

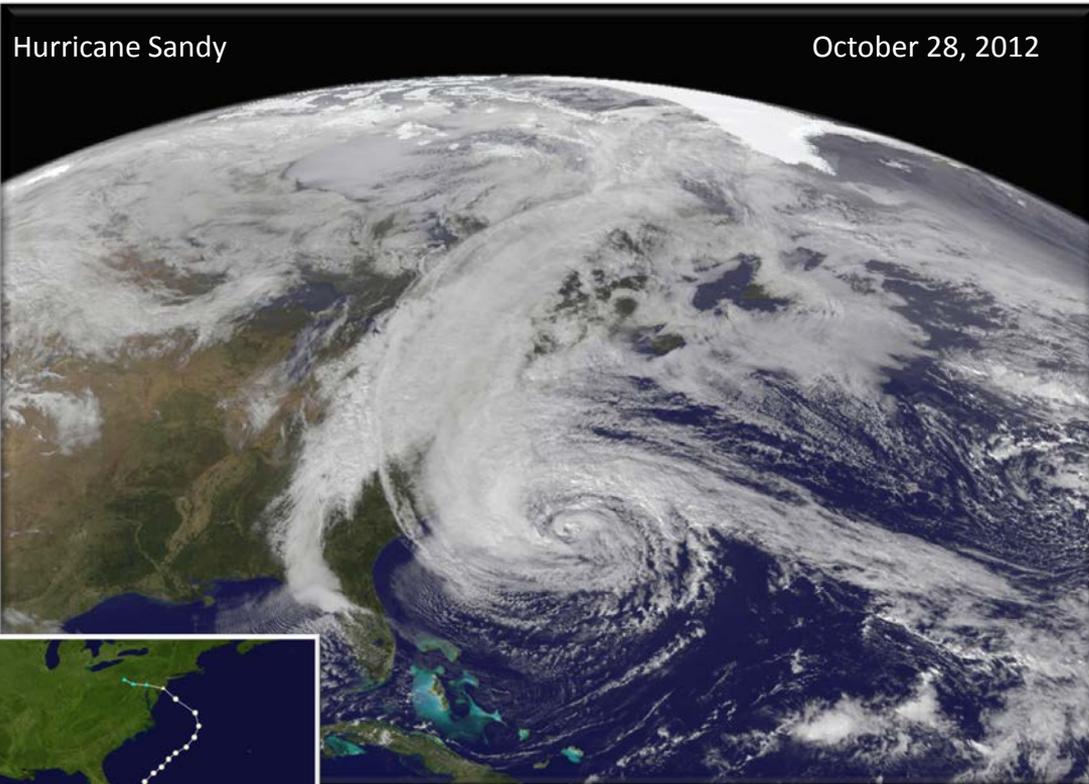
# Accelerating US Global Weather Prediction Development

27-29 October 2015

Tim Schneider

NOAA / ESRL / GSD

# We Need Better Forecast Tools



*"A European forecast that closely predicted Hurricane Sandy's onslaught days ahead of U.S. and other models is raising complaints in the meteorological community."*

*"The U.S. does not lead the world; we are not No. 1 in weather forecasting, I'm very sorry to say that," says AccuWeather's Mike Smith..."*

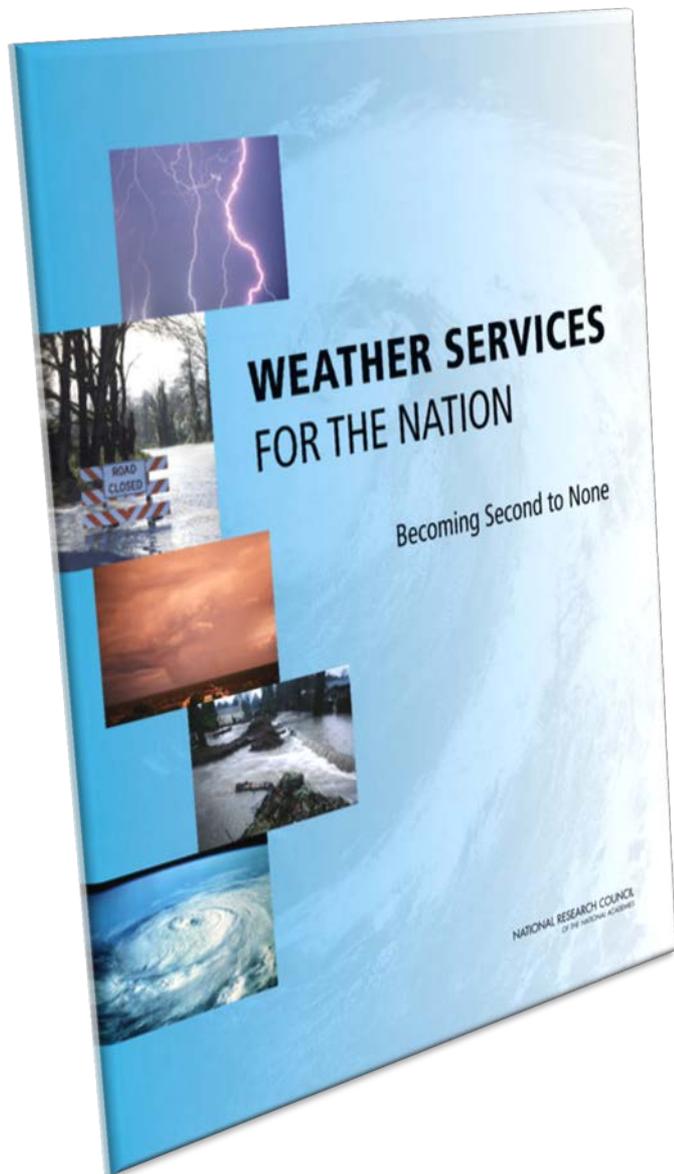
Source: USA Today, October 30, 2012



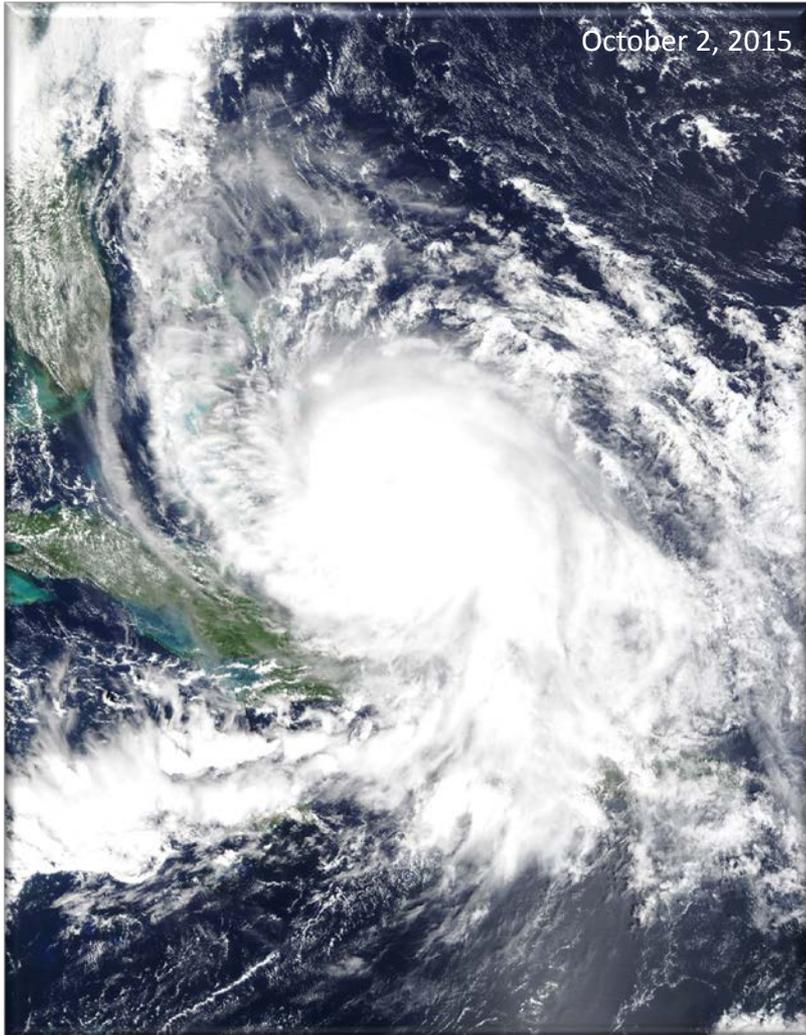
# National Research Council: *Becoming Second to None*

