

**National Oceanic and
Atmospheric Administration**

24 July 2023

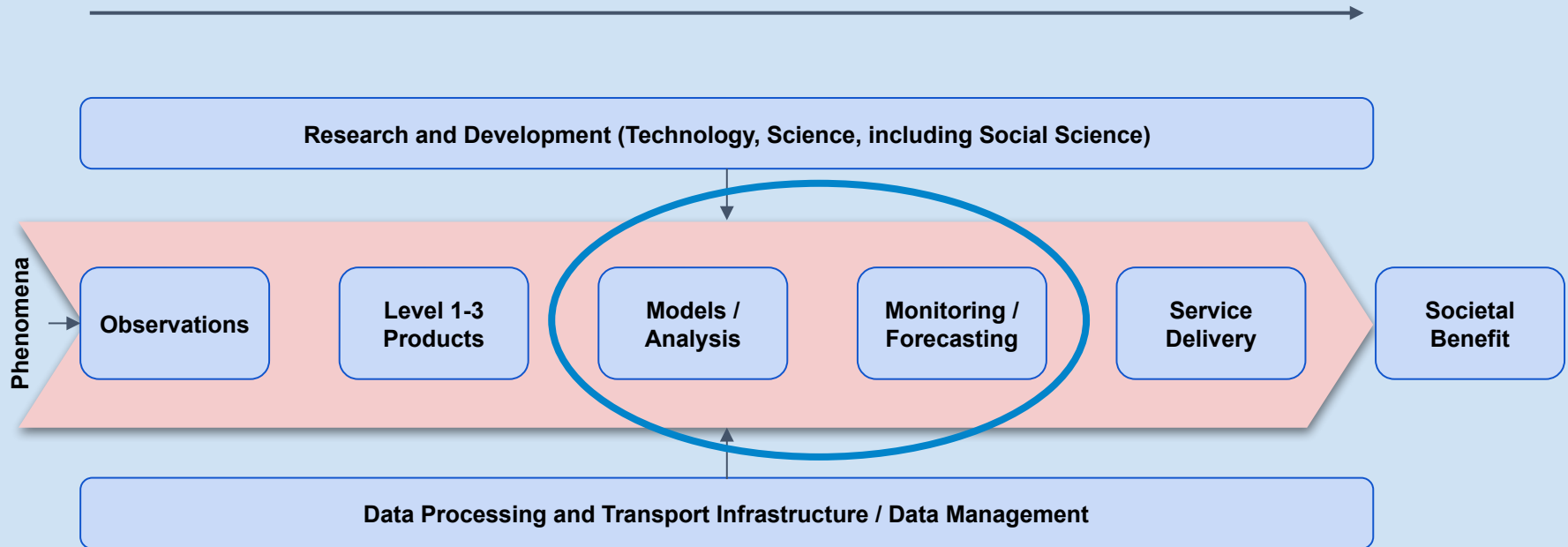
Unifying Innovations in Forecasting Capabilities Workshop

Opening Remarks

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NOAA Value Chain

Data to Information



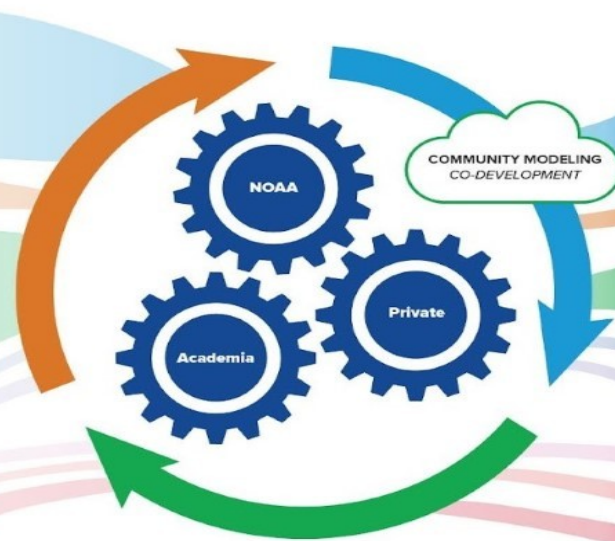
Simplifying NOAA's Operational Forecast Suite

