Real-Time HWRF Forecasts for the Joint Typhoon Warning Center

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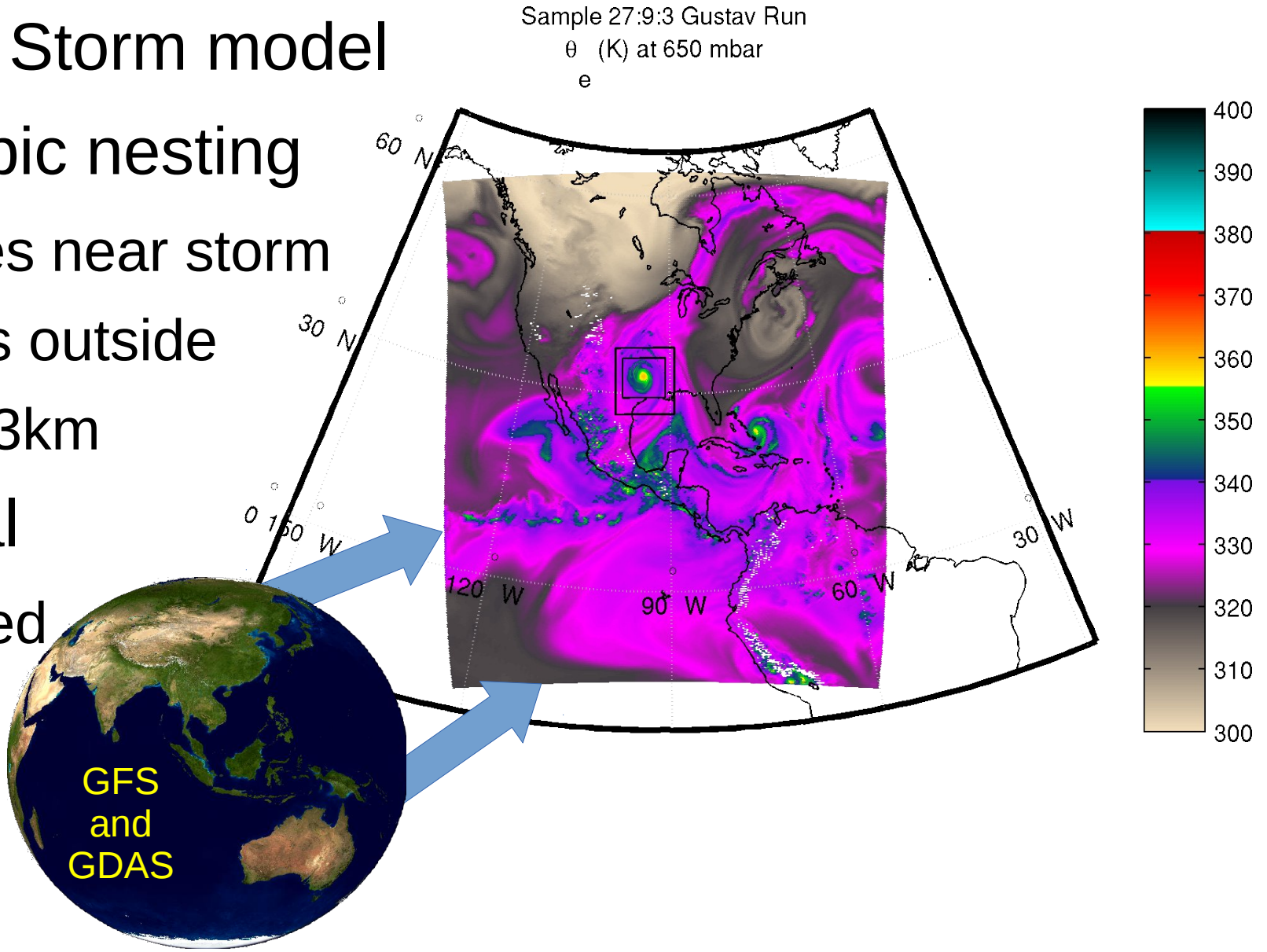
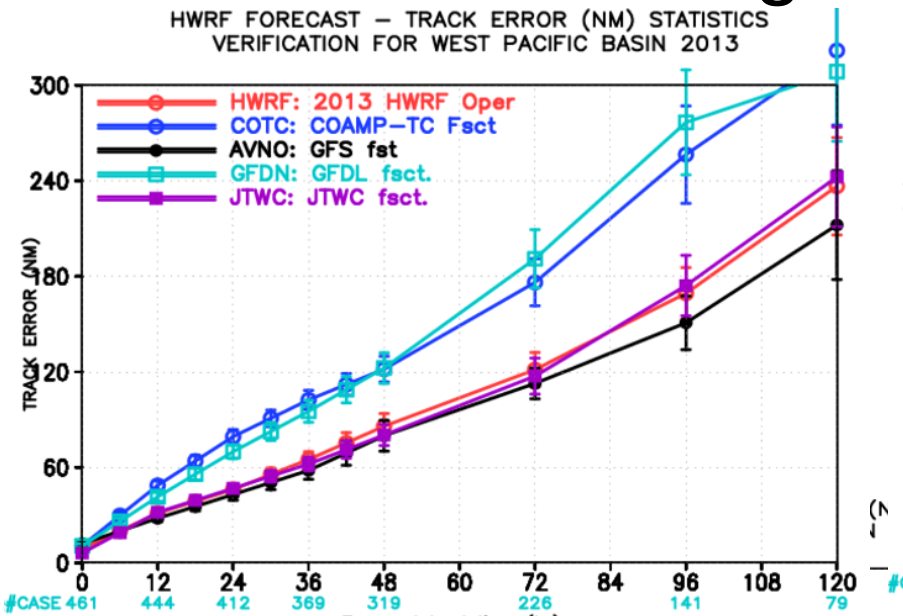
HWRF for JTWC: What and Why
What is HWRF?

