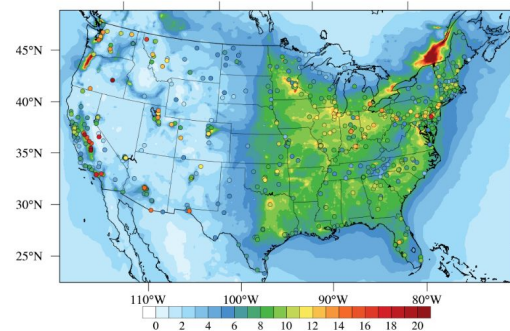
NAQFC Community Emission Testbed (NCET): Accelerating anthropogenic emission updates for NAQFC FV3-CMAQ through community collaboration

Lead PIs: Dr. Bok Haeng Baek, George Mason University; Dr. Daniel Tong, George Mason University

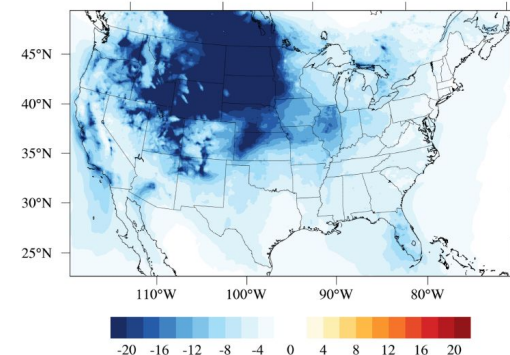
- Goal: Develop a community emission system that cost-effectively generates high quality emissions
- Assemble and deploy a cloud-based National Air Quality Forecasting Capability (NAQFC) Community Emission Testbed (NCET) to improve representation of emissions (smoke, dust, agricultural, vehicle) in NAQFC
- Determine preferable emission configurations for improving ozone (O_3) and fine particulate matter (PM_{2.5}) forecasts
- Successfully implemented new Community Multiscale Air Quality (CMAQ) inline coupler for Meteorologically-induced Emissions (MetEmis) into CMAQ v5.3.2



MetEmis PM25 201901



PM2.5 difference (MetEmis-Base)/Base January



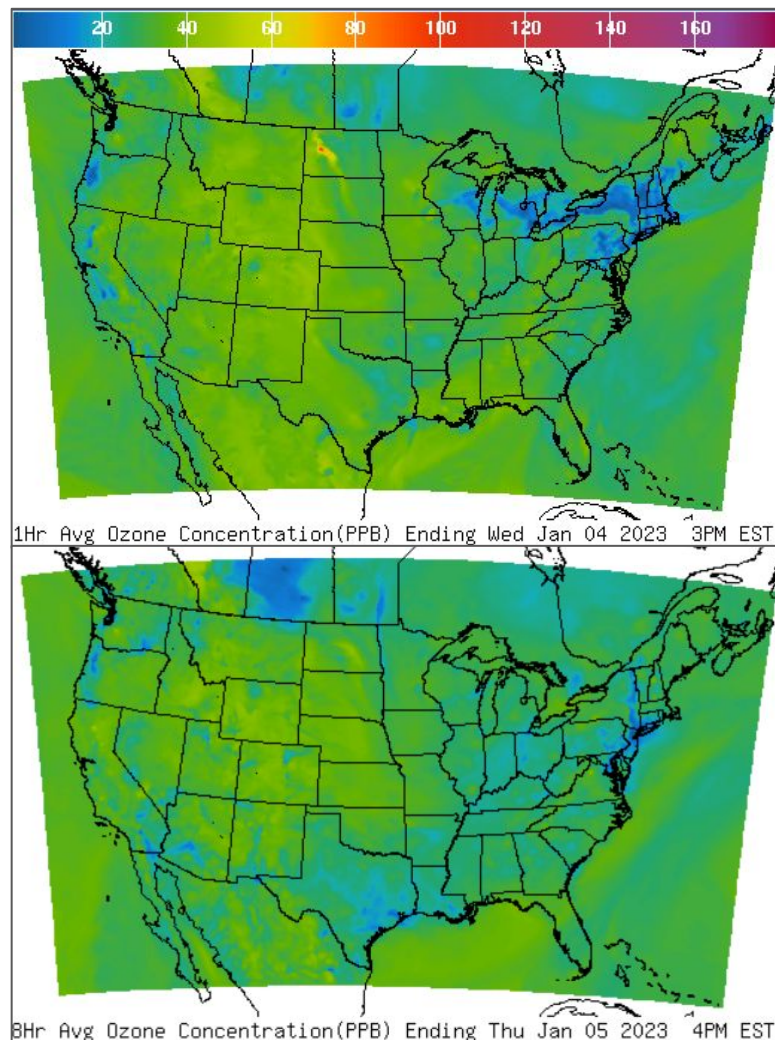
FY22 AIR QUALITY PROJECT HIGHLIGHT:

Exploring the Potential Value of Ensemble Air Quality Predictions

A novel dynamical ensemble design for probabilistic air quality predictions during wildfires based on RRFS-CMAQ

Lead PI: Dr. Rajesh Kumar, NCAR

- Goal: Explore and quantify the potential value of ensemble air quality predictions using the Rapid Refresh Forecast System-Community Multiscale Air Quality (RRFS-CMAQ) model
- Will develop a 10-member dynamical ensemble suitable for operational air quality predictions during wildfires
- Outcome: Significantly improve the accuracy of NAQFC ozone and fine particulate matter predictions to assist air quality forecasters better protect public health





FIRE WEATHER

RESEARCH PRIORITIES

- Developing components related to a next generation coupled wildfire-weather Unified Forecast System that leads to improved forecasts of fire behavior and smoke
- Forecast system verification and predictability
- Social science and decision support services
- Subseasonal-to-seasonal forecasting



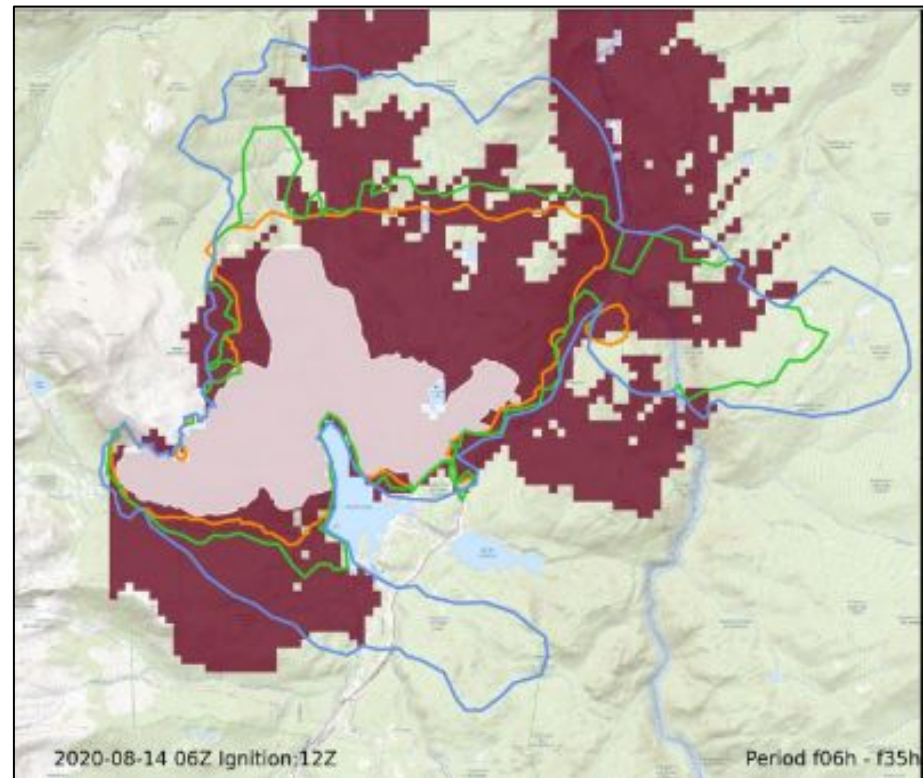
FY22 AIR QUALITY PROJECT HIGHLIGHT:

Integrate WRF-FIRE Module Into the UFS model

Implementing a state-of-the-science fire behavior model in the Unified Forecast System

Lead PIs: Dr. Pedro A. Jimenez Munoz, NCAR

- **Goal:** To incorporate a state-of-the-science fire behavior model (WRF-FIRE) that accounts for fire-atmosphere feedbacks into the UFS
- **Tasks include:**
 - Creating the Fire National Unified Operational Prediction Capability (NUOPC)
 - Implementing the fire behavior module in the Fire NUOPC
- **Outcome:** Explicitly simulate the fire-atmosphere feedbacks with UFS for the first time to simulate evolution of wildland fire spread and smoke transport and dispersion



Cameron Peak Fire Perimeter in WRF-FIRE
on August, 14 2020 in Colorado

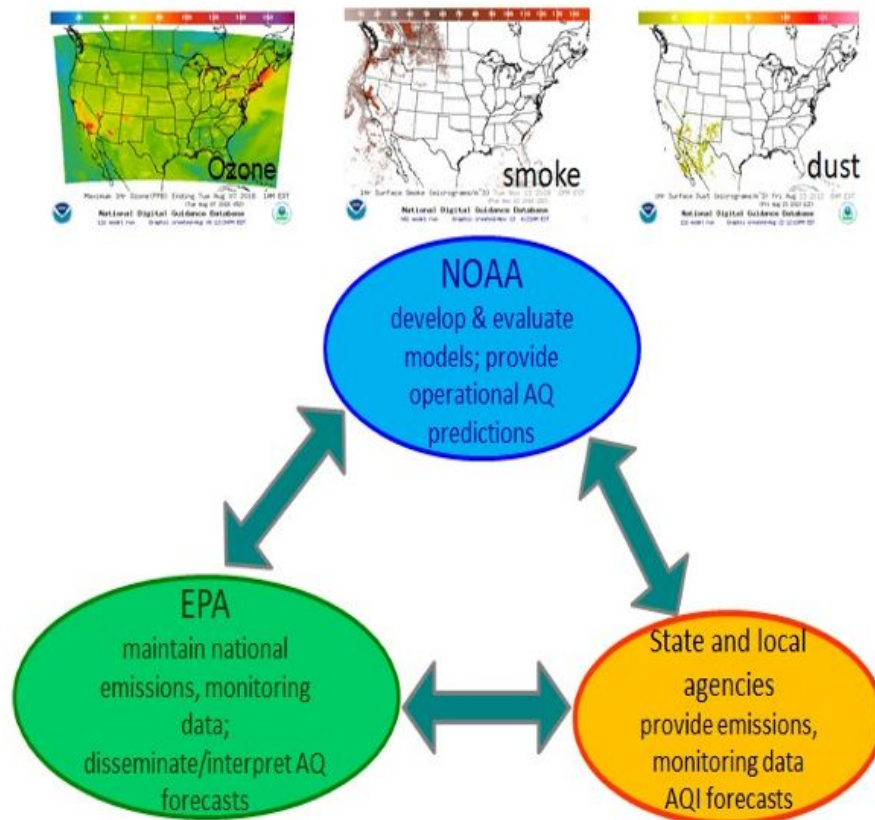


WPO AIR QUALITY

COLLABORATES WITH NWS/EMC NAQFC TEAM

- WPO regularly collaborates with NWS Environmental Modeling Center (EMC) to:
 - Develop and refine WPO's air quality research priorities
 - Review proposals submitted to WPO funding opportunities
 - Guide projects through R2O funnel with goal of transitioning into operations
- WPO works with EMC to support advancing NAQFC and improving air quality predictive capabilities

