Tuesday, July 25th

1PM Community Discussion: Insights from Industry and Academia

1:00 – 1:15 – Insights from Tomrrow.io in Operationalizing a UFS-Based Weather Forecasting System – Luke Peffers (Tomorrow.io)
1:15 – 1:30 – Experience of Using UFS for Academic Research: A survey from OU MAP lab – Xuguang Wang (University of Oklahoma)
1:30 – 1:45 – Can Today's UFS be Used as a Teaching and Development Tool? – Christiane Jablonowski (University of Michigan)
1:45 – 2:00 – Codefest, HSD, GST and UFS Usability Tests – Shih-Wei Wei (University at Albany, SUNY) and Ligia Bernardet (NOAA GSL and DTC)

2PM Panel Discussion on Use Cases & Needs of UFS Applications by New Professionals, Professors & Industry

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Insights from Tomrrow.io in Operationalizing a UFS-Based Weather Forecasting System

Session:

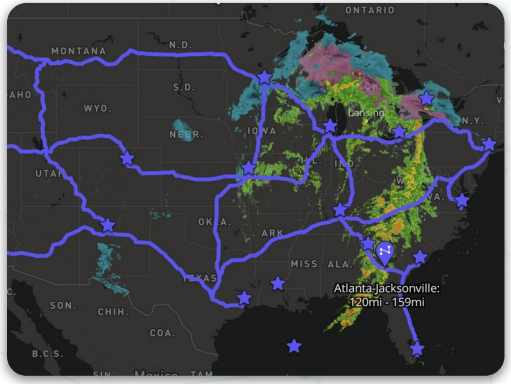
Community Discussion: Insights from Industry and Academia

UCAR Center Green Campus

Tuesday July 25, 2023

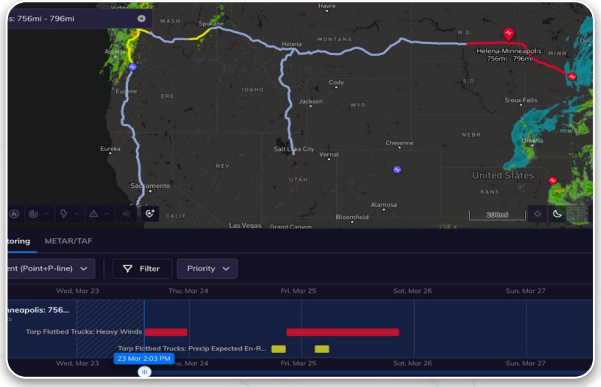
1:00pm Mountain

Tomorrow.io's dashboard can be tailored to your specific needs



Upload fixed routes point location or use the routing endpoint for dynamic routes