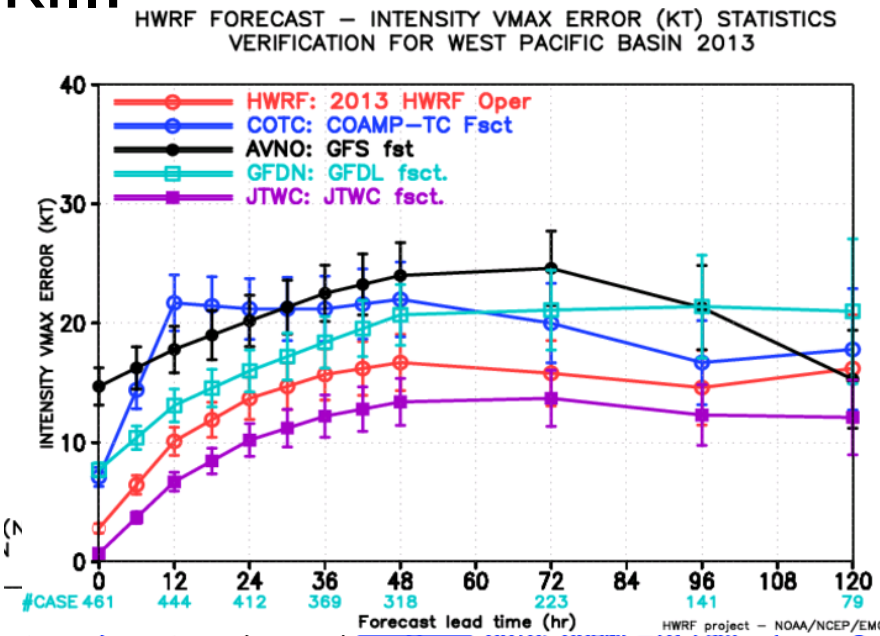
- Tropical Storm model
- Telescopic nesting
  - high res near storm
  - low res outside
  - 27, 9, 3km
- Regional
  - GFS-fed



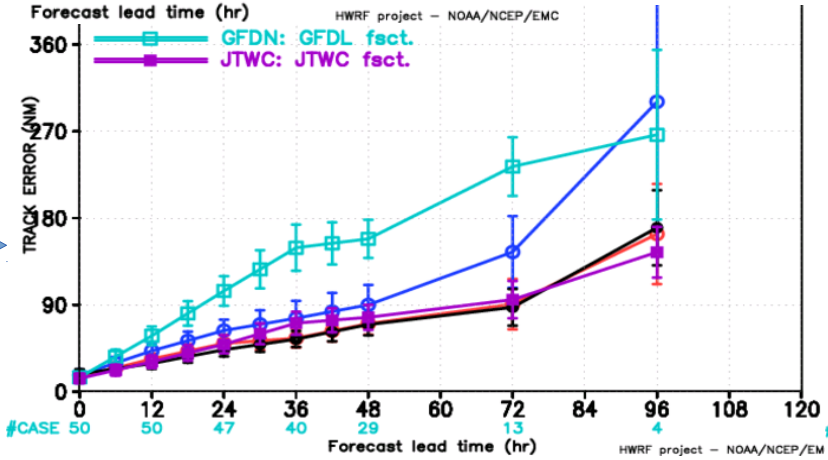
HWRF for JTWC: What and Why
Why do we want HWRF?