Reducing the 21 Stand-alone Operational Forecast Systems into Eight Applications

21 Independent Stand-alone Systems

- Global Weather, Waves & Global Analysis - GFS/ GDAS
- Global Weather and Wave Ensembles, Aerosols - GEFS
- Short-Range Regional Ensembles - SREF
- Global Ocean & Sea-Ice - RTOFS
- Global Ocean Analysis - GODAS
- Seasonal Climate - CDAS/ CFS
- Regional Hurricane 1 - HWRF
- Regional Hurricane 2 - HMON
- Regional High Resolution CAM 1 - HiRes Window
- Regional High Resolution CAM 2 - NAM nests/ Fire Wx
- Regional High Resolution CAM 3 - RAPv5/ HRRR
- Regional HiRes CAM Ensemble - HREF
- Regional Mesoscale Weather - NAM
- Regional Air Quality - AQM
- Regional Surface Weather Analysis - RTMA/ URMA
- Atmospheric Transport & Dispersion - HySPLIT
- Coastal & Regional Waves - NWPS
- Great Lakes - GLWU
- Regional Hydrology - NWM
- Space Weather 1 - WAM/IPE
- Space Weather 2 - ENLIL

Unified Forecast System (UFS)



UFS Applications

- Medium Range & Subseasonal
- Marine & Cryosphere
- Seasonal
- Hurricane
- Short-Range Regional HiRes CAM & Regional Air Quality
- Air Quality & Dispersion
- Coastal
- Lakes
- Hydrology
- Space Weather



Vision: Enable the most accurate and reliable operational numerical forecast model in the world.

Mission: To be the *catalyst* for community research and modeling system advances that continually inform and accelerate advances in our nation's operational forecast modeling systems.

What EPIC is....

- A virtual community model development environment
- Management of cloud-ready code
- Community access to NOAA observations, data & tools
- Community support & engagement
- Clear research & model transition to operations priorities
- End-to-end testing for Unified Forecast System applications
- Expand to support comprehensive NOAA Earth systems

Community Engagement



Cloud Use



Data Assimilation: JCSDA'S JEDI

- NOAA is transitioning to use the Joint Center for Satellite Data Assimilation Joint Effort for DA Integration (JEDI) system
- JEDI provides a software infrastructure for data assimilation
- JEDI is for scientific exploration and operational forecasting

A multi-agency research center to improve the use of satellite data for analyzing and predicting the weather, the ocean, the climate and the environment.