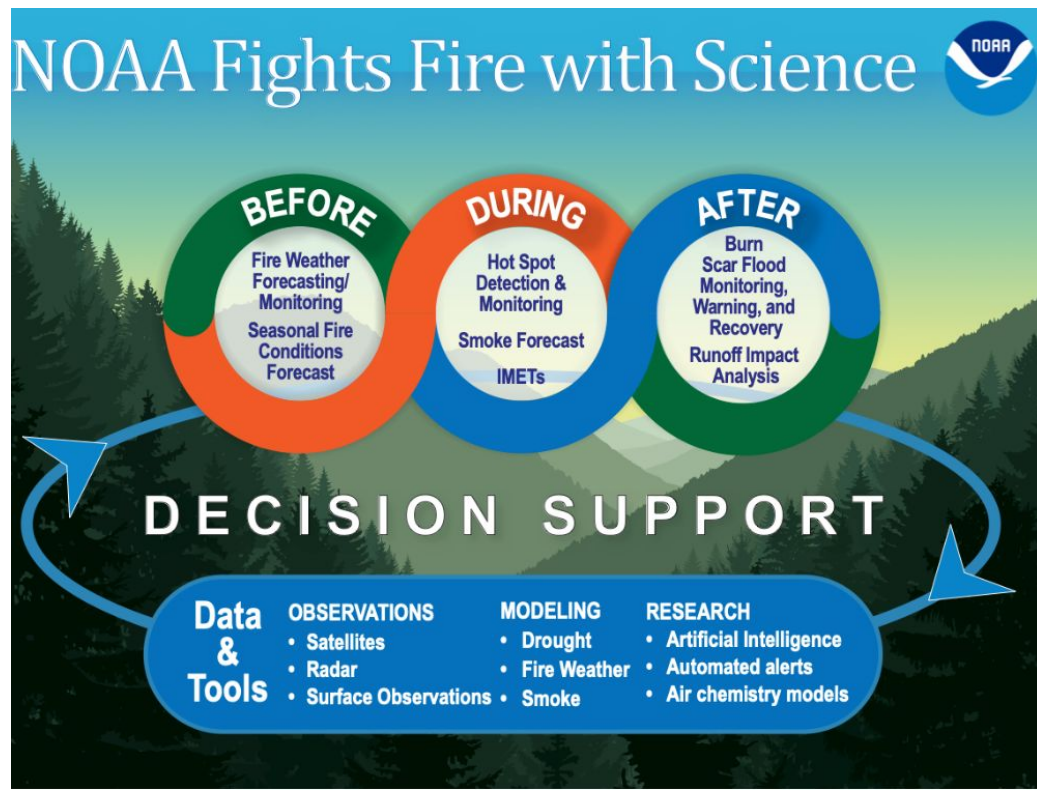
National Air Quality Forecasting Capability (NAQFC)



WPO FIRE WEATHER

ENGAGES WITH NOAA FOReST INITIATIVES

- WPO participates in NOAA's Fire Observation, Research, and Services Team (FOReST).
- FOReST coordinates fire weather activities across NOAA:
 - Membership includes NESDIS, NWS, and OAR
 - Reports to the NOAA Earth Systems Integration Board (ESIB) Weather Team
- FOReST helps inform WPO fire weather research priorities.





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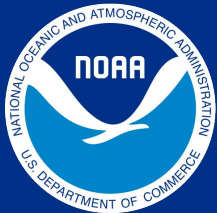


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Department of Commerce // National Oceanic and Atmospheric Administration



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January 26, 2023

Joint Technology Transfer Initiative (JTII) Program

Dr. Chandra Kondragunta, JTII Program Manager

Activity Area 3: Advancement and Transition of Weather Research





JOINT TECHNOLOGY TRANSFER INITIATIVE - MISSION

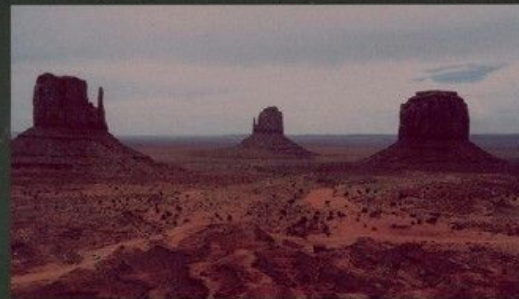
The JTTI Program, in coordination with the National Weather Service (NWS), funds and accelerates the transition of matured research from the Weather Enterprise to improve NWS operational efficiency and performance.

JTTI ensures ***continuous, cost effective development and transition*** of the latest scientific and technological advances into the NWS operations, while supporting efforts to sunset legacy systems.

**** The charge: "CROSSING THE VALLEY OF DEATH!"***

NATIONAL RESEARCH COUNCIL

FROM RESEARCH TO OPERATIONS IN **WEATHER SATELLITES** AND **NUMERICAL WEATHER PREDICTION**



CROSSING THE VALLEY OF DEATH

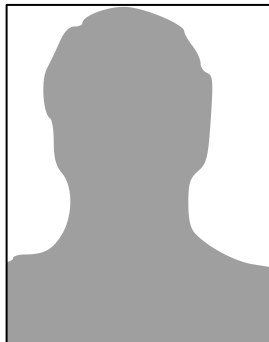
OUR TEAM



Program Manager

Dr. Chandra Kondragunta
Program Manager and Lead
Federal Program Officer (FPO)

Dep. Program Manager



Vacant

Program Coordinator



Dr. Aaron Pratt
Program Coordinator and
FY22 Internal Competition Lead

Temporary Members



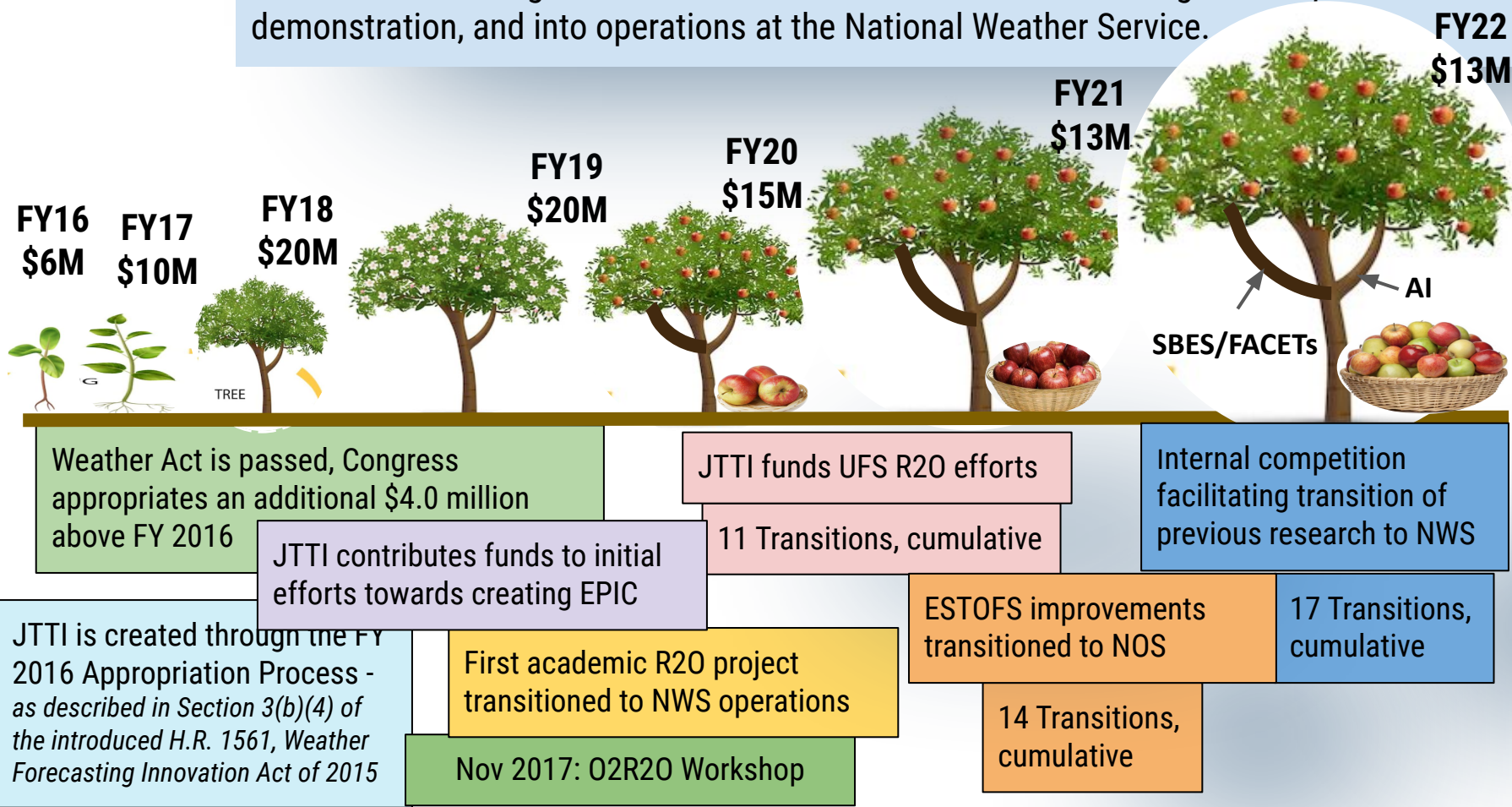
Dr. Henrique Alves
FPO and FY23 Innovations
Competition Lead



Dr. Valbona Kunkel
R2X Liaison and
Contract Support

HISTORY

JTTI was created in response to the need for designated R&D funding to ensure new and innovative technologies are able to transition from research through development and demonstration, and into operations at the National Weather Service.





ACTIVITIES

JTTI improves the nation's weather forecasting capability by transitioning cutting edge technologies from the Weather Enterprise to NWS (***which is critical for crossing the R20 divide***), by:

- Working with NWS to ***identify operational requirement gaps***.
- Selecting and funding the most promising interdisciplinary R20 projects that have ***higher potential for transition to NWS operations***.
- Fostering collaboration between researchers and operational entities ***early in the transition process***.
- Serving as ***knowledge brokers on NOAA's transition process***.