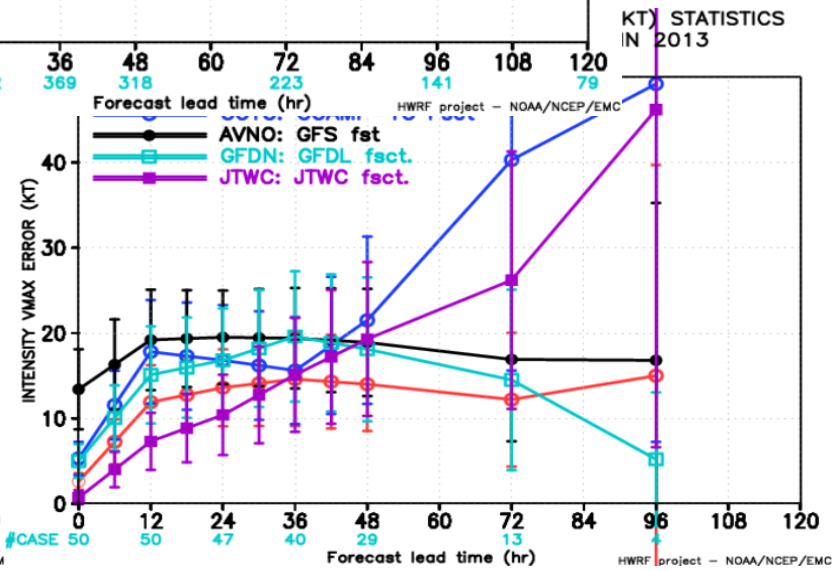
- Good Forecasting skill:





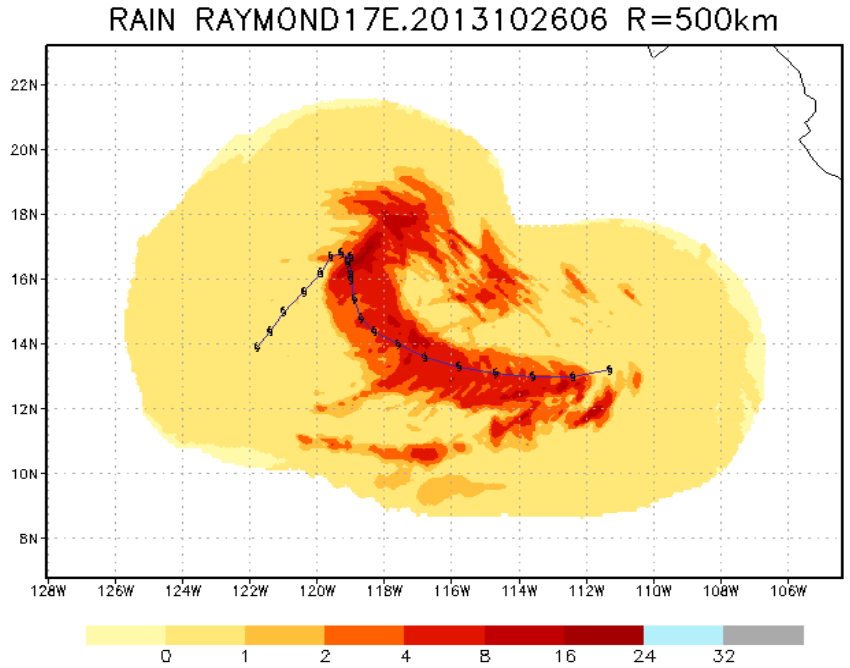
Indian Ocean Basin

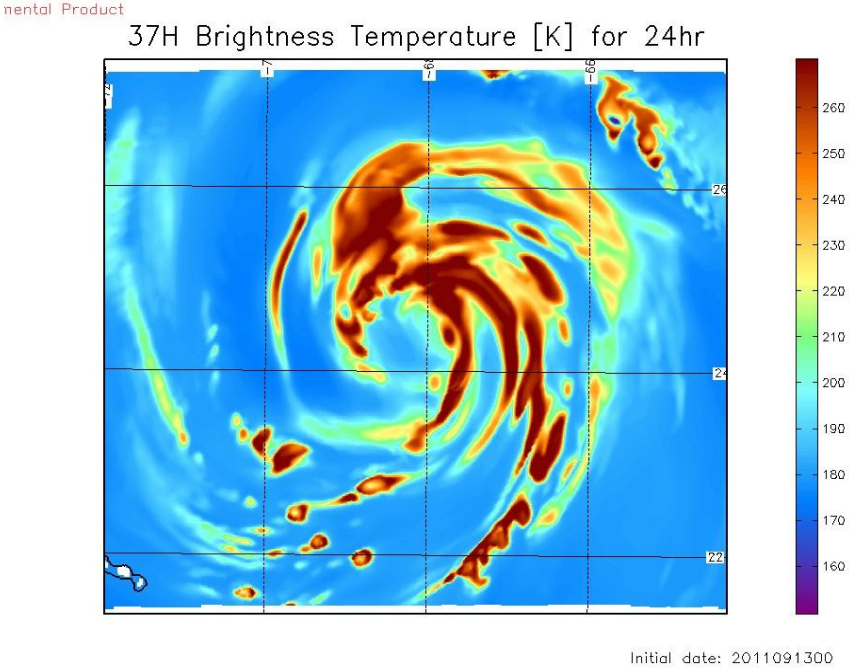




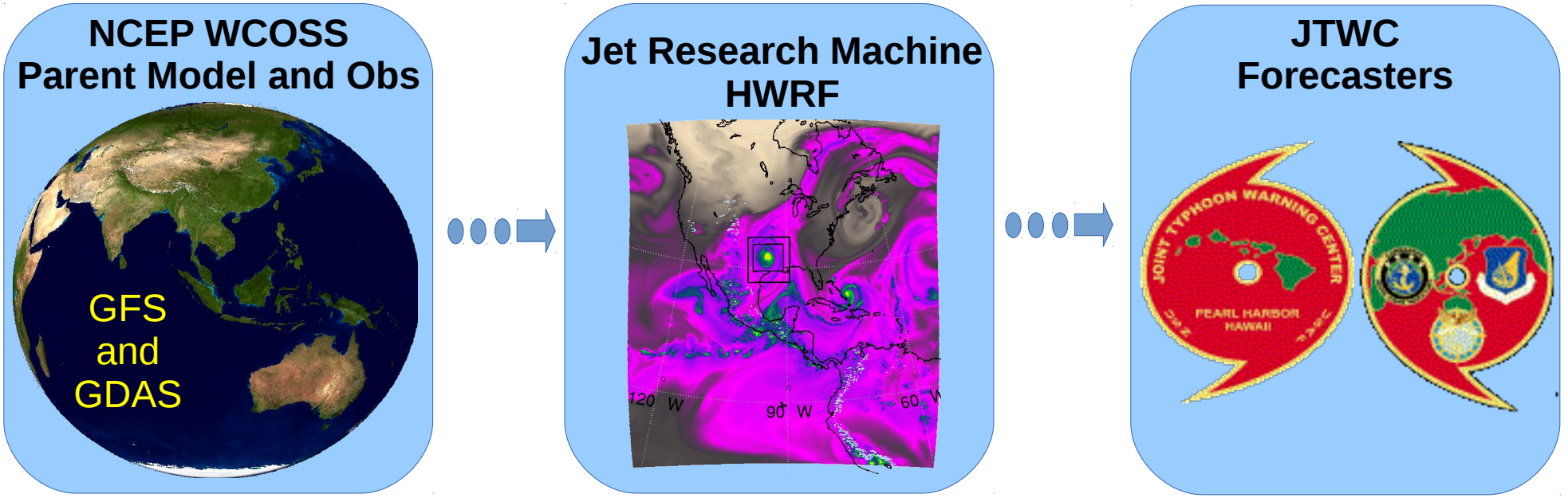
HWRF for JTWC: What and Why
Why do we want HWRF?

- Extra forecast products useful to forecasters.
  - Rain and wind swaths.
  - Synthetic satellite imagery (F17 SSMIS, various IR).
  - Storm structure forecasts (RMW, thermal, wind radii).