Create insights and alerts based on specific weather parameters



Visualize and manage alerts along routes in real time

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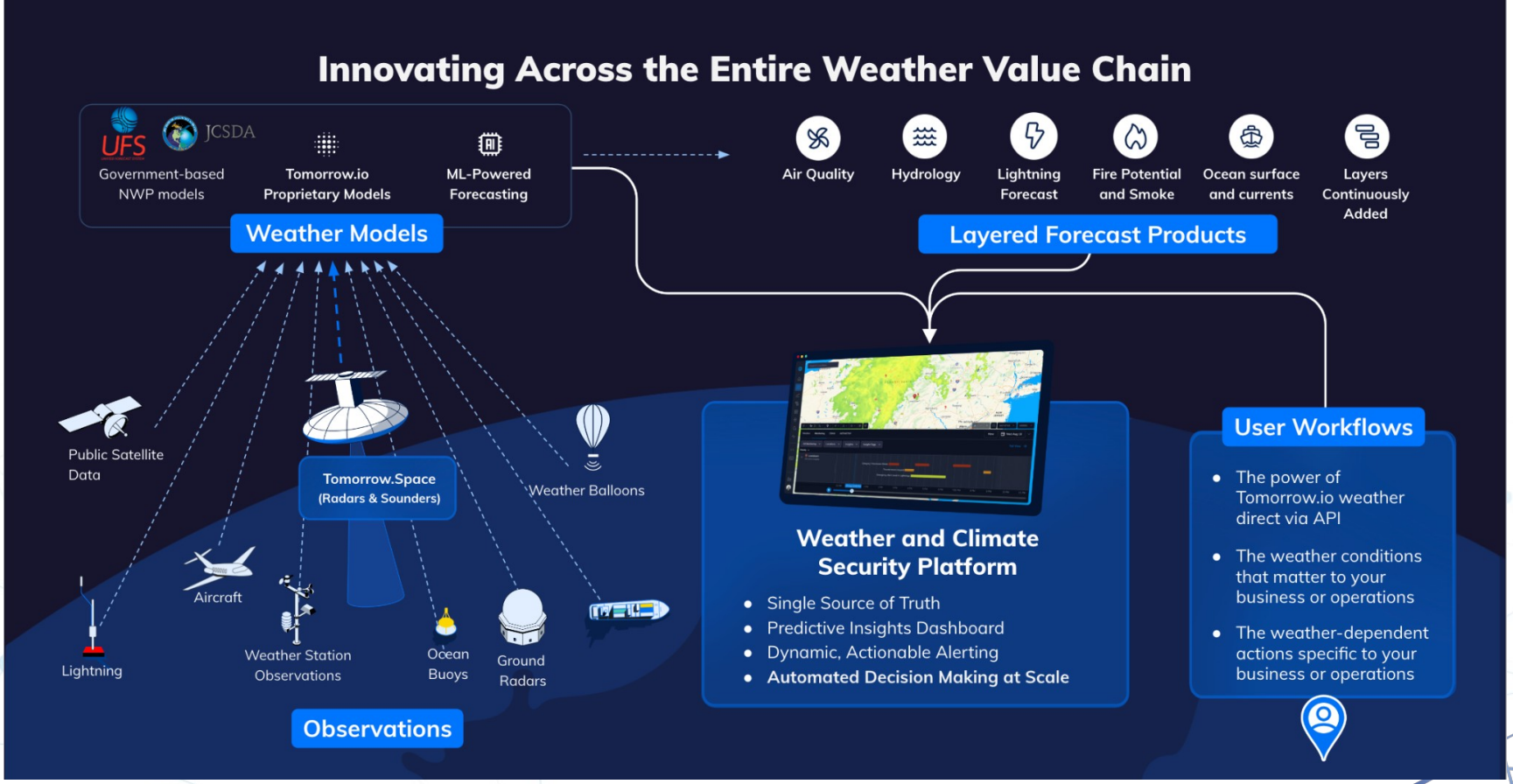
Innovating Across the Entire Weather Value Chain