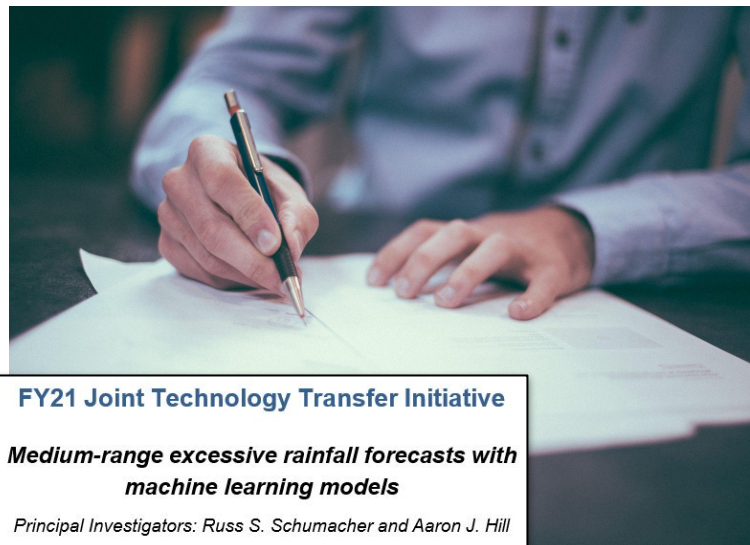


JTTI AND TRANSITION PLANS

To accelerate R2O transitions, JTTI follows **NAO-216-105B: Policy on Research and Development Transitions**

- A Research to Operations (R2O) transition plan is **recommended** for all funded projects above Readiness Level-4.
- Transition plans describe and facilitate the transfer of R&D2O, representing agreement between researchers, operators and/or users, for a feasible pathway and potential Concept of Operations (CONOPS).

*** JTTI has required transition plans for all projects funded by the program since its inception.**



FY21 Joint Technology Transfer Initiative

Medium-range excessive rainfall forecasts with machine learning models

Principal Investigators: Russ S. Schumacher and Aaron J. Hill

Department of Atmospheric Science/Cooperative Institute for Research in the Atmosphere, Colorado State University

Research to Operations Transition Plan



*Office of Oceanic and Atmospheric
Research and
National Weather Service*

** 76% of JTTI's funded R20 projects are external community, truly integrating the external community into the NOAA R20 process.*

COMPETITIONS

INTERNAL

36 Projects Funded since 2016

Move or accelerate mature research within NOAA (NWS) to advance projects that are short of the necessary resources to complete the transition process into operations.

These projects normally are at a higher readiness level and just need the final nudge to become operational.

EXTERNAL

116 Projects Funded since 2016

Provides resources to the external community (outside of NOAA), primarily as competitive grants solicited through the WPO annual Notice of Funding Opportunity (NOFO).

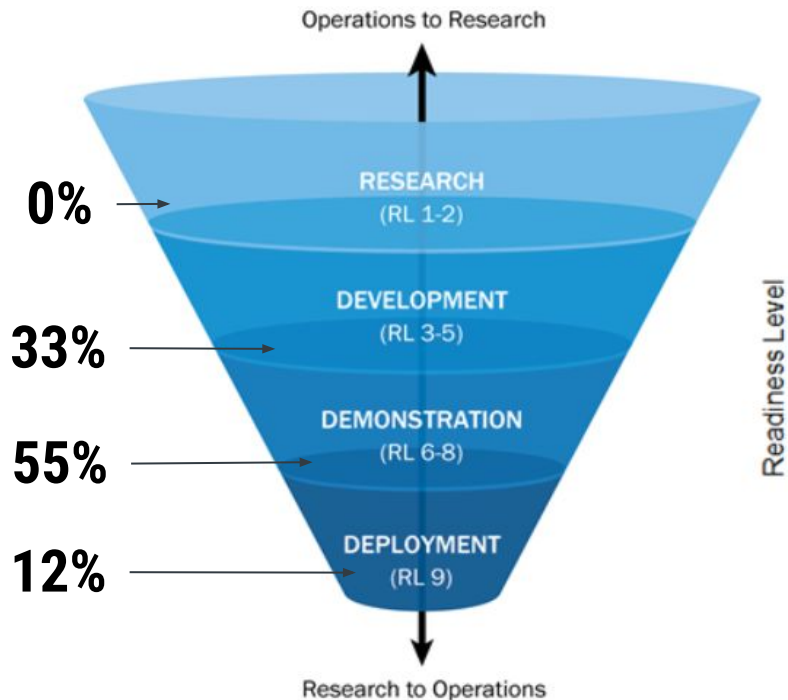
These projects can be from academia, industry, or other entities external to NOAA.



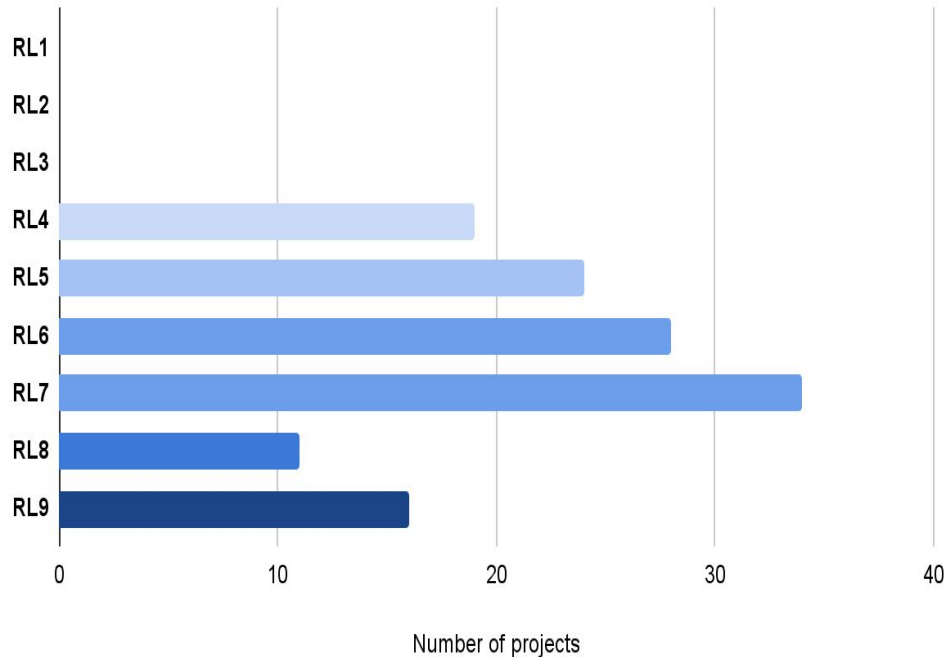


JTTI AND “THE FUNNEL”

** JTTI is the **first program in NOAA** to use RLs to track transition progress.*



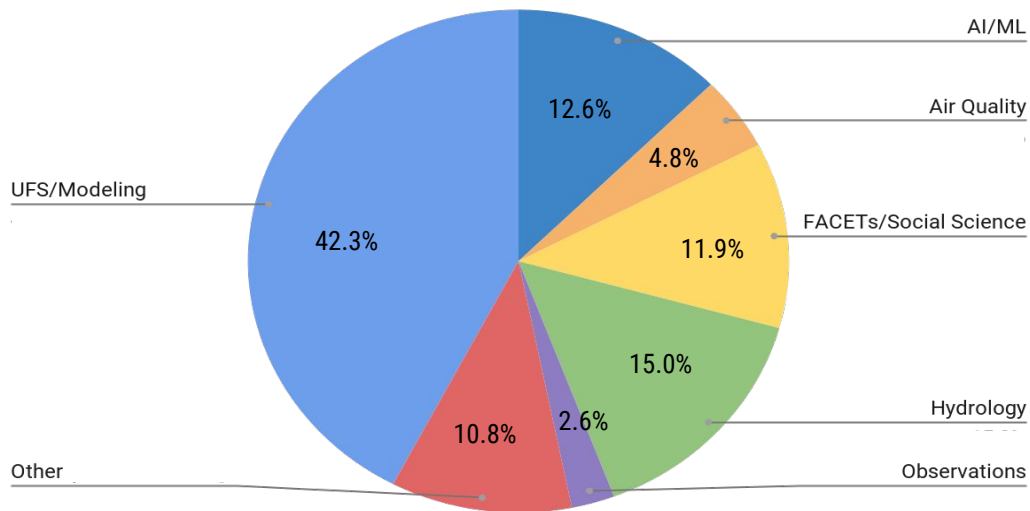
Number of JTTI projects per Readiness Level (FY16-FY22)



INTERDISCIPLINARY R20

JTTI funds and accelerates a variety of R20 projects that cross disciplines in NOAA, enhancing service delivery and improving weather and water forecasting.

JTTI Funding by Topic Area (FY16-FY22)