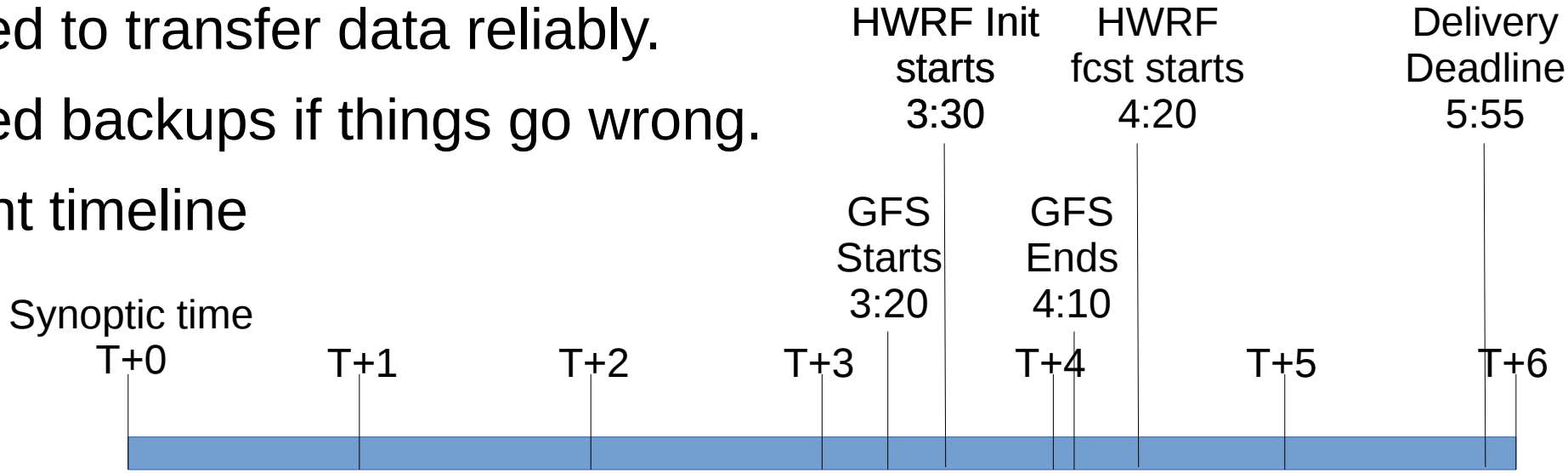




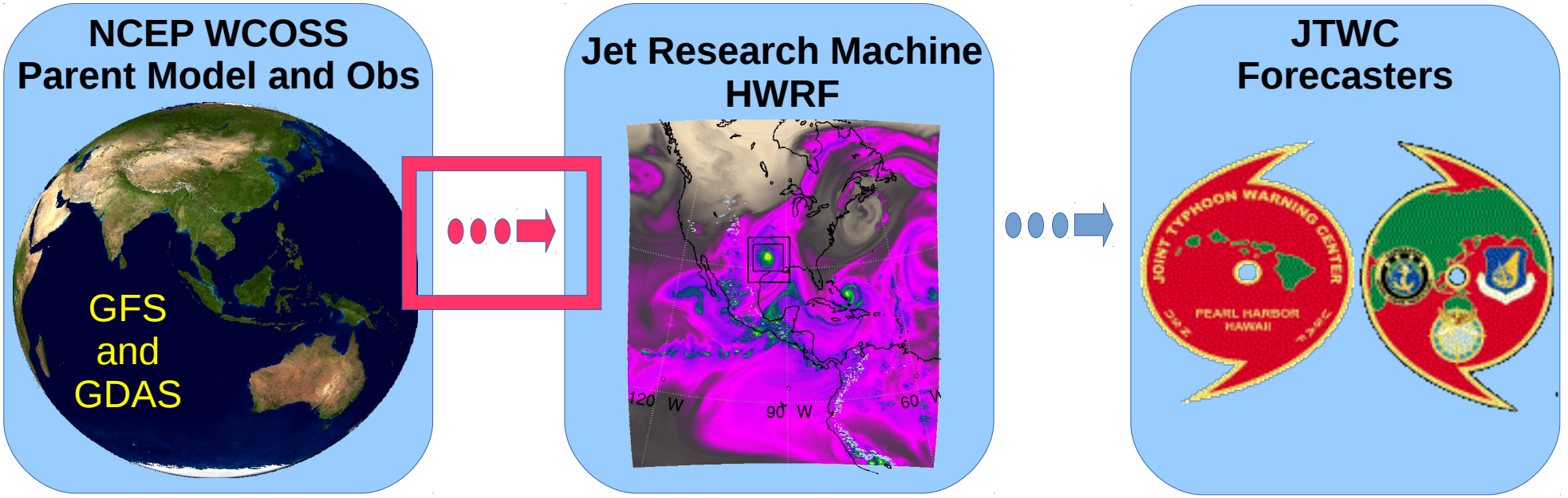
Real-Time on Non-Operational Machines Workflow Requirements



- Need to transfer data reliably.
- Need backups if things go wrong.
- Tight timeline