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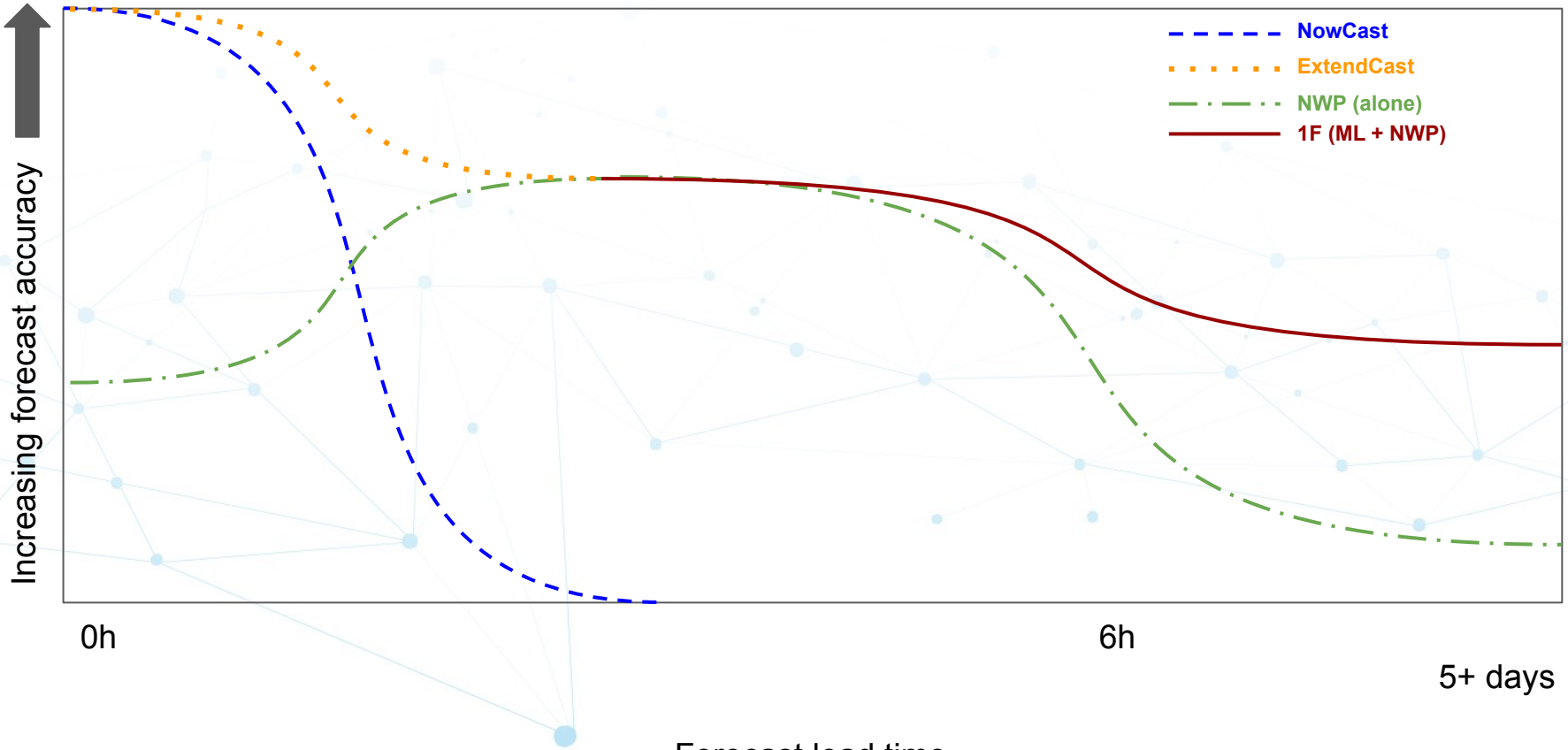