## Numerical Weather Prediction: *(Recommendation 1.b)*

“The National Weather Service (NWS) global and regional numerical weather prediction systems should be of the highest quality and accuracy, ***with improvements driven by user needs and scientific advances.*** To achieve this goal, the NWS should give priority to upgrading its data assimilation system and ***increasing the resolution of its deterministic and ensemble modeling systems.***”



# Three Years Later...Hurricane Joaquin



- European's forecast track was still better\*, but...
- NOAA's HWRF hurricane intensity forecasts were 'second to none'
- US research models had 20" precipitation forecasts in South Carolina 36 hours in advance (verified)
- The National Hurricane Center *correctly* never issued any hurricane watches or warnings for the mainland

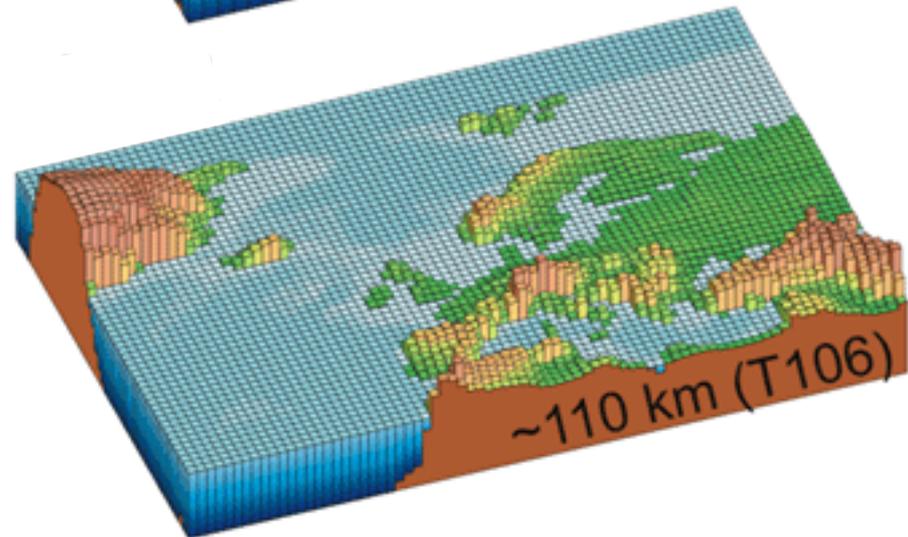
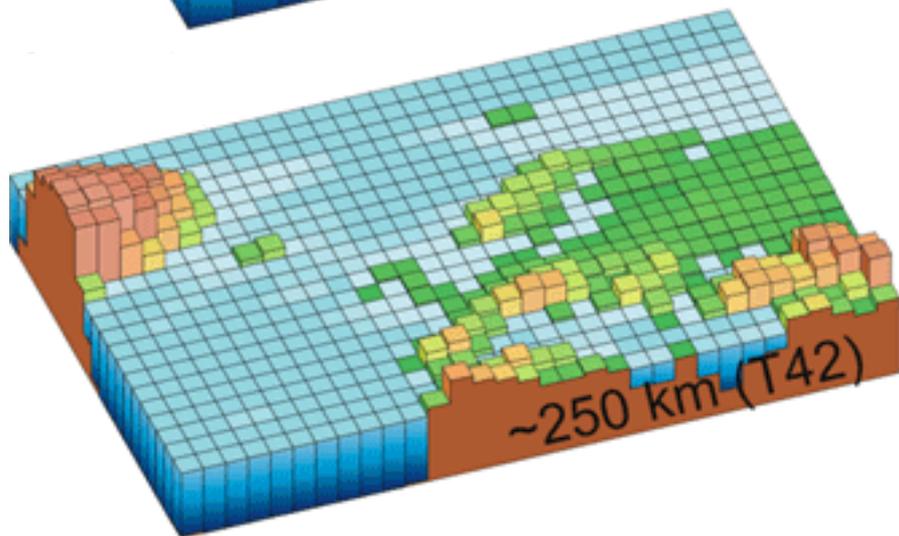
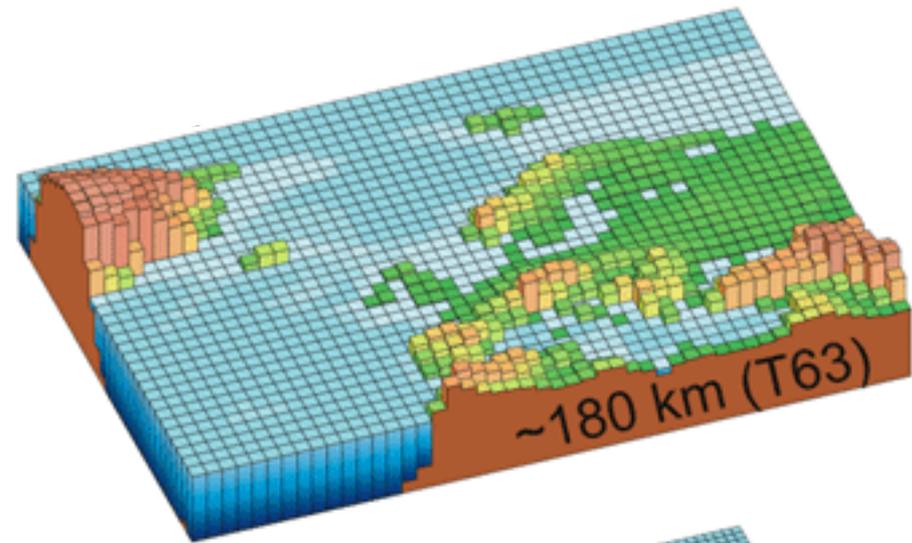
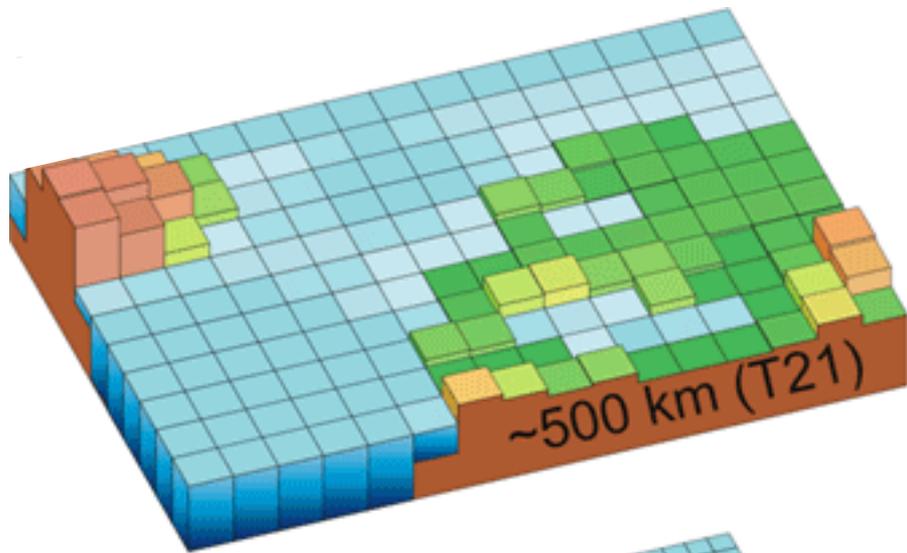
# We Must Get the Clouds Right