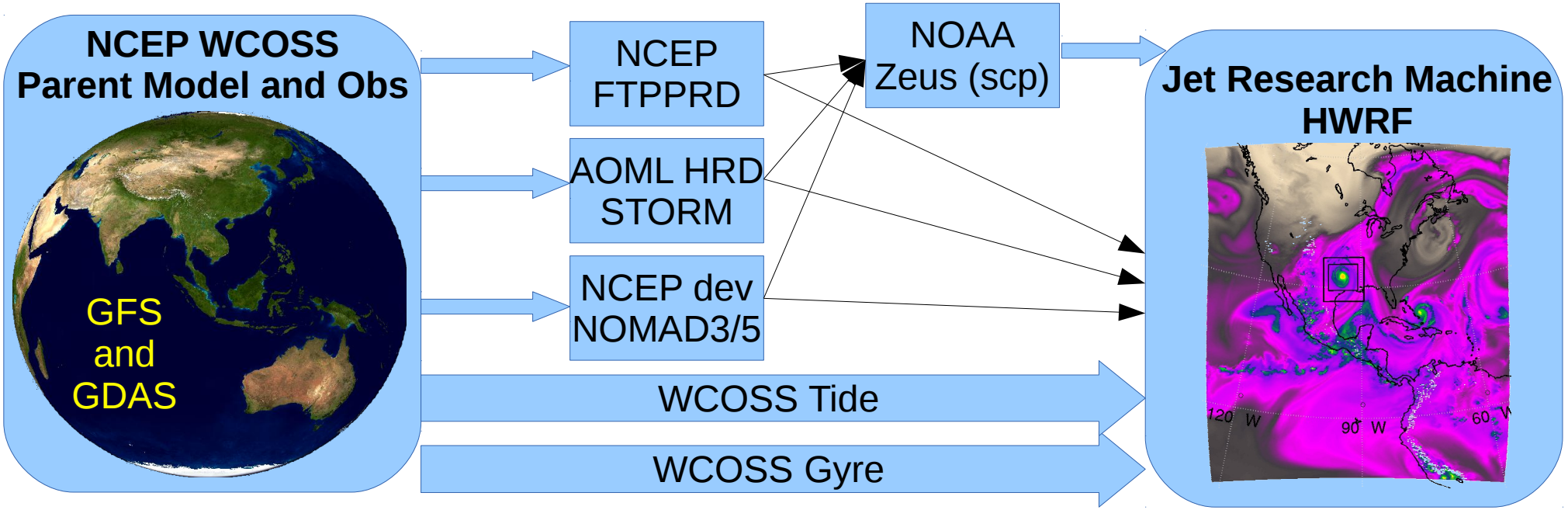


Real-Time on Non-Operational Machines Problems and Workarounds



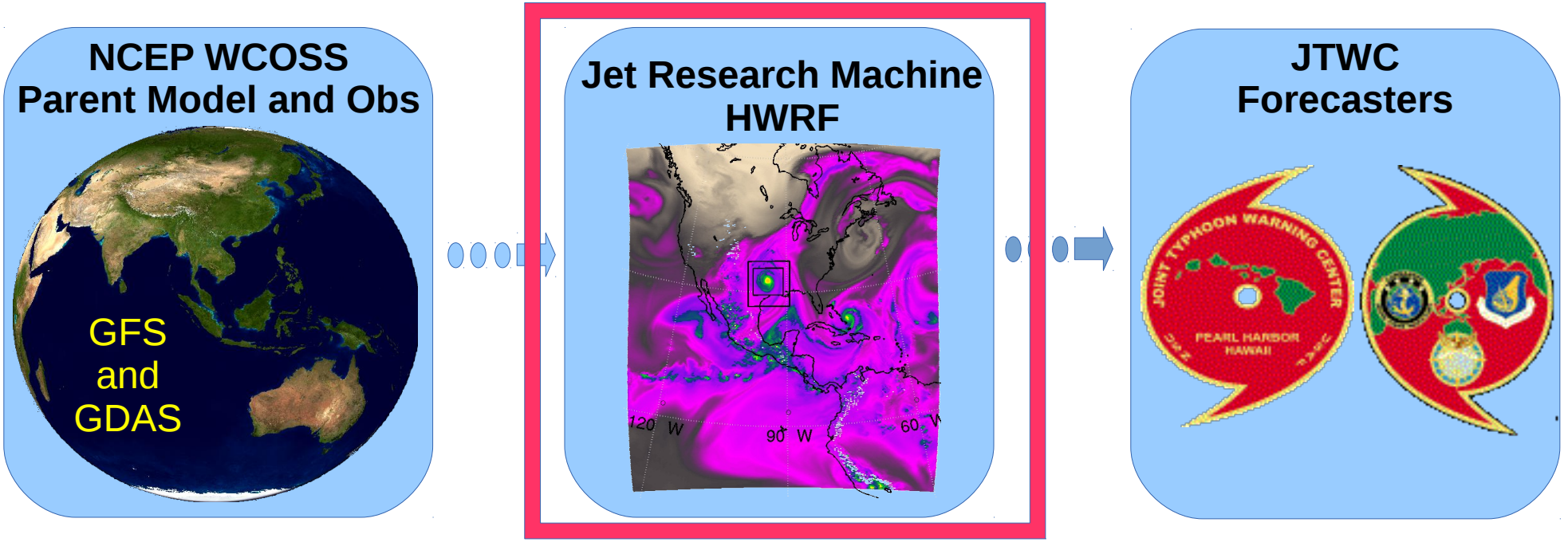
- Transfer ~20GB in two hours, four times a day.
- NOAA networks inherently unreliable.
- Two WCOSSes: Tide and Gyre.
  - NCEP production may switch at any time.

