# HWRF Initialization Overview

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