6-14 IMG BAND=1 (0.62 UM) 26 OCT 12 (2012300) 22:32 UTC NOAA DU755EC CIMSS

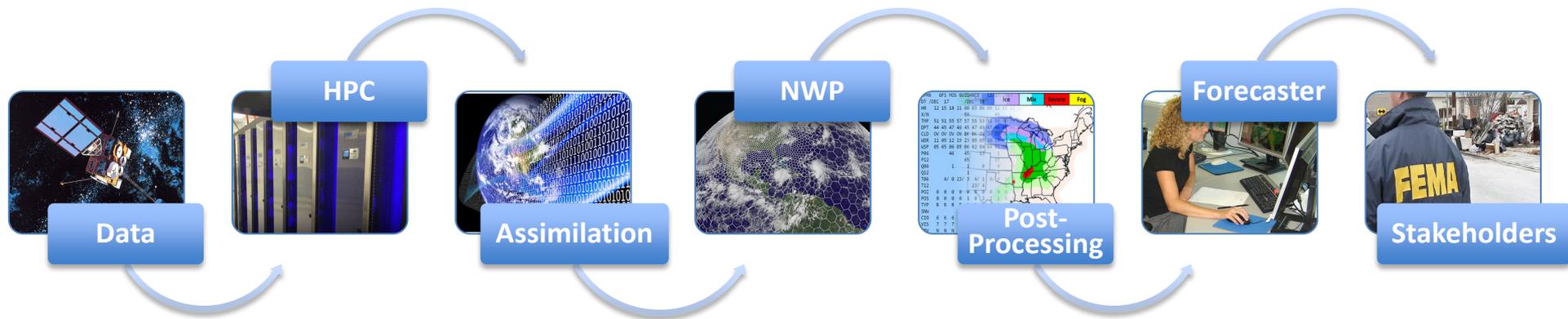
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# Ocean-Land-Atmosphere Interactions: The Devil's in the Details

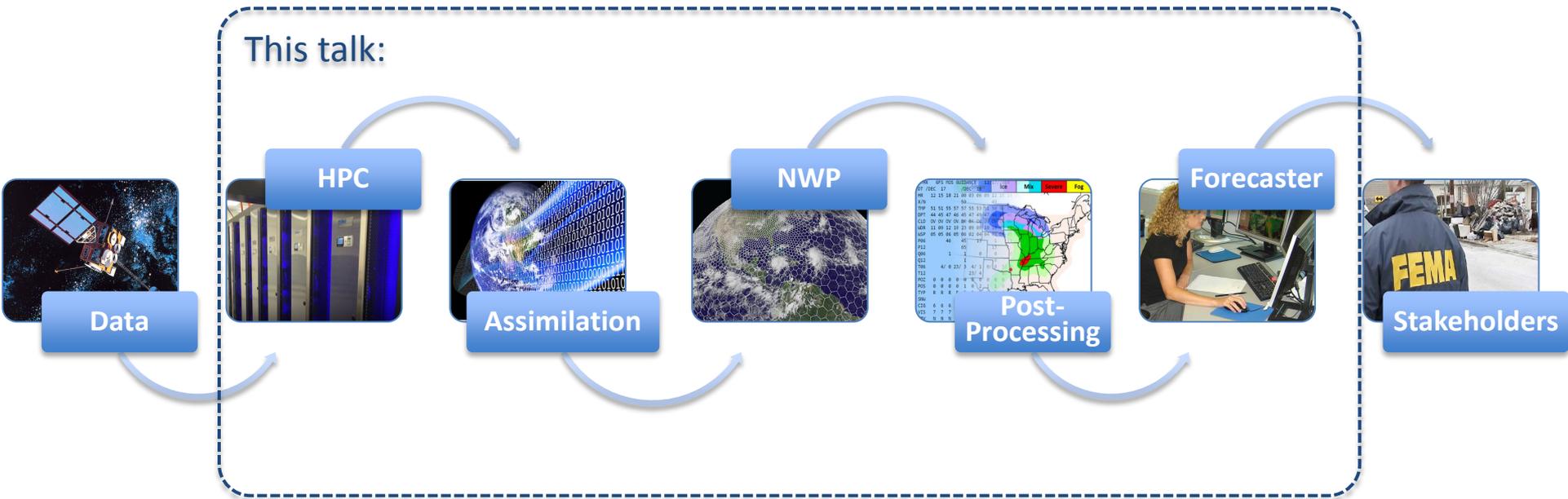


# Sandy Supplemental:

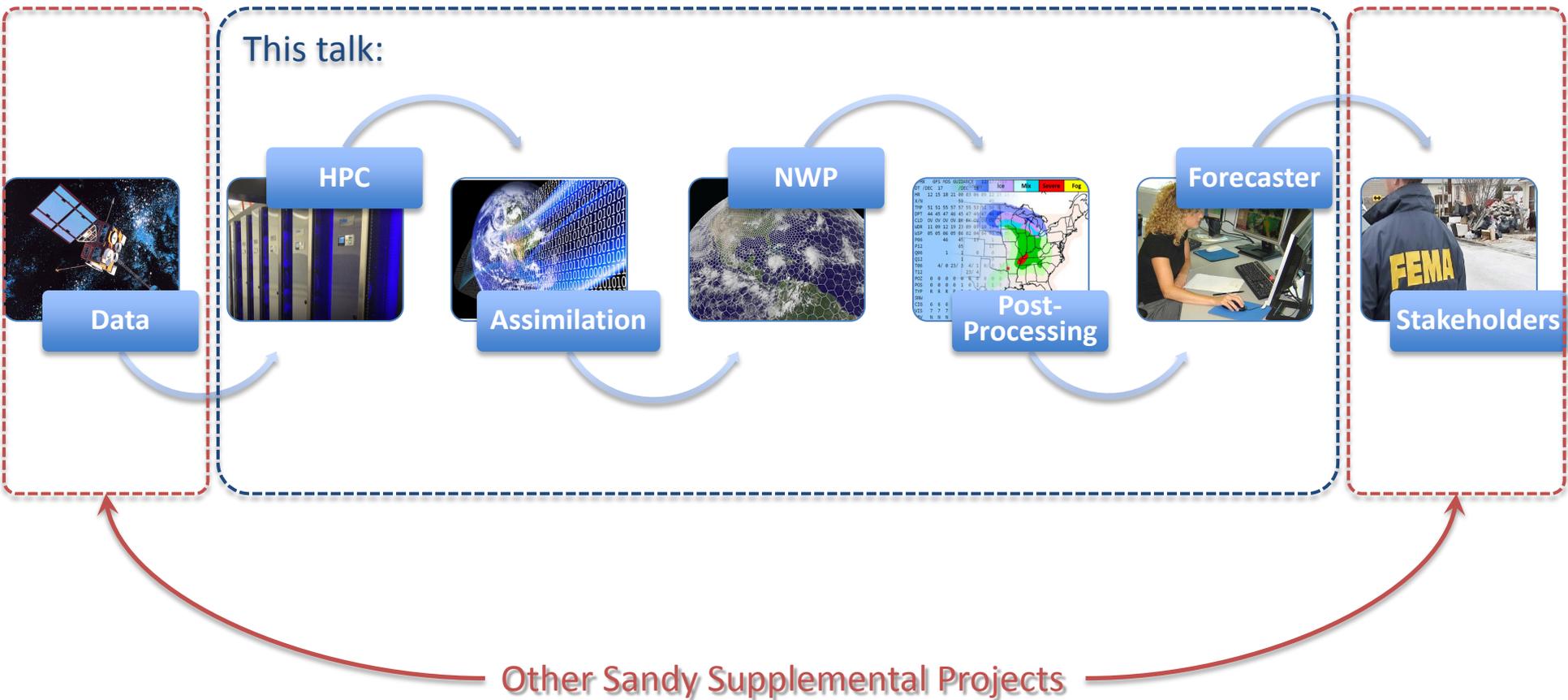
## We've improved every link in the chain!