Real-Time on Non-Operational Machines Problems and Workarounds



- Mesh network for data transfer.
- Transfer through multiple routes.
  - Same destination; avoid duplicate transfers.
- Required custom mirroring software.

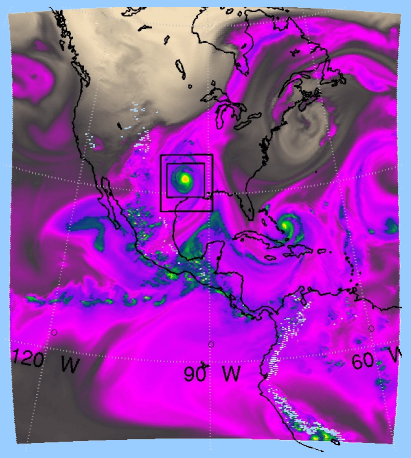
Real-Time on Non-Operational Machines Problems and Workarounds



- Research machines unreliable.
  - Batch system, filesystem, other hardware failures.
  - Regular downtimes for maintenance.

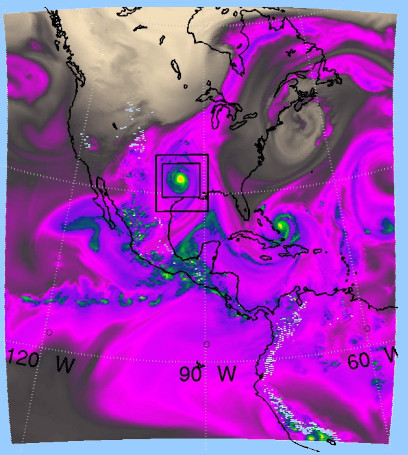
Real-Time on Non-Operational Machines Problems and Workarounds

Jet Research Machine HWRF



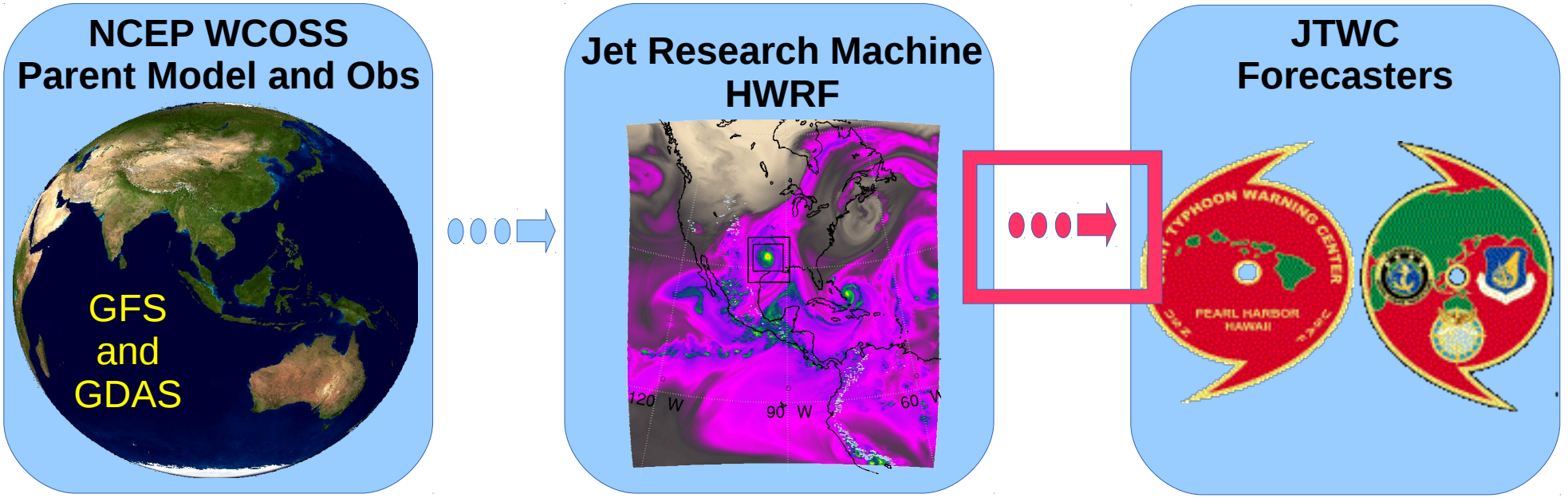
- Dedicated compute nodes
  - Three sets.
- Ability to switch between two filesystems.
- Warn JTWC before scheduled maintenance.