198

Total RL
Advancements

152

Total Projects
Funded

2

Private Sector
Transitions

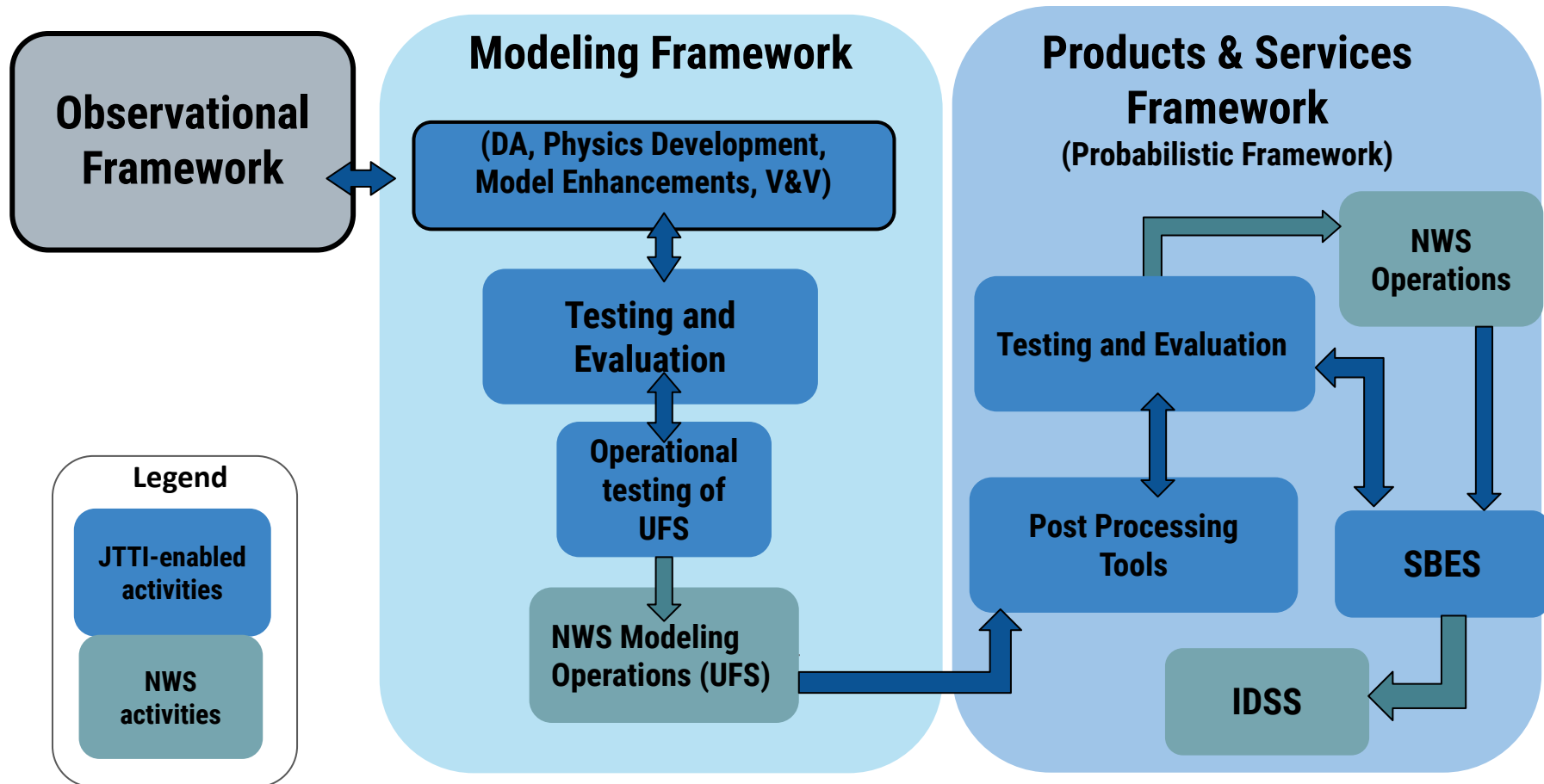
12

Academic Sector
Transitions

3

Internal NOAA
Transitions

ENABLING A WEATHER-READY NATION

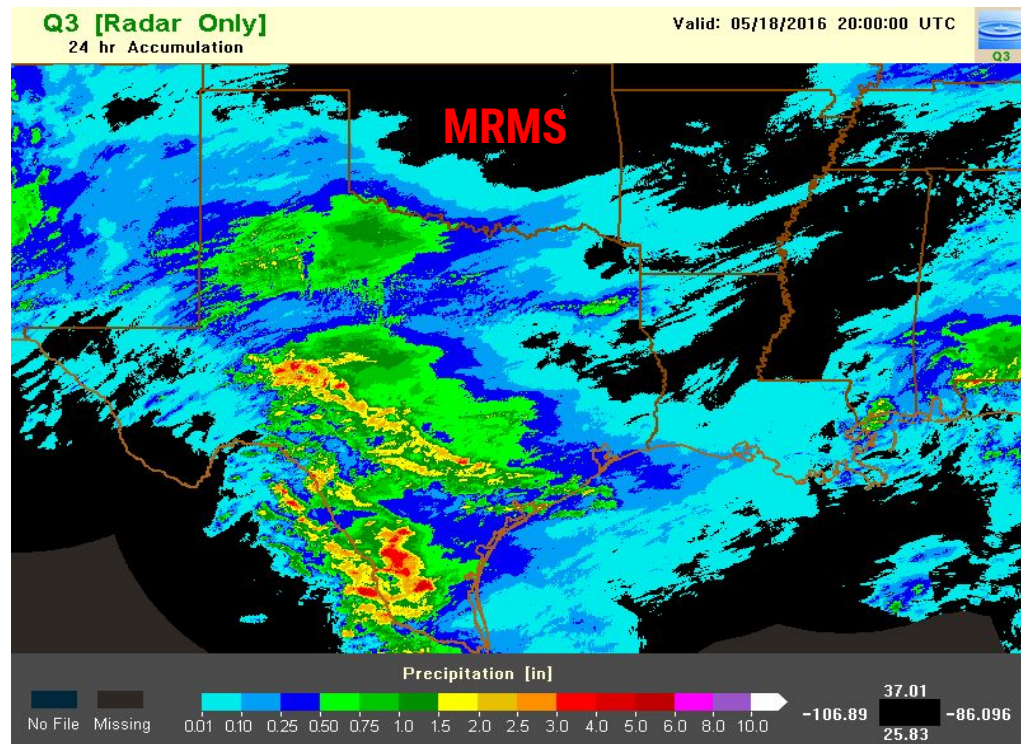


ENABLING A WEATHER-READY NATION

Enhancements added to the operational Multi Radar Multi Sensor system

Improved operational Quantitative Precipitation Estimation

Enhanced MRMS leads to more accurate and timelier flash flood and severe storm/tornado warnings



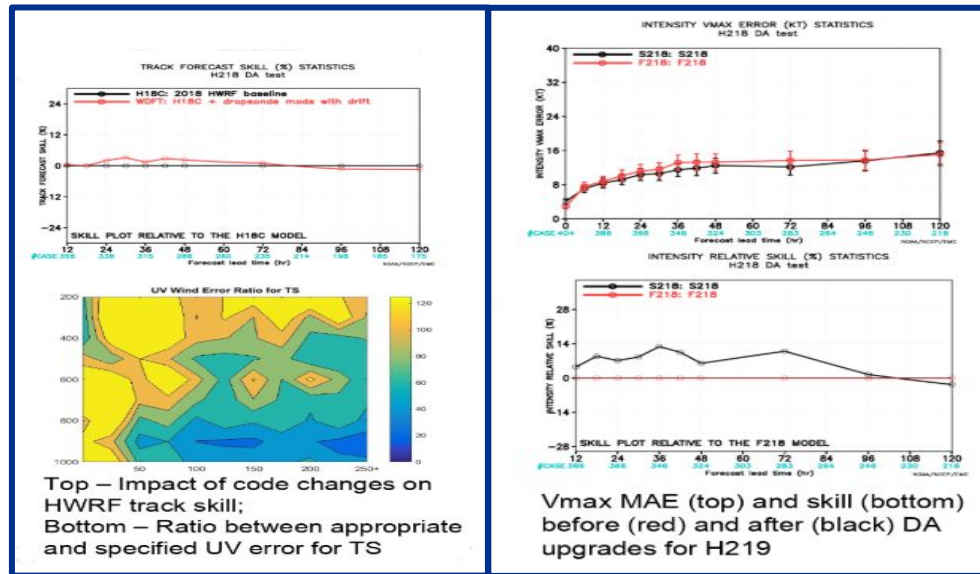
Observational Framework

ENABLING A WEATHER-READY NATION

Improved the use of dropsondes in NWS Hurricane operations

Accounting for dropsonde drift led to greater reconnaissance aircraft data usage

Contributed to improving the hurricane track and intensity forecast by 10%



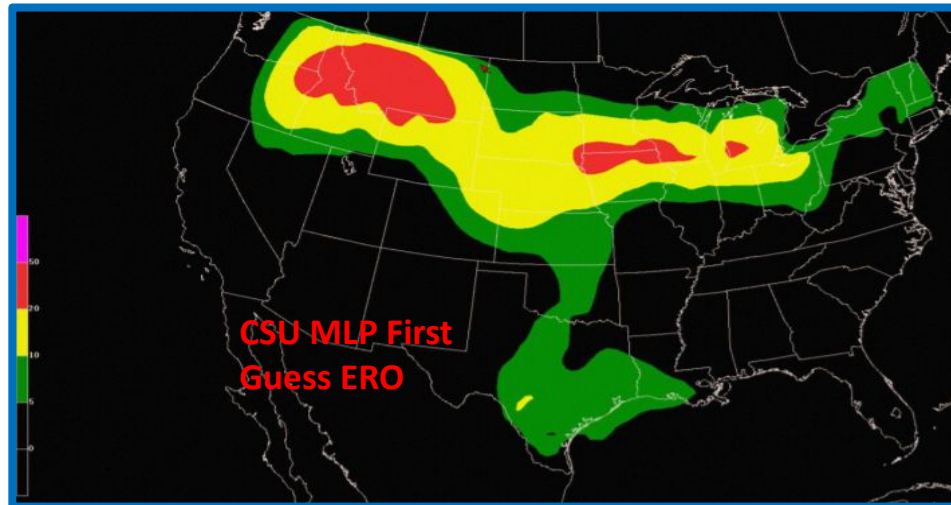
**(DA, Physics Development,
Model Enhancements, V&V)**

ENABLING A WEATHER-READY NATION

Transitioned CSU Machine Learning Algorithm to NWS/WPC operations

Improved the skill and efficiency of the Excessive Rainfall Outlook product by replacing a labor intensive manual process with an AI/ML tool

Project yielded new methods and techniques for improve operational forecasts of heavy precipitation and flash flooding



Post Processing Tools

ENABLING A WEATHER-READY NATION

**Transitioned first ever
Social and Behavioural
Science project from the
nonprofit sector to NWS
operations**

This transition improves
usability of the Winter
Severe Storm Index by
adding updated risk
categories

Contributes to
understanding usage of
impact-based forecast
products.

FROM



TO

Potential Winter Storm Impacts	
	No Impacts Impacts not expected.
	Limited Impacts Rarely a direct threat to life and property. Typically results in little inconveniences.
	Minor Impacts Rarely a direct threat to life and property. Typically results in an inconvenience to daily life.
	Moderate Impacts Often threatening to life and property, some damage unavoidable. Typically results in disruptions to daily life.
	Major Impacts Extensive property damage likely, life saving actions needed. Will likely result in major disruptions to daily life.
	Extreme Impacts Extensive and widespread severe property damage, life saving actions will be needed. Results in extreme disruptions to daily life.

Updated impact definitions	
Potential Winter Storm Impacts	
	Winter Weather Area Expect Winter Weather. • Winter driving conditions. Drive carefully.
	Minor Impacts Expect a few inconveniences to daily life. • Winter driving conditions. Use caution while driving.
	Moderate Impacts Expect disruptions to daily life. • Hazardous driving conditions. Use extra caution while driving. • Closures and disruptions to infrastructure may occur.
	Major Impacts Expect considerable disruptions to daily life. • Dangerous or impossible driving conditions. Avoid travel if possible. • Widespread closures and disruptions to infrastructure may occur.
	Extreme Impacts Expect substantial disruptions to daily life. • Extremely dangerous or impossible driving conditions. Travel is not advised. • Extensive and widespread closures and disruptions to infrastructure may occur. • Life-saving actions may be needed.