# Sandy Supplemental: We've improved every link in the chain!



# Sandy Supplemental: We're improving every link in the chain!



# At a Glance:

## The High-Impact Weather Prediction Project

### *“Just the facts...”*

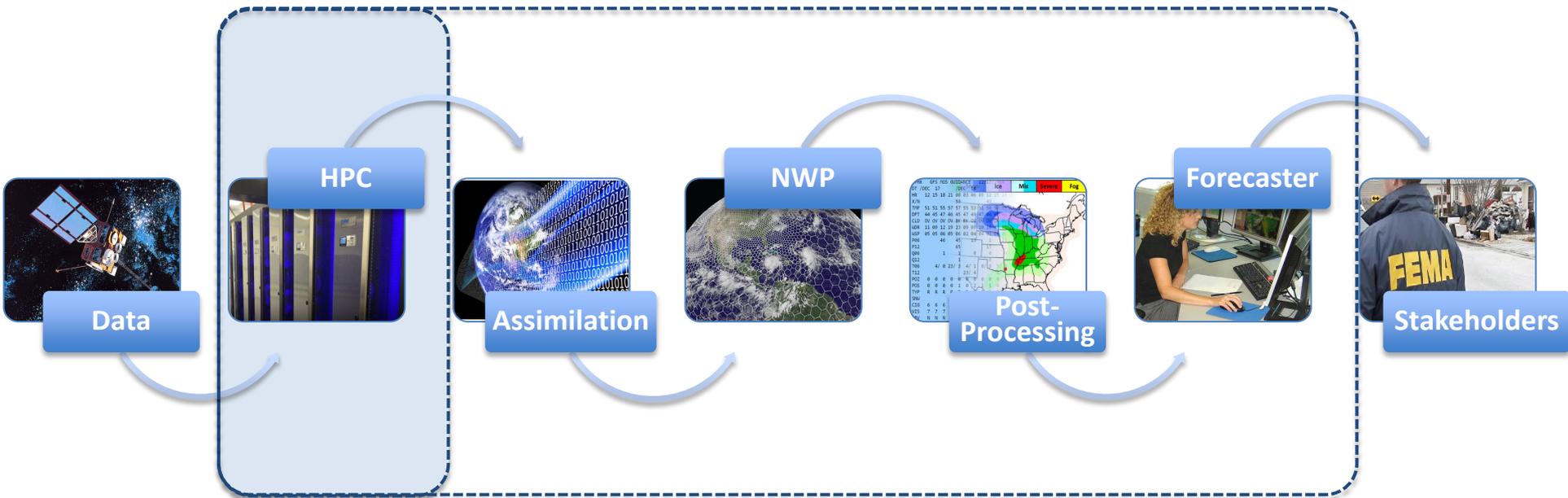
- HIWPP is an OAR “Sandy Supplemental” Project
  - \$12.905M
  - 3-Year ‘Accelerator’
- Collaborative project, coast-to-coast:
  - 3 NOAA Laboratories
  - 2 NWS Centers
  - 4 Universities
  - US Navy
  - National Center for Atmospheric Research (NSF)

### *How are we doing it?*

- Building on existing efforts...
  - Enhance & accelerating them
- Research to operations:
  - Hand-off to the Next Generation Global Prediction System (NGGPS)