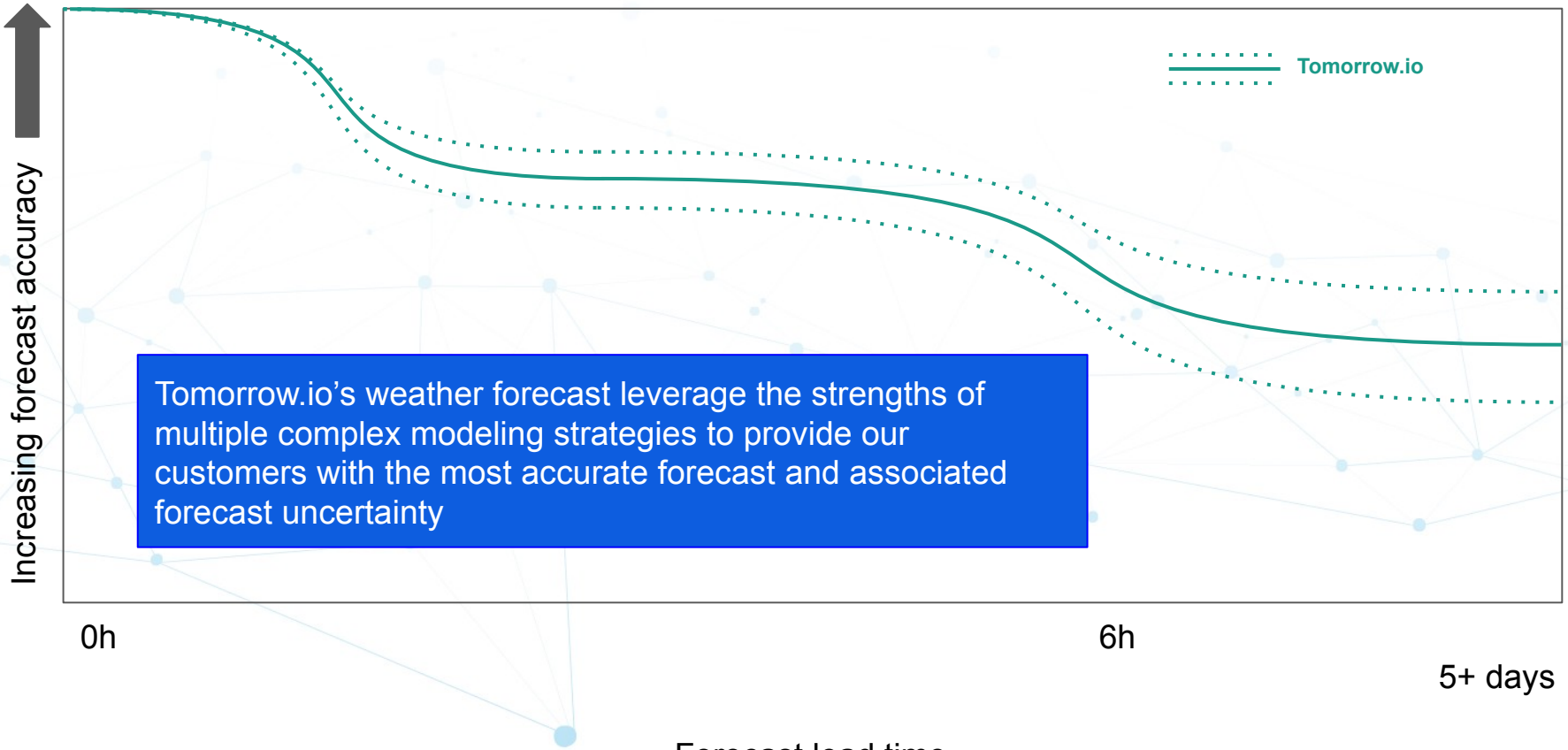
Leveraging multiple models to optimize accuracy across time scales