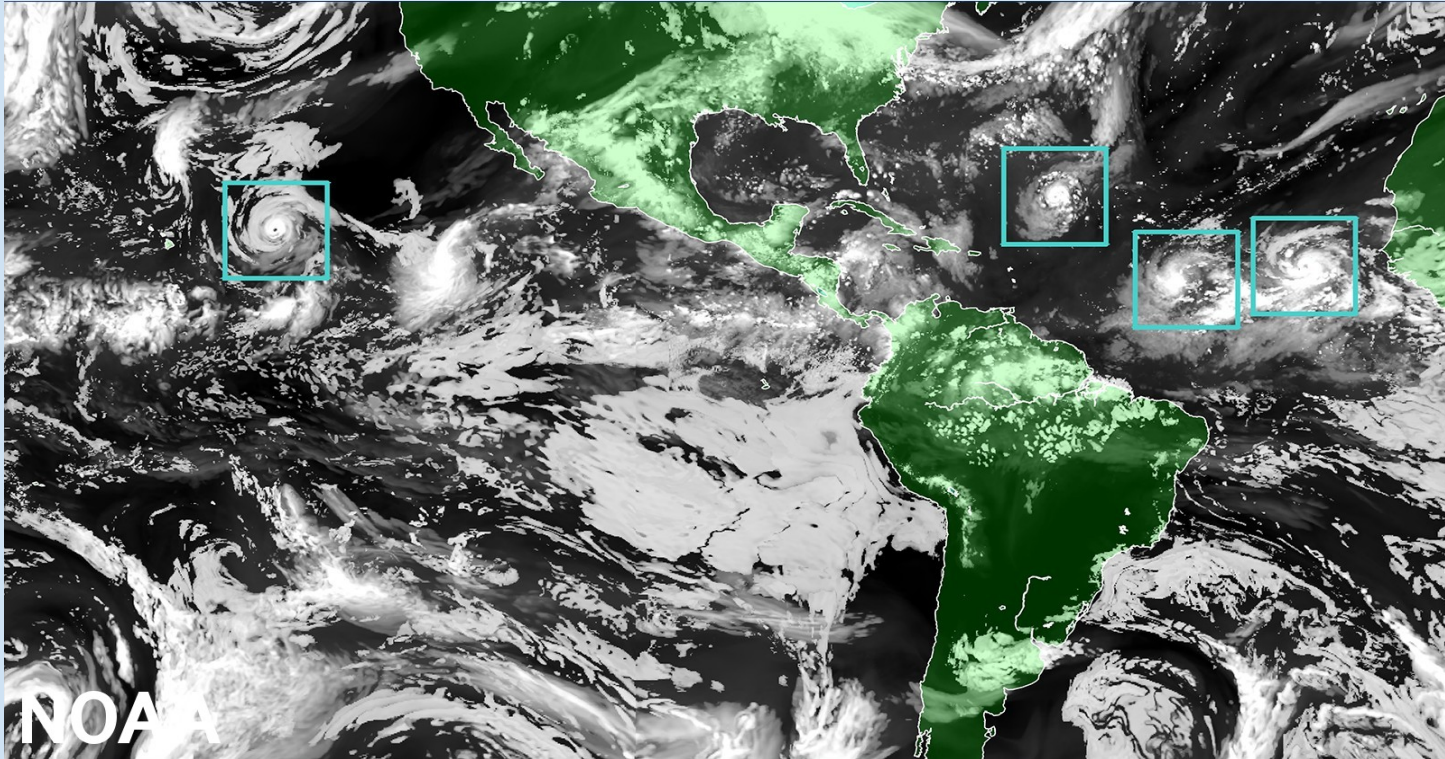


What Does Epic Success Look Like?

1. Facilitate strong collaborations
2. Develop a publicly accessible end-to-end testing and development environment
3. Bring innovations to improve UFS performance



UFS Application HAFS Now Operational



Summary: Improvements for HAFS in Skill Space vs HWRF

Metric	NATL		EPAC	
	HAFS-A	HAFS-B	HAFS-A	HAFS-B
Track Skill	<i>Mostly improved</i>	<i>Improved</i>	<i>Improved</i>	<i>Improved</i>
Intensity Skill	Neutral to <i>improved</i>	<i>Improved</i>	Neutral to <i>improved</i>	<i>Mostly improved</i>
Storm Size Bias	RMW neutral, mixed for 34 kt, reduced for 50 kt and 64 kt radii	RMW neutral, increased for 34 kt, reduced for 50 kt and 64 kt radii	Reduced for RMW, 34 kt, 50 kt and 64 kt radii	Reduced for RMW, 34 kt, 50 kt and 64 kt radii
RI Cases	Track errors are reduced , intensity slightly behind	Track errors are reduced , intensity slightly behind	Track errors are reduced , neutral for intensity	Track errors are reduced , intensity slightly behind
RI Metrics	Slightly behind HWRF	Slightly behind HWRF	<i>Improved</i>	<i>Improved</i>
P-W relationship	Neutral	Neutral	<i>Improved</i>	<i>Improved</i>
Waves	Neutral to <i>Improved</i>	N/A	<i>Improved</i>	N/A

Negative

Mixed/Neutral

Positive



Strategic Directions

- 10-Year NOAA Modeling Strategy (Fall 2023)
- 10-Year NOAA Data Assimilation Strategy (Winter 2023/24)
 - Opportunities to build the workforce . . .
- Journey to the cloud - For data storage and access (e.g. NODD), modeling, AI/ML, HPC computing, and collaboration





THANK YOU