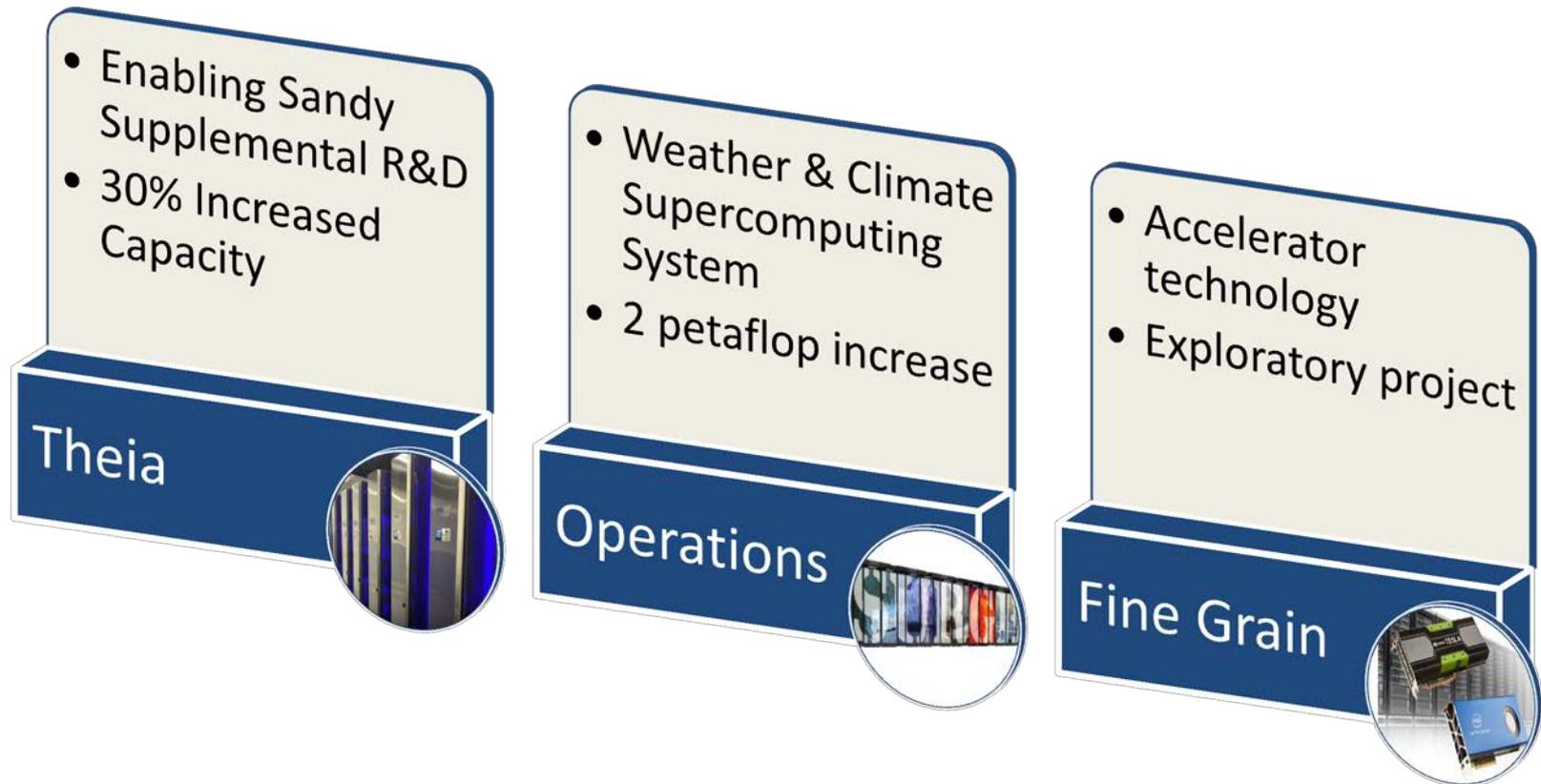


# Sandy Supplemental: High Performance Computing

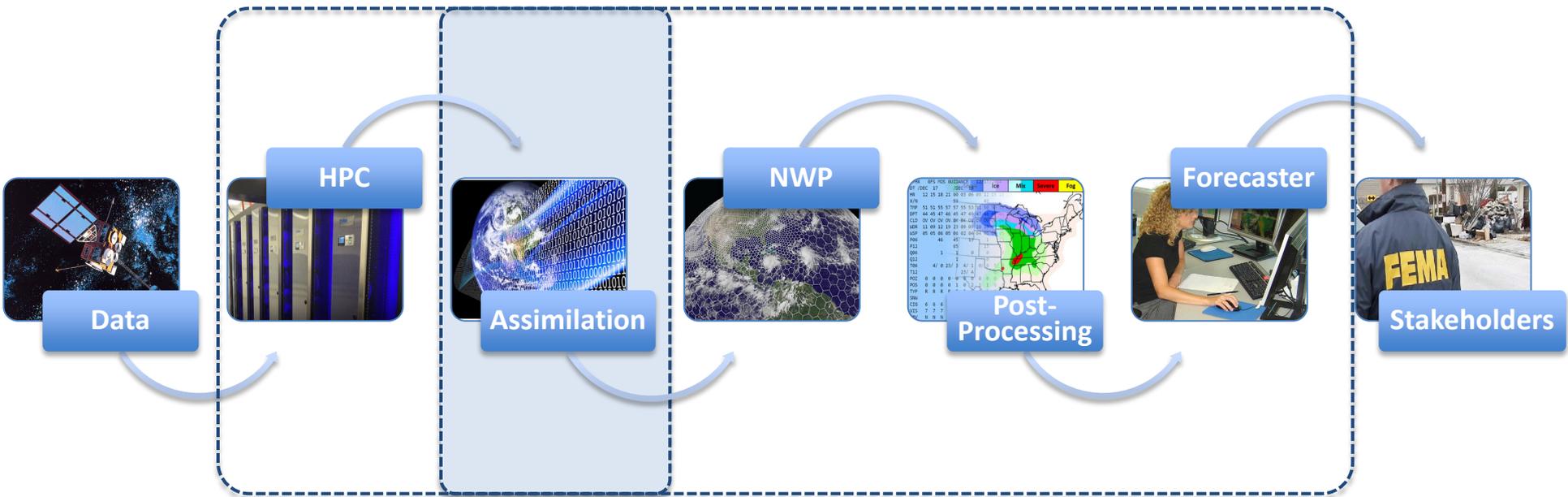


# Enabler: High Performance Computing

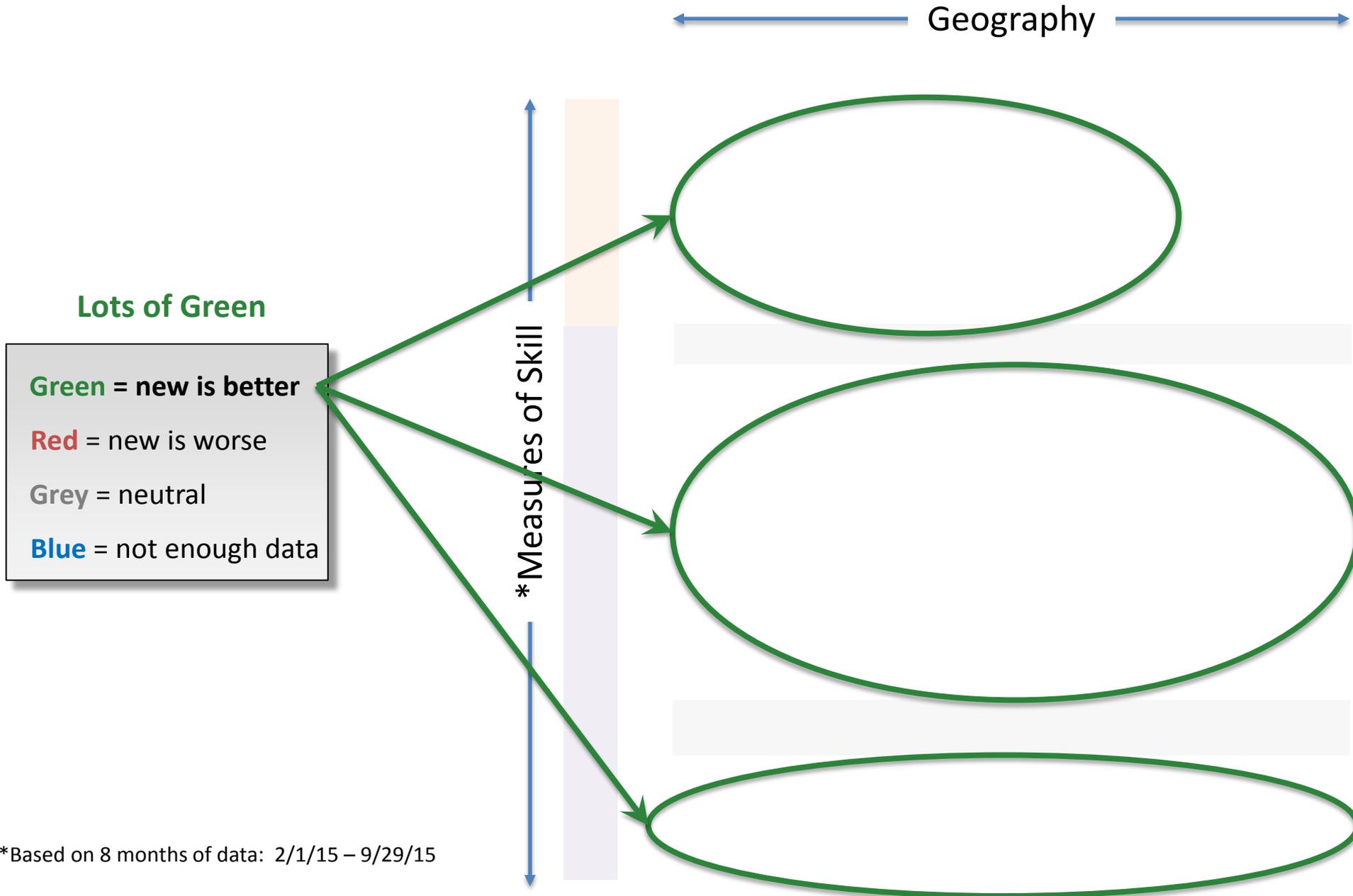
*New supercomputing funded by the Sandy Supplemental Disaster Relief Act:*