Integrated Modeling View From the Eyes of Our Customers



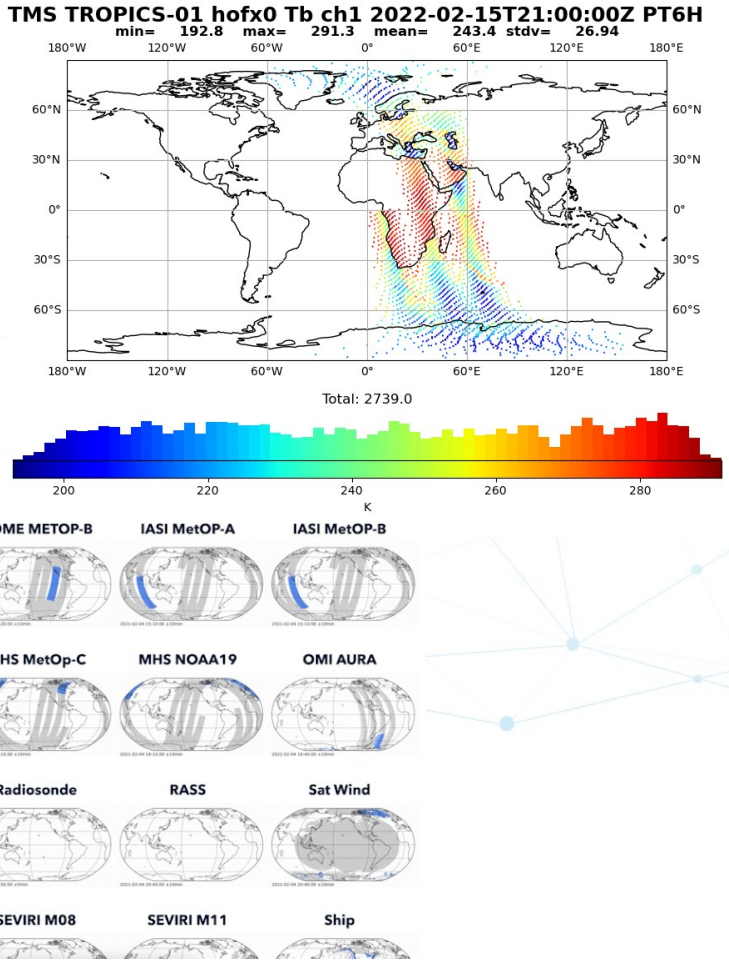
Partnerships and Plans

External Science/Development Support

- NOAA CRADA
- JCSDA

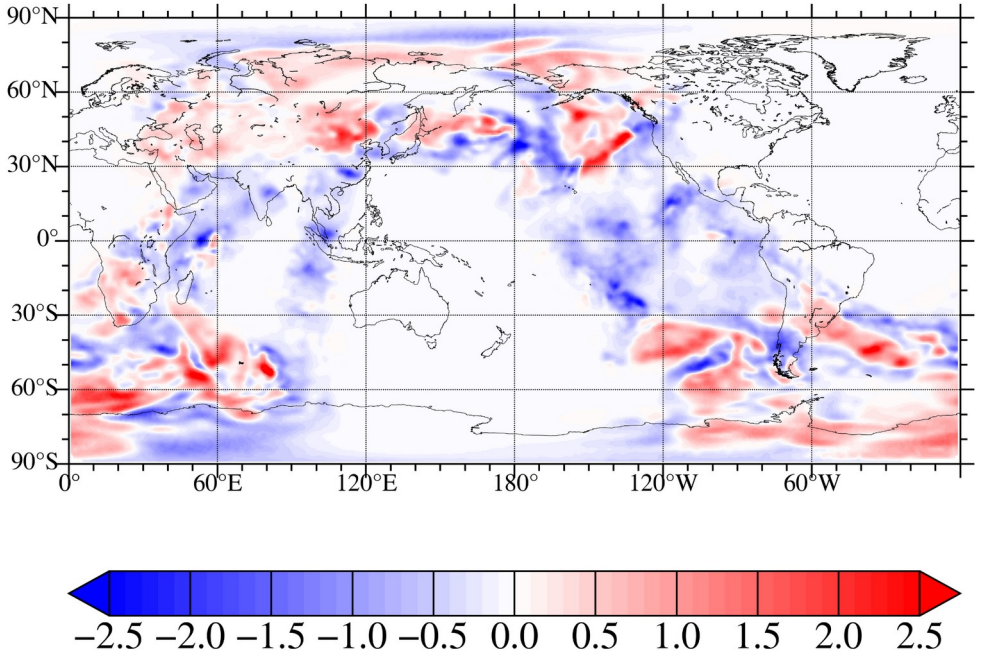
Internal Weather Team Development

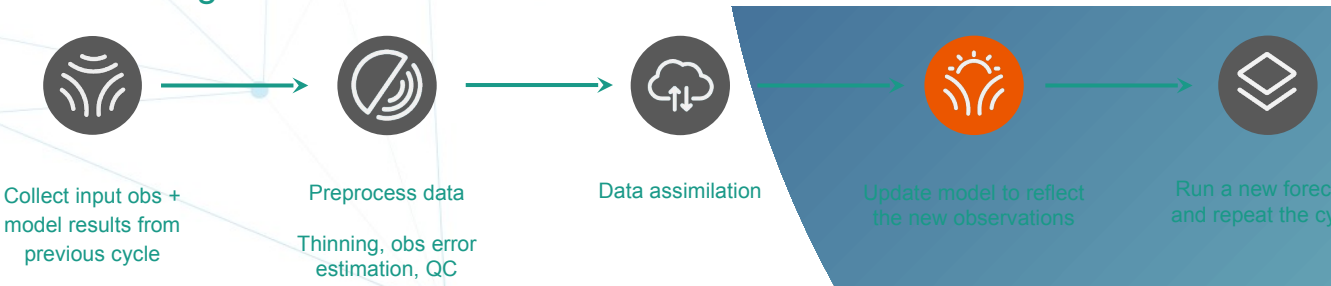
- Operational UFS/JEDI Cycling
- Continue using nature runs to simulate observations
- Work on building up our testbed system to assimilate the simulated observations
- Radar operators
  + 3DVAR / 4DVAR / EnKF
  + Many observations
  = OSSE