WCOSS Backup HWRF



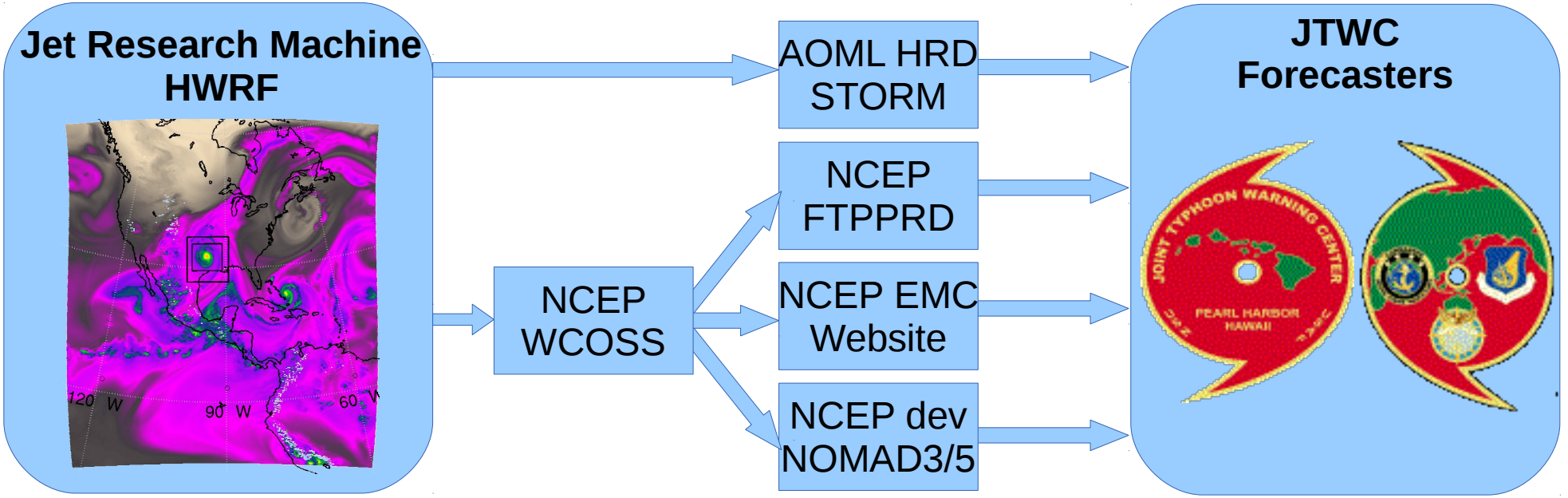
- Last resort: use other machines
  - WCOSS - Phailin (Jet went down)
    - Rare: requires special permission.
  - Zeus - unusable
    - machine is overutilized

Real-Time on Non-Operational Machines Problems and Workarounds



- No direct transfer route: must use intermediate storage servers (FTP/HTTP).
- Servers unreliable.
- NOAA networks unreliable.

Real-Time on Non-Operational Machines Problems and Workarounds



- Use four intermediate servers.
- One bypasses the NCEP network entirely.
- Use HTTP and FTP on all four.

Concluding Remarks

- Model is ready for an operational environment.
- Model is valuable to JTWC.
- Research machines are not ready for an operational model.
  - Decent reliability but not up to operational levels.
- Need 24/7 operators in case of failures
  - EMC has no shift workers (only 9-5 workers)