# Sandy Supplemental: Data Assimilation

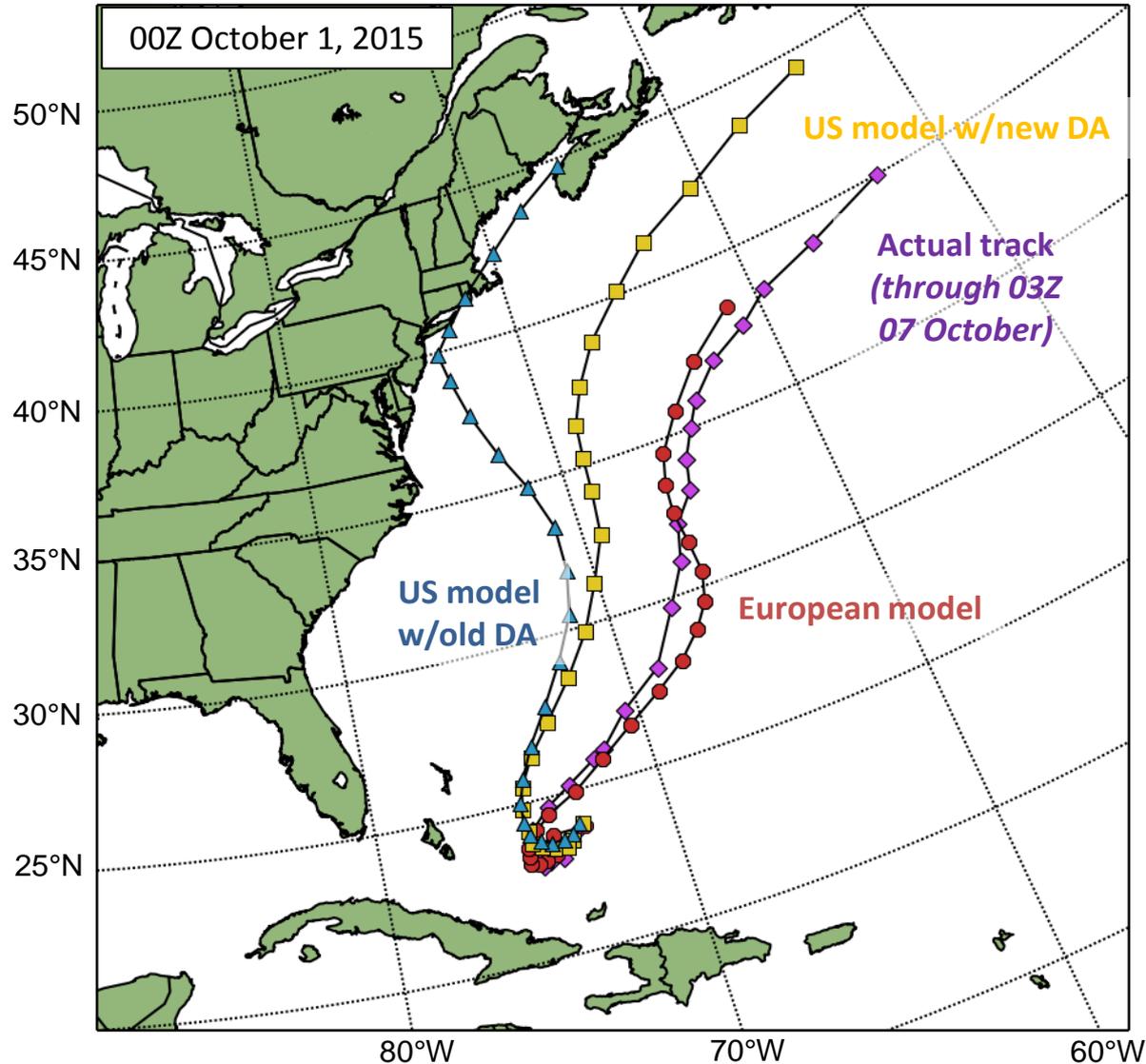


# You have to Start at the Beginning: Data Assimilation

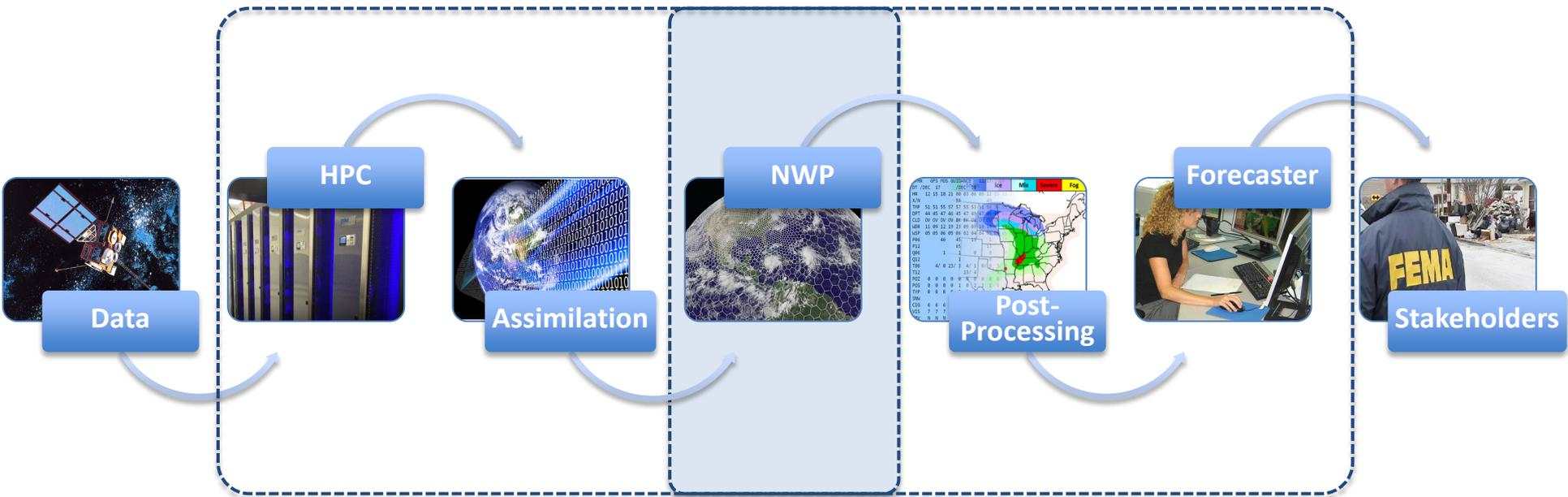


# Better Data Assimilation (DA) = Better Forecasts

## Hurricane Joaquin

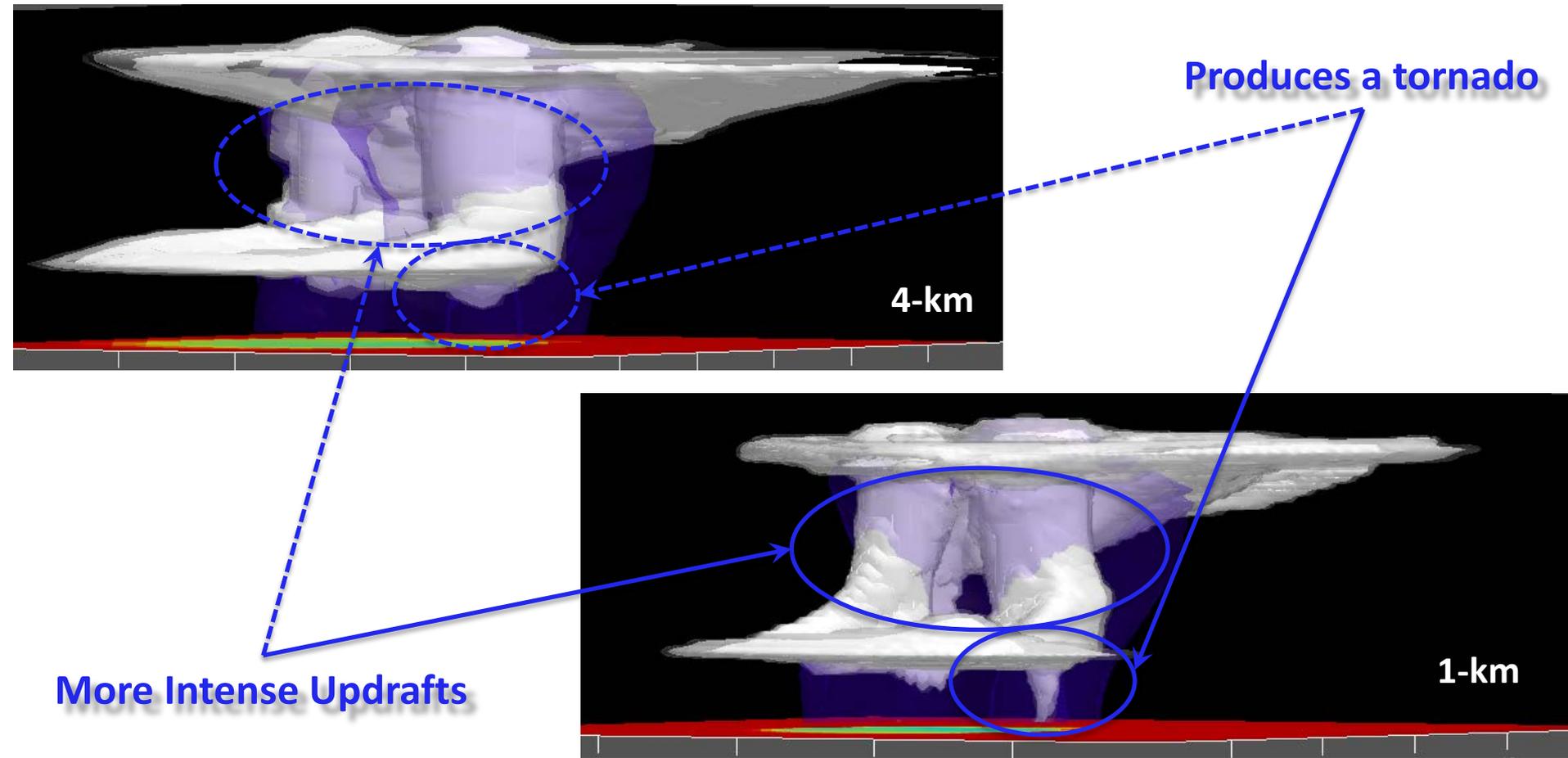