SBES

THE FUTURE OF JTTI

Advance the Unified Forecast System (UFS):

- Continue funding RRFsV1 and 3D-RTMA through UFS-R20 project
- Advance strongly-coupled data assimilation (DA) framework
- Enhance UFS infrastructure through improved coupling of various UFS components

Advance Probabilistic Framework and make it a reality

- Continue to fund and transition FACETs/SBES R20 projects
- Continue to fund and transition high-impact weather R20 projects



THE FUTURE OF JTIT

Expand JTIT's interdisciplinary scope

- Add Fire Weather and Space Weather to the JTIT funding priorities

Continue working synergistically with EPIC

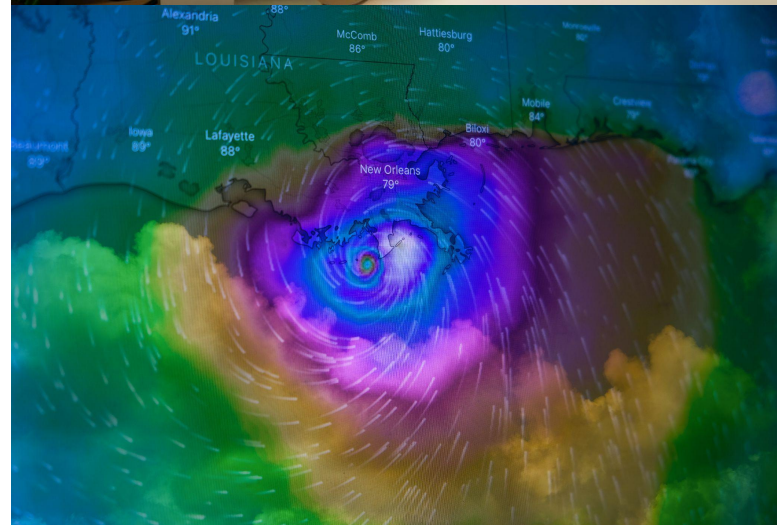
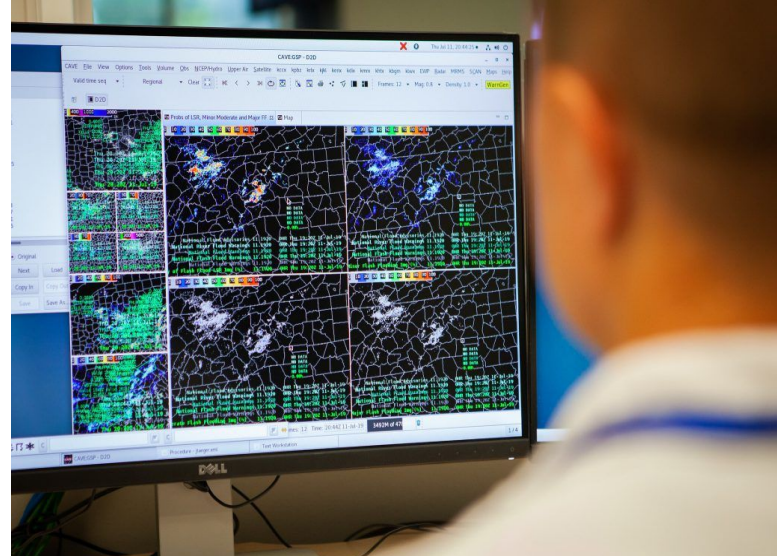
- Support innovation for community modeling through NOFO funding

Run an internal competition for NOAA scientists

- Help clear backlog of higher RL projects by transitioning them to NWS operations

Increase the diversity of JTIT funded institutions

- Fund at least one R20 project from a minority-serving institution



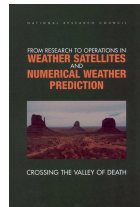
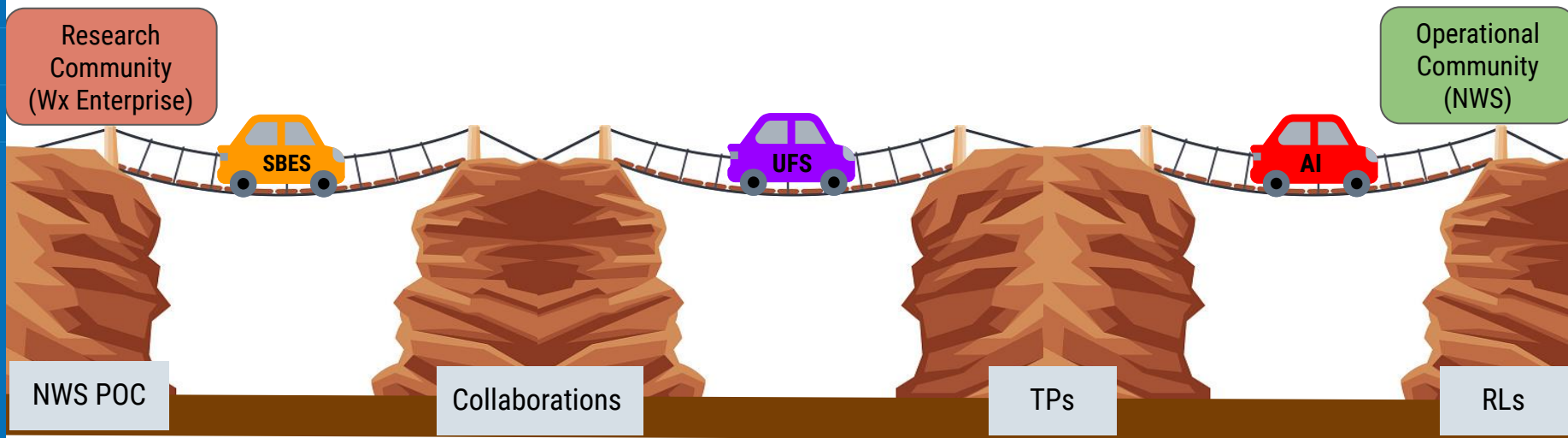
JTTI AS THE BRIDGE BUILDER

Helping other WPO Programs advance:

- Funded several SBES projects and first program to transition SBES projects to NWS operations in NOAA
- Significantly advanced probabilistic framework in NOAA - bringing the first FACETs transition project closer to operations
- Provided seed funding and works synergistically with EPIC to advance community earth system modeling with UFS

Unified Forecast System: Advanced Short Range Weather forecast model application - RRFSv1 and 3D-RTMA closer to NWS operations

Transitioned AI/ML technology to NWS operations ahead of the previous administration's AI Initiative





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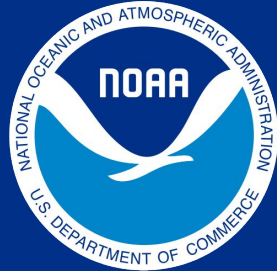


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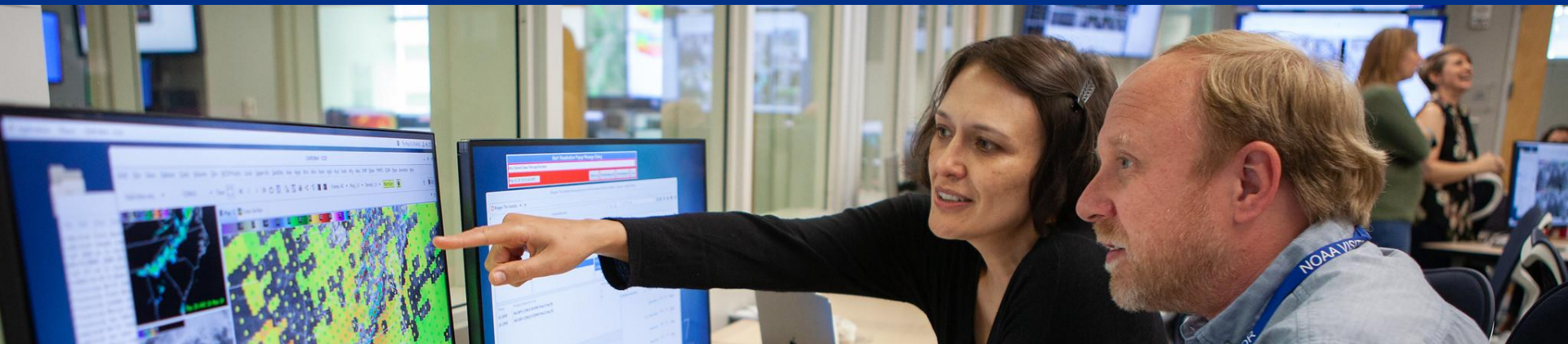
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January 26, 2023

Weather Testbeds Program

Jordan Dale, Testbeds Program Manager

Activity Area 3: Advancement and Transition of Weather Research



TESTBEDS PROGRAM OVERVIEW

- Testbeds are collaborative spaces where forecasters and weather researchers work alongside each other to integrate solutions into operational weather forecasts.
- The Testbeds Program funds projects to test and demonstrate new forecast technologies such as models, forecast techniques, data, etc. in the NOAA weather testbeds.



TESTBEDS PROGRAM

OUR TEAM



**JORDAN
DALE**

Program Manager



**FELICIA
GUARRIELLO**

Program Coordinator

What We Do

- Competitively fund academic partners, commercial industry, and NOAA laboratories through cooperative agreements
- Projects test and demonstrate new cutting-edge forecast technologies (models, techniques, data, etc.) in the NOAA weather testbeds to accelerate its transition to the National Weather Service (NWS) forecast operations
- Fund testbed infrastructure costs (contractors, software, hardware) to support testbed operations

TESTBEDS PROGRAM

SUPPORTS THREE WEATHER TESTBEDS



Hazardous Weather Testbed (HWT)

Storm Prediction Center (NWS)
National Severe Storms Lab (OAR)
Norman, OK

Hydrometeorology Testbed (HMT)

Weather Prediction Center (NWS)
Physical Sciences Lab (OAR)
College Park, MD

Hurricane and Ocean Testbed (HOT)

National Hurricane Center (NWS)
Atlantic Oceanographic &
Meteorological Lab (OAR)
Miami, FL

TESTBEDS PROGRAM

COORDINATES WITH OTHER WPO PROGRAMS

- WPO's Testbeds Program is not the only WPO Program supporting HMT, HOT, and HWT.
- Other WPO Programs providing support include:
 - JTTI: funds projects and provides infrastructure support to HMT, HOT, and HWT
 - Social Science: funds projects working with HWT
 - S2S: funds projects working with the Climate Testbed





TESTBEDS PROGRAM

HMT RESEARCH PRIORITIES

- Improve probabilistic winter precipitation forecasts
- Improve flash flood monitoring and forecasting
- Enhance forecaster use of probabilistic information
- Improve atmospheric forcings for hydrologic models
- Improve characterization of the state of the current environment
- Improve risk communication of probabilistic forecasts

Hydrometeorology Testbed (HMT)

Conducts research on precipitation and weather conditions that can lead to flooding, and fosters transition of scientific advances and new tools into forecasting operations