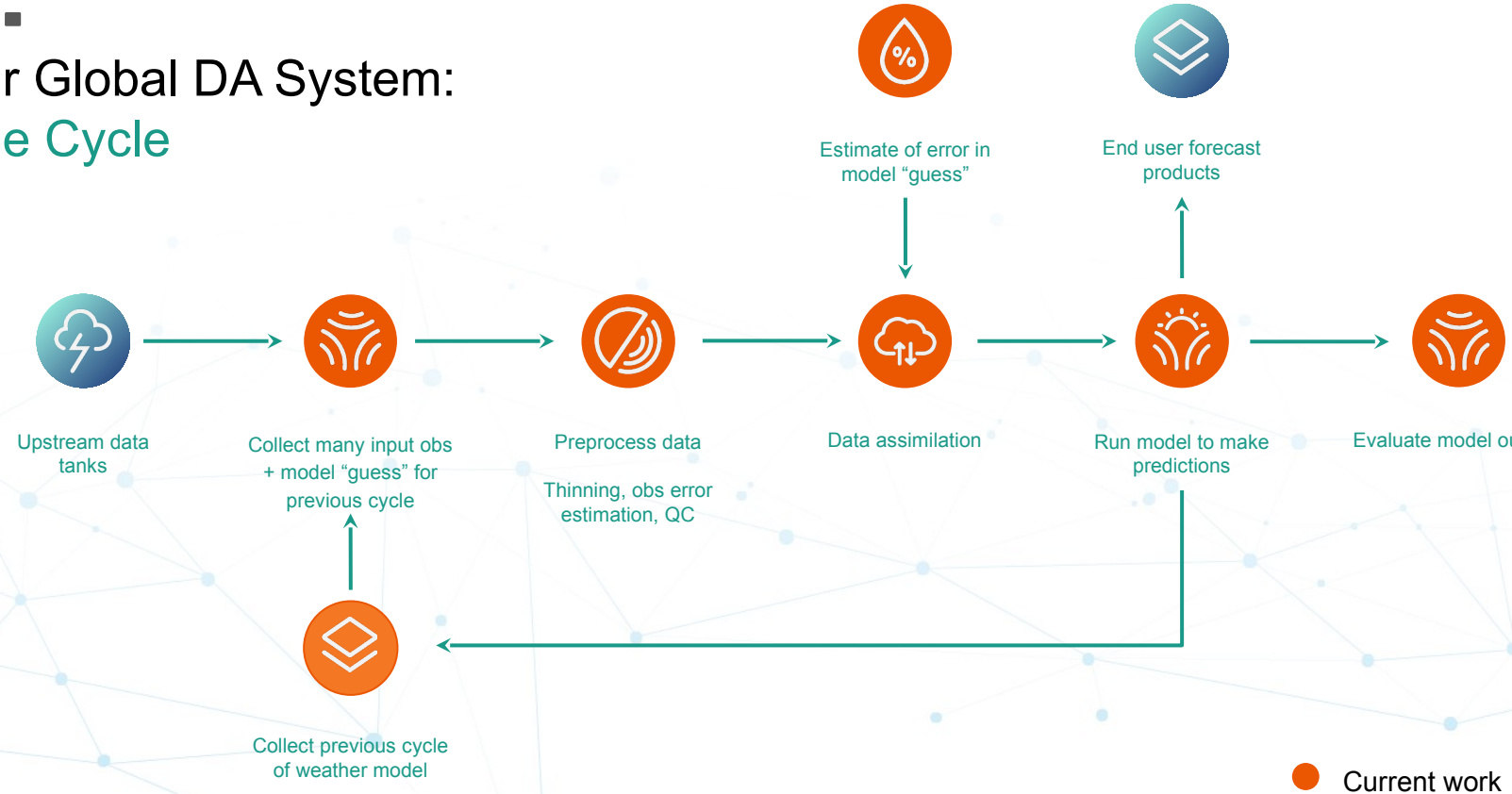
Building Our Global DA System

- UFS/JEDI 3DVAR is working! Our simulated data has an impact on our model.
- Figure shows model **increment** for temperature at 540 hPa, based on multiple TMS orbits ingested over a six hour window.
- Next work: Adding more instruments.





Our Global DA System:
One Cycle



Helpful Government Support

- Tutorials, academies, and workshops are a great way to introduce new users to the system
- NOAA's transition to GitHub has made it much easier to understand their systems.
- Shared computing resources (like the Orion supercomputer) make collaboration easier

HPC Considerations

- The JCSDA/NOAA/NASA effort to unify the software stack needed to perform DA and run models is fantastically implemented
  - Users can be confident that codes are portable and decently tested
  - Containerization and cloud migration efforts also help users to use NOAA models
- Many missed opportunities for optimizing code to reduce runtime and overall cost.
  - GMAO has novel work on automatic differentiation and GPU offload of models
  - Overall system needs considerable performance profiling.

Barriers to Development

- Too much code is still hardcoded to NOAA systems
  - This is being addressed, but there is a ton of remaining technical debt
- At present, there is no good method to work closely with JCSDA, even on a NOAA CRADA project
  - This blocks shared research and development
  - There is also no policy for community contributions to JCSDA
  - Contributions are somewhat discouraged, and this goes against the UFS/EPIC vision
  - Documentation practices need work
    - JCSDA example: rationale for changes and change logs are kept internal
    - This breaks downstream applications, and it makes it hard for EPIC to prepare for JEDI

How we would want to contribute:

- We would like to work with CRTM, JEDI, and the wider community to develop the core science needed to use satellite radar in a global DA system
  - It would help if CRTM development were more open
  - We need a radar operator, and we need an open source CRTM coefficient generation package
- We want to make instruments with the best possible impact
  - Shared experiments
  - We need a framework for open collaboration.

Thank you!