# Sandy Supplemental: Numerical Weather Prediction

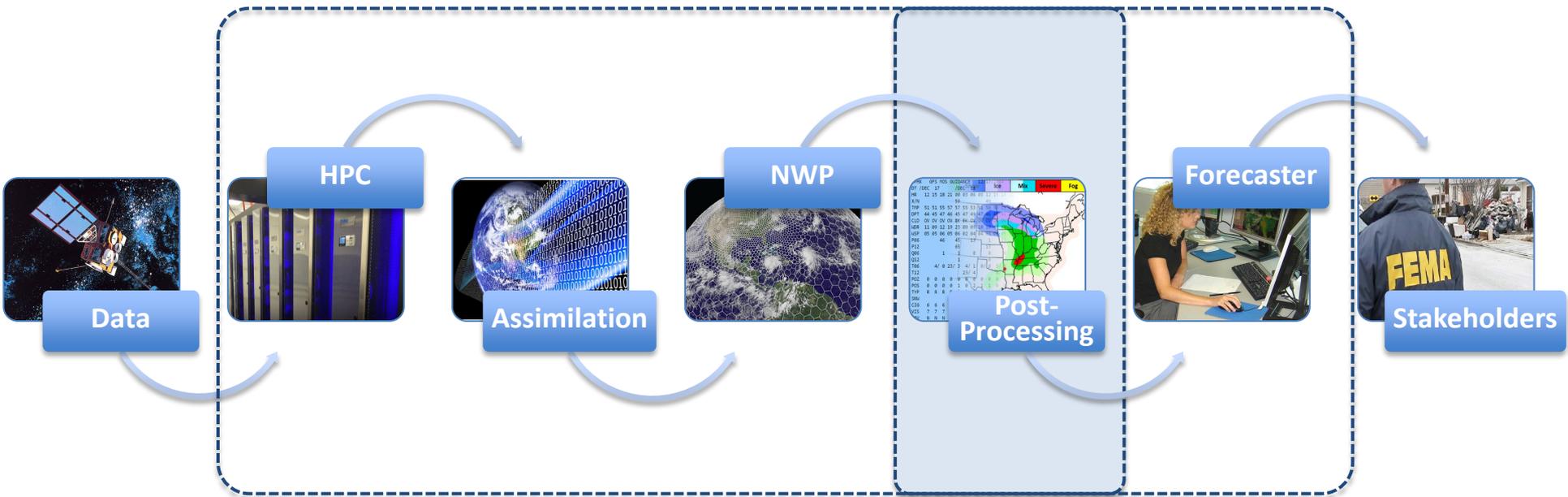


# Resolution Matters:

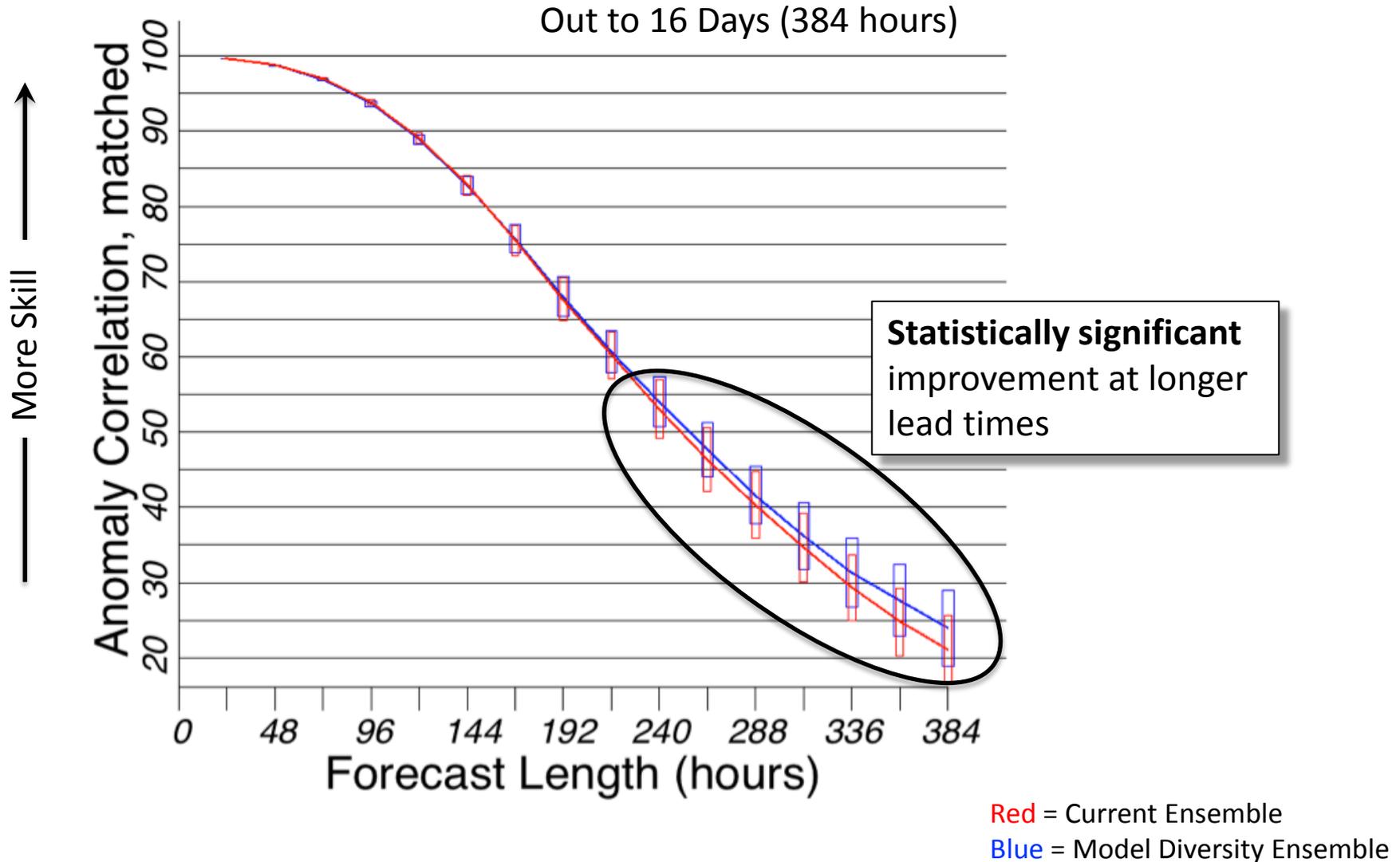
## *Simulation of a Tornado-Producing Super-Cell Storm*



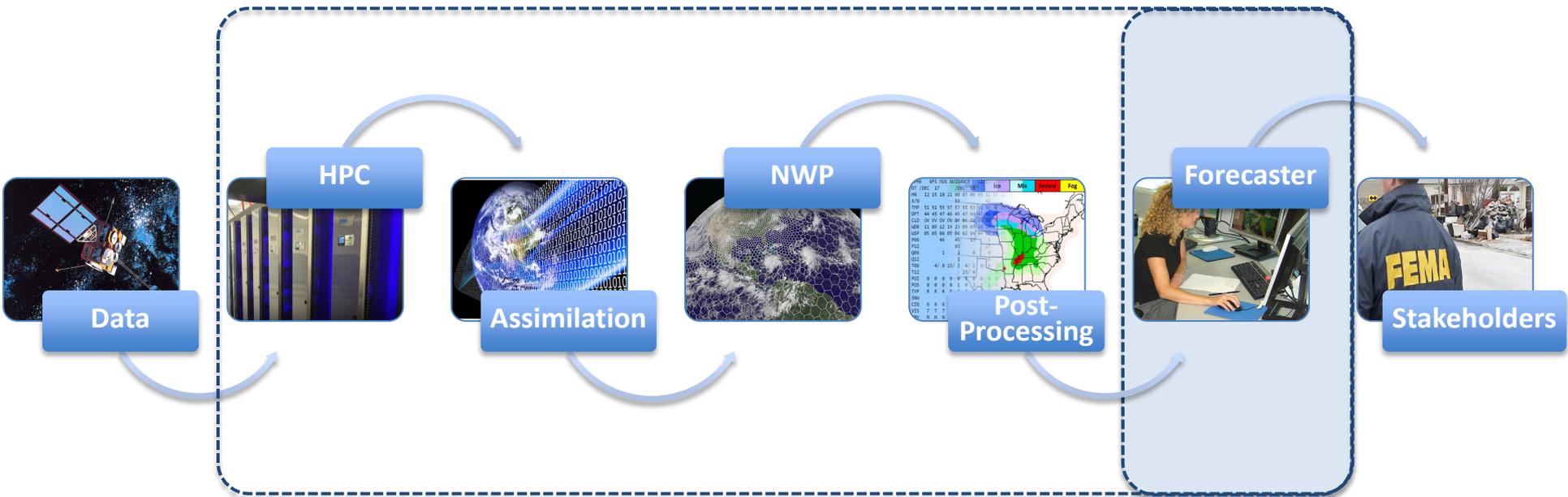
# Sandy Supplemental: Statistical Post Processing & Ensembles