**Weather Prediction Center (NWS)
Physical Sciences Lab (OAR)
College Park, MD**

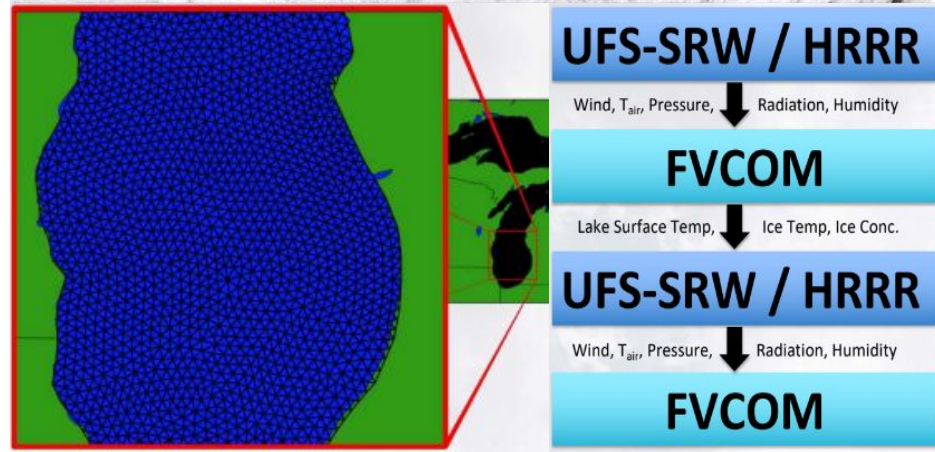
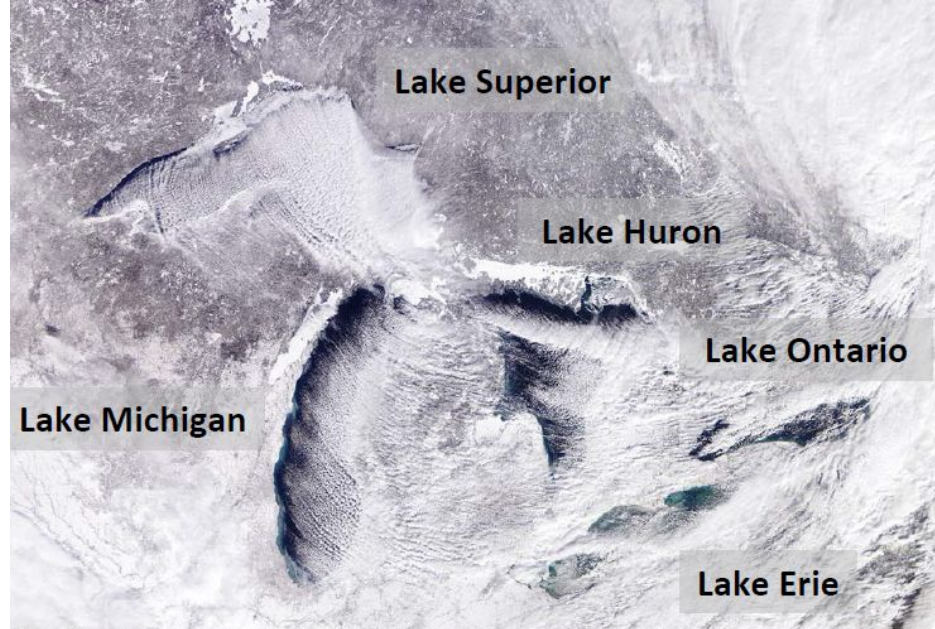
FY19 HMT PROJECT HIGHLIGHT:

Coupling FVCOM to UFS-SRW

Improving Lake-Effect Snow Forecasting Capabilities via Advanced Coupling Techniques in NOAA's Unified Forecast System (UFS)

Lead PI: Dr. Christiane Jablonowski, University of Michigan

- Goal: Improve lake-effect snow and ice forecasting capabilities by advancing NOAA's 3D lake model and its coupling to ice (FVCOM) in UFS Short-Range Weather (UFS-SRW) model
- Replace satellite-based lake surface temperature in UFS with FVCOM lake data
- Utilized HMT to evaluate case studies with regional UFS-SRW model coupled to FVCOM
 - Showed improved representation of lake-effect snow and ice
- Targeted for transition into future operational Rapid Refresh Forecast System (RRFS)





TESTBEDS PROGRAM

HOT RESEARCH PRIORITIES

- Improve operational analysis of the surface wind field in tropical cyclones (TCs)
- Develop guidance on the best flight track strategies and/or supplemental observation strategies
- Improve guidance for TC track and intensity
- Improve guidance for TC genesis
- Apply and integrate relevant social and behavioral science methodologies
- Develop tools and/or products to help forecasters better interpret conflicting radar and reconnaissance data to assess TC intensity and structure in real time

Hurricane and Ocean Testbed (HOT)

Transfer more rapidly and smoothly new technology, research results, and observational advances into improved tropical cyclone analysis and prediction at operational centers

**National Hurricane Center (NWS)
Atlantic Oceanographic &
Meteorological Lab (OAR)
Miami, FL**

FY19 HOT PROJECT HIGHLIGHT:

TCLOGG: Improving TC Genesis Prediction

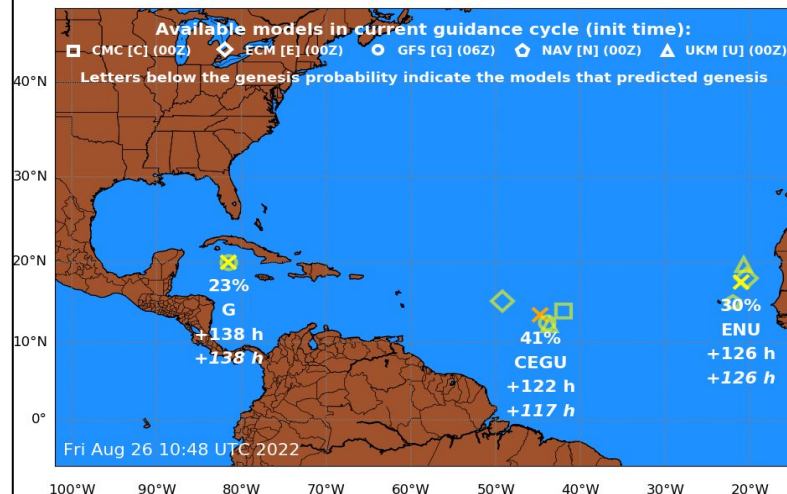
Further Improvements and Extensions to the Tropical Cyclone Logistical Guidance for Genesis (TCLOGG)

Lead PI: Dr. Robert Hart, Florida State University

- **Goal:** Improve Tropical Cyclone (TC) genesis prediction through advancing the TCLOGG tool
- Used ensemble of global numerical models (e.g., GFS, ECMWF, etc.) to:
 - Extend genesis guidance from 2–5 days to 7 days
 - Develop a most likely time of genesis forecast
- Working to expand the TCLOGG approach to use GEFS Reforecast output to make use of ensemble data
- Utilized HOT to run TCLOGG on National Hurricane Center (NHC) workstations for use by forecasters in real-time since 2019
- Awaiting final operational NHC implementation decision

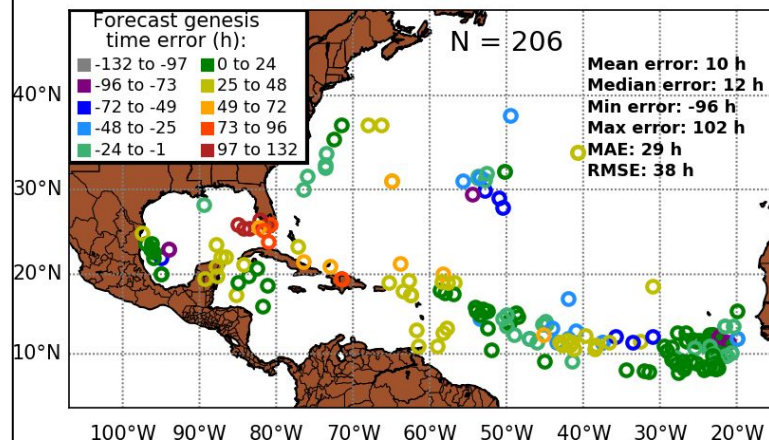
Experimental 0-120 h TC genesis probability

2022-08-26 06Z consensus guidance



Preliminary TC genesis forecast timing verification

2021 CON based 168 hour genesis forecast hit events





TESTBEDS PROGRAM

HWT RESEARCH PRIORITIES

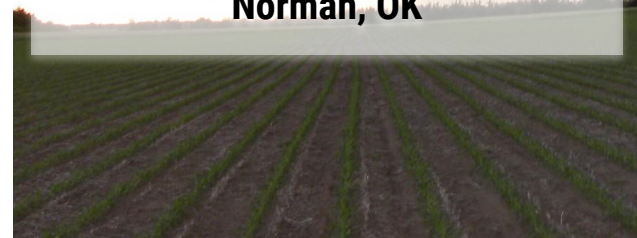
Improve forecasts and warnings for tornado, large hail, damaging wind, and lightning through advancing:

- NOAA's convection-allowing ensemble forecast system
- NOAA's regional and/or global deterministic models and ensembles
- Observation datasets and data analysis techniques to provide the best state of the current environment
- Forecasters' use of data, techniques, and guidance, as well as end-users' ability to receive, assess, understand, and respond

Hazardous Weather Testbed (HWT)

Accelerates transition of new meteorological insights and technologies into advances in severe weather forecasting and warning

**Storm Prediction Center (NWS)
National Severe Storms Lab (OAR)
Norman, OK**



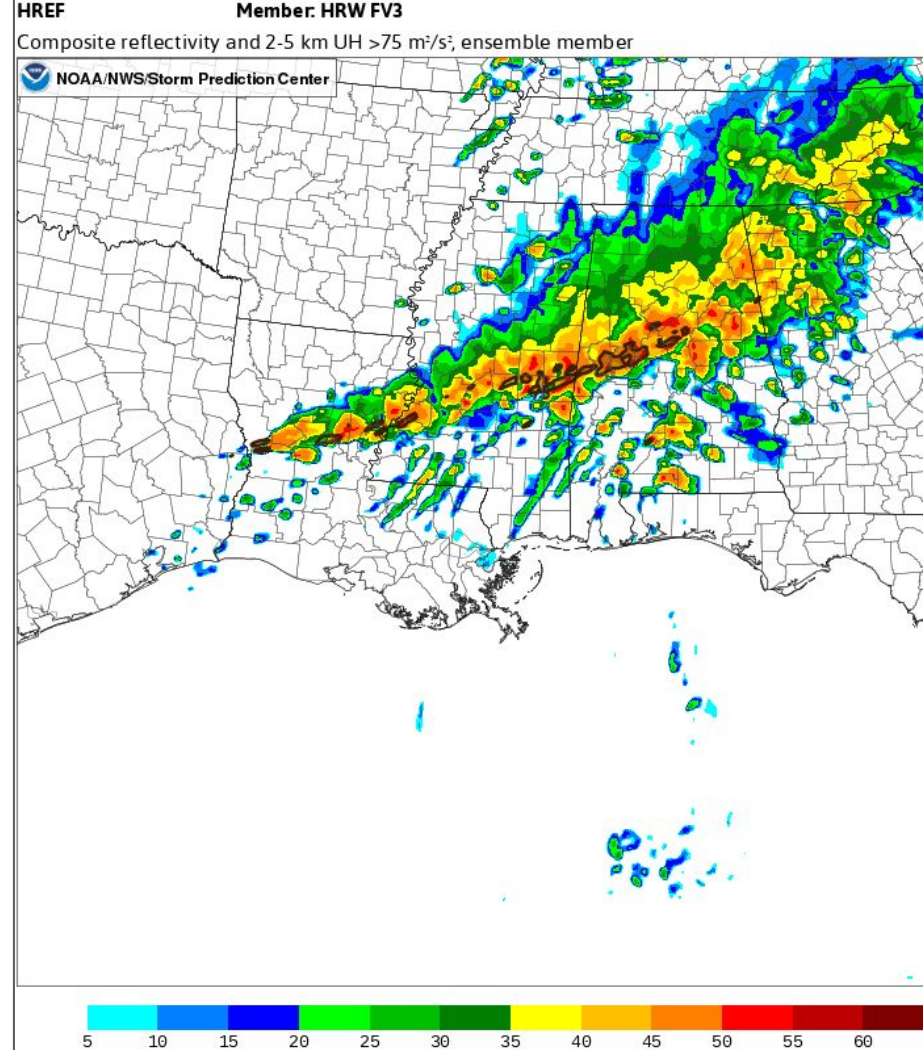
FY19 HWT PROJECT HIGHLIGHT:

Stochastic Physics Configuration for RRFS

Implementation and testing of stochastic perturbations within a stand-alone regional (SAR) FV3 ensemble using the Common Community Physics Package (CCPP)

Lead PIs: Dr. Jeff Beck, Colorado State University/CIRA;
Jamie Wolff, NCAR

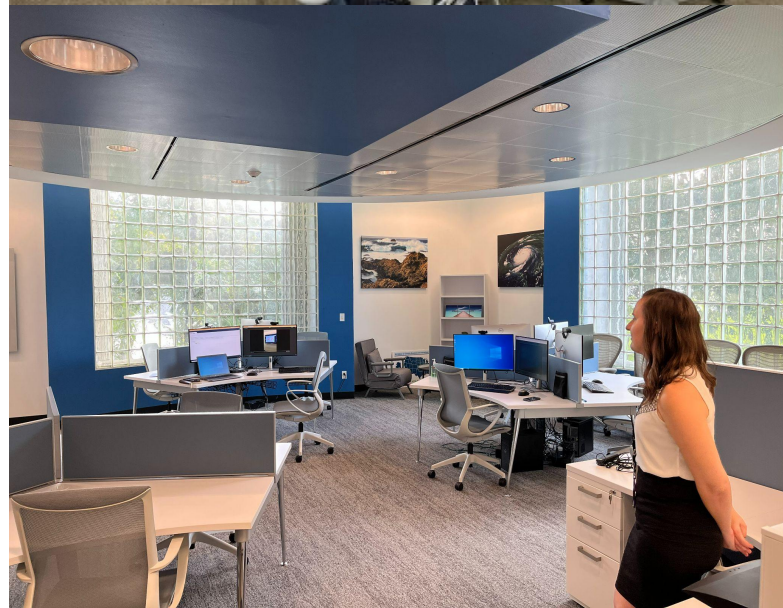
- Goal: Provide a stochastic physics configuration for Rapid Refresh Forecast System (RRFS)-based ensembles and for eventual RRFS implementation
- Implemented four different stochastic approaches in the FV3-Limited Area Model (LAM)
- Utilized HWT to test RRFS ensemble configurations with stochastic physics
- Completed implementation of stochastic physics in the UFS-SRW App and RRFS prototypes
- Working with RRFS developers to facilitate implementation into future operational RRFS



TESTBEDS PROGRAM

SUPPORTS TESTBED INFRASTRUCTURE

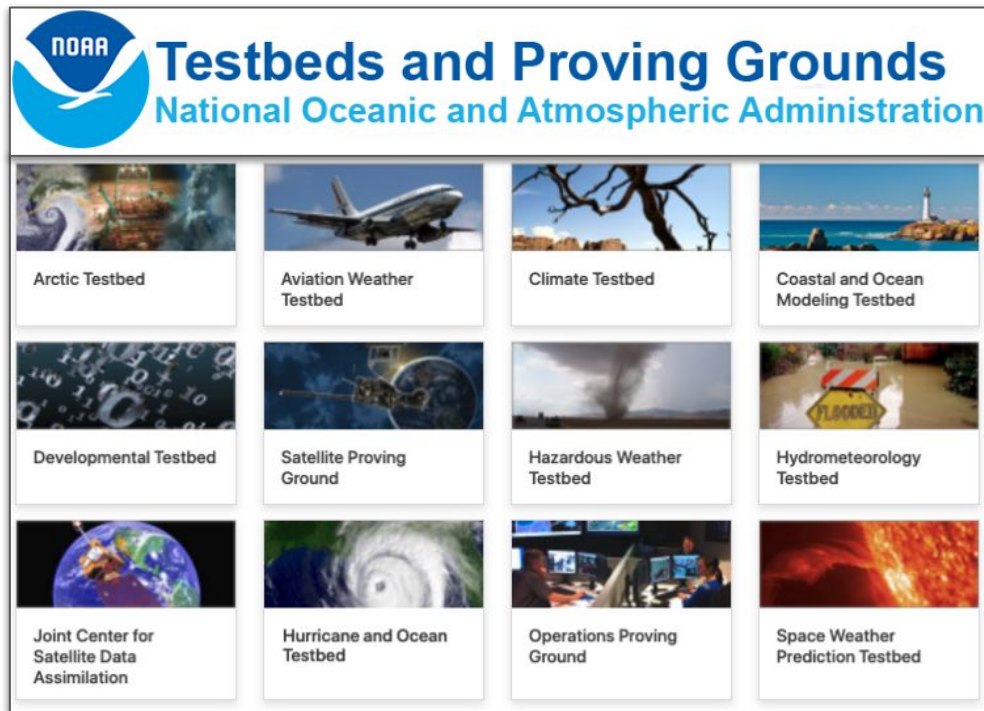
- The Testbeds Program supports infrastructure including:
 - Contractual services: testbed coordinators, IT support
 - Equipment: hardware & software upgrades
 - Travel: for forecasters to participate
- Infrastructure support is critical for:
 - Running annual experiments (e.g., HWT Spring Forecast Experiment, HMT Winter Weather Experiment, etc.)
 - Efficiently moving Testbeds projects through the research-to-operations funnel in preparation for possible transition to operations



TESTBEDS PROGRAM

ENGAGES WITH NOAA TBPGCC

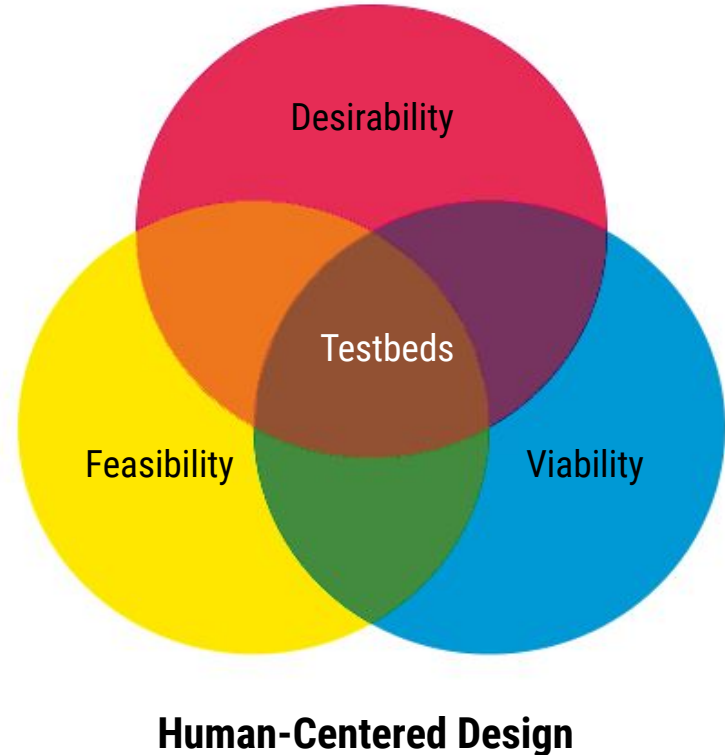
- The Testbeds Program participates in NOAA's Testbeds & Proving Grounds Coordinating Committee (TBPGCC) which:
 - Facilitates communication and provides coordination and consistency across NOAA Testbeds and Proving Grounds
 - Includes members from 12 NOAA Testbeds and Proving Grounds
- WPO participation improves understanding of Testbeds' needs and priorities (e.g., funding, UFS/EPIC, cloud, AI/ML, transitions)



TESTBEDS PROGRAM

LOOKING FORWARD

- Integrate human-centered design into Testbed operations for:
 - Researchers & forecasters
 - End users
- Better incorporate Social Science research into NOAA Testbeds
- Engage with NOAA's future Fire Weather Testbed
- Improve coordination across WPO Programs in supporting NOAA Testbeds





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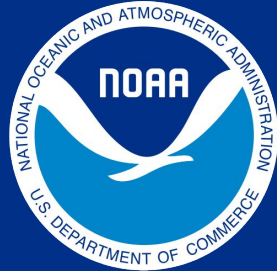


@NOAA_WPO



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January 26, 2023

Research Transitions and Evaluation

Matthew Mahalik, Transitions and Evaluation Lead

Activity Area 3: Advancement and Transition of Weather Research



TRANSITIONS AND EVALUATION SUPPORT

OUR TEAM



**MATT
MAHALIK**

Research Transitions
and Evaluation Lead



**VALBONA
KUNKEL**

R2O Scientist and
Coordinator



**LAURA-MICHEL
DEHAAN**

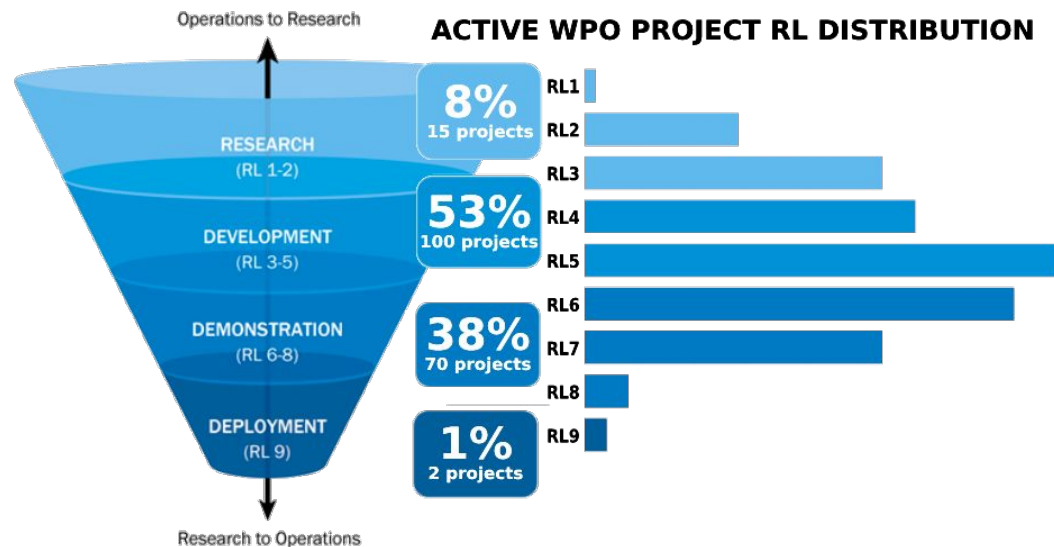
Data Analyst and
Coordinator



CONTRIBUTING TO THE DOC MISSION

DOC Strategic Goals

- Address the Climate Crisis Through Mitigation, Adaptation, and Resilience Efforts
- Expand Opportunity and Discovery Through Data
- Provide 21st Century Service with 21st Century Capabilities



- ✓ Accelerate transitions* to incorporate cutting-edge science in operational settings as quickly as possible
- ✓ Evaluate the R&D results for data-driven, evidence-based decisions

**This is hard!*



CONTRIBUTING TO THE NOAA AND OAR MISSIONS



NOAA R&D Vision Areas

- ✓ **Reduce societal impacts** from hazardous weather and other environmental phenomena
- ✓ A robust and effective **research, development, and transition** enterprise