# Improved Medium-Range Forecast Skill Through Model Diversity



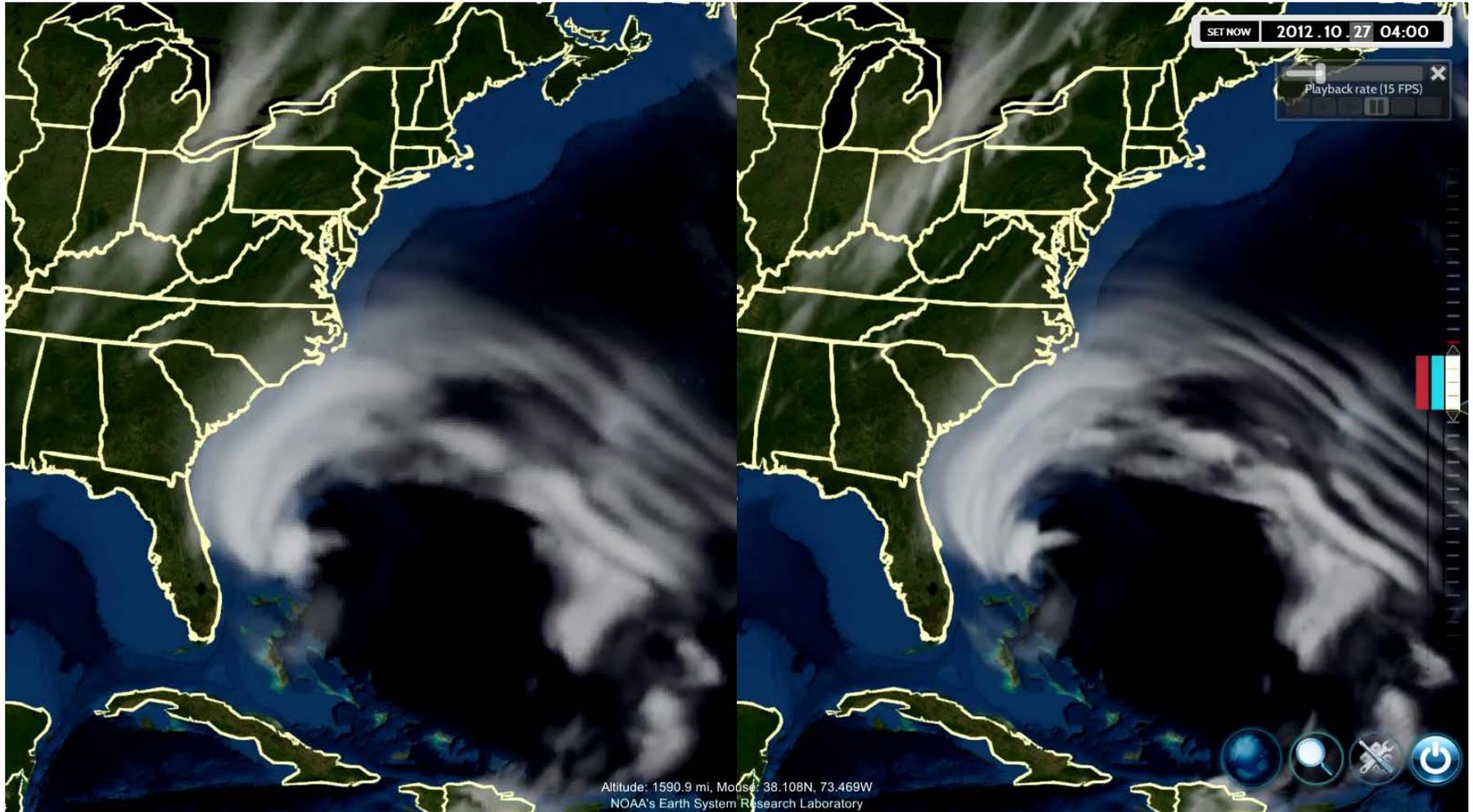
# Sandy Supplemental: Supporting the Forecaster



# Hurricane Sandy: Yesterday and Today...

2012 Resolution Models; 30 km FIM

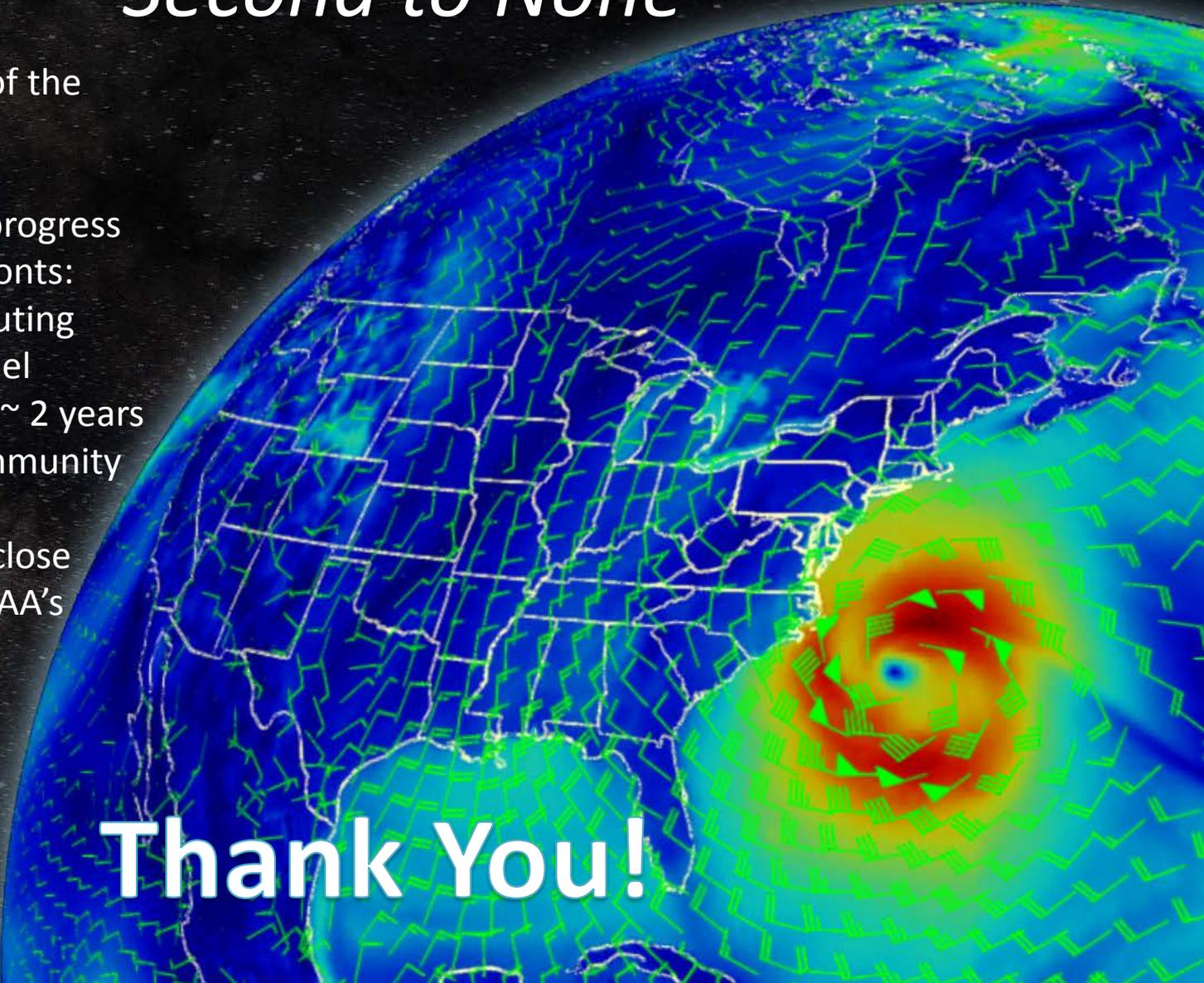
2015 Resolution Models: 10 km FIM



Visualization prepared with the NOAA Earth Information System (NEIS)

# We're Getting Closer to Being *'Second to None'*

- HIWPP is about 70% of the way through project
- We've made a lot of progress across a number of fronts:
  - Advanced Computing
  - Accelerated model development by ~ 2 years
  - Engaged the community
- R2O built-in through close coordination with NOAA's NGGPS Program



**Thank You!**