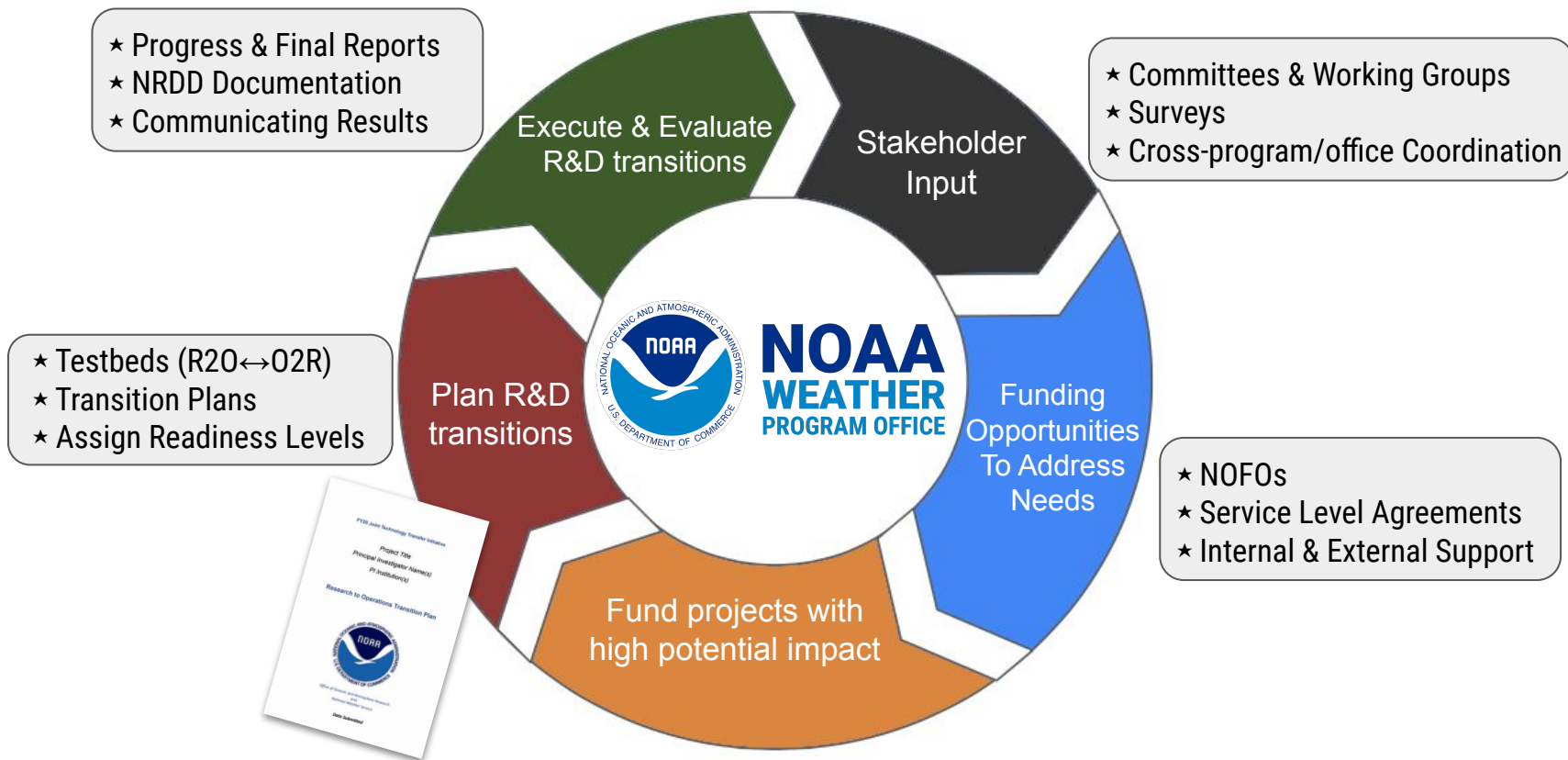
OAR Mission: Research, Develop, Transition

Conduct research to understand and predict the Earth system; **develop technology** to improve NOAA science, service, and stewardship; and **transition the results** so they are useful to society.



- ✓ **Track** diverse R&D to advance science, identify new ways to **apply it**, and provide transition support to **realize it**
- ✓ **Expand transition plans** to support observing systems, knowledge transfers, and public code releases
- ✓ **Prioritize** funding, transition planning, and project coordination for internal and external industry partners
 - *Modeling, technological, societal, and observational forecast improvements and services*

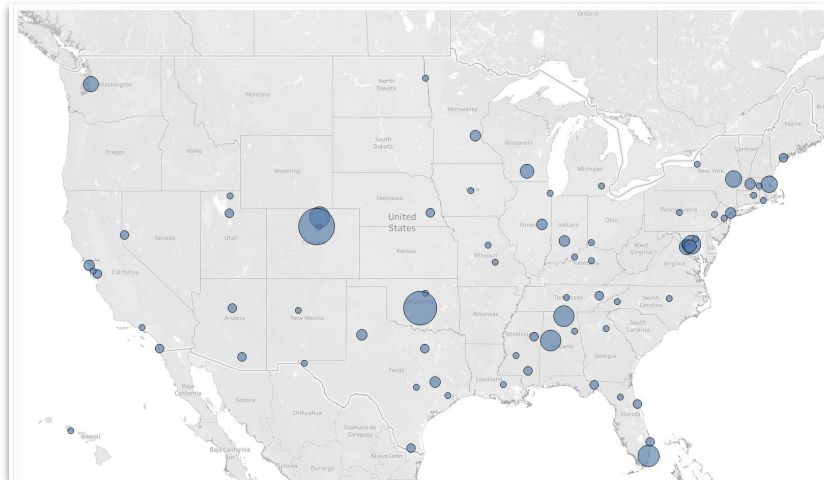
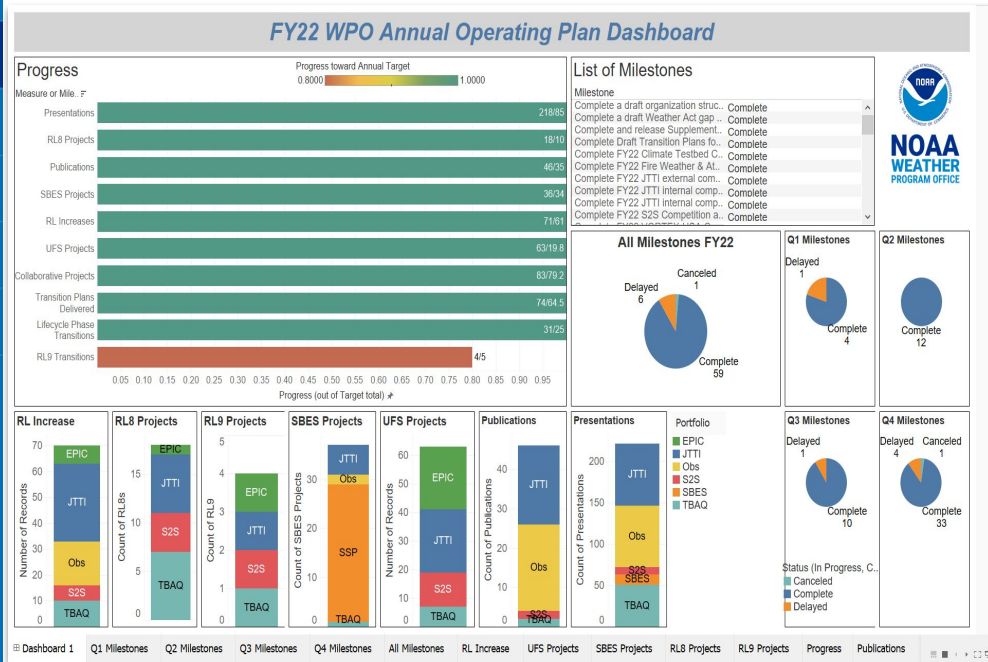
AN END-TO-END TRANSITION PROCESS



CONTRIBUTING TO THE WPO MISSION

Invest in the Future

- Expand WPO's transitions support team
- Innovate methods to database our R&D
- Integrate evaluation into office operations
- Adhere to NOAA R&D Transition Policy
- Utilize new technologies and NOAA's transition tools
- Strive for diverse benefits and equitable transition

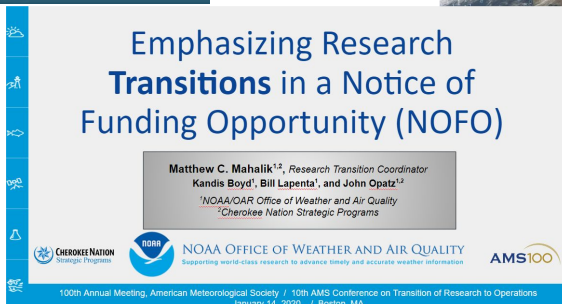


Figures: (above) map showing institutions submitting LOIs in response to WPO FY23 NOFO; (left) WPO's Tableau operating plan dashboard

CONTRIBUTING TO THE WPO MISSION

Active Role in the Scientific Community

- *Developing webinars*
- *Presenting at conferences*
- *Hosting R2O workshops*
- *Expanding NOFO opportunities*
- *Streamlining transition process*
- *Facilitating R2X conversations*





ACCOMPLISHMENTS

- ✓ Implement readiness levels and transition plans to **“speak transitions”** in NOAA & the community
- ✓ Foster an environment of **coordination between line offices**
 - *Established an active role within NOAA’s testbeds and transitions community*
- ✓ Improve the **rate of transitions** and decrease the time to complete transitions

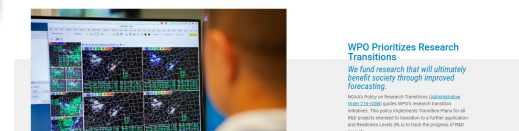
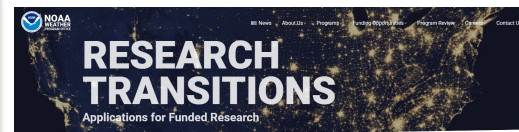
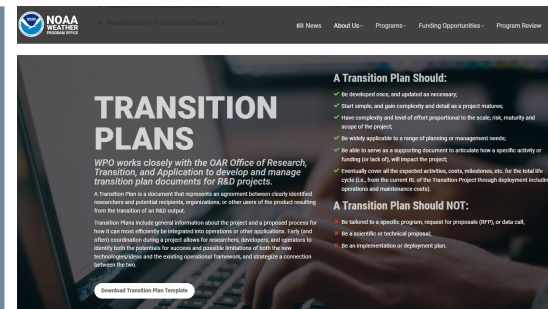


Since 2017:

126 Signed Transition Plans

56 Mission & Forecast Improvements Delivered at RL8

23 Fully Completed Transitions





THE NEXT FRONTIER

- **Tackle the hard questions**
 - What is a transition?
 - What do Readiness Levels really mean?
 - How can we increase the utility of transition plans?
- **Community and human-centered approaches**
 - Collect and incorporate community feedback
 - Reduce the burden of transitions
 - Evidence-based actions
- **Adapt our methods as the science, priorities, and policies evolve**
 - Commercialization, community modeling, and whatever is next...



Photo courtesy Matt Mahalik, 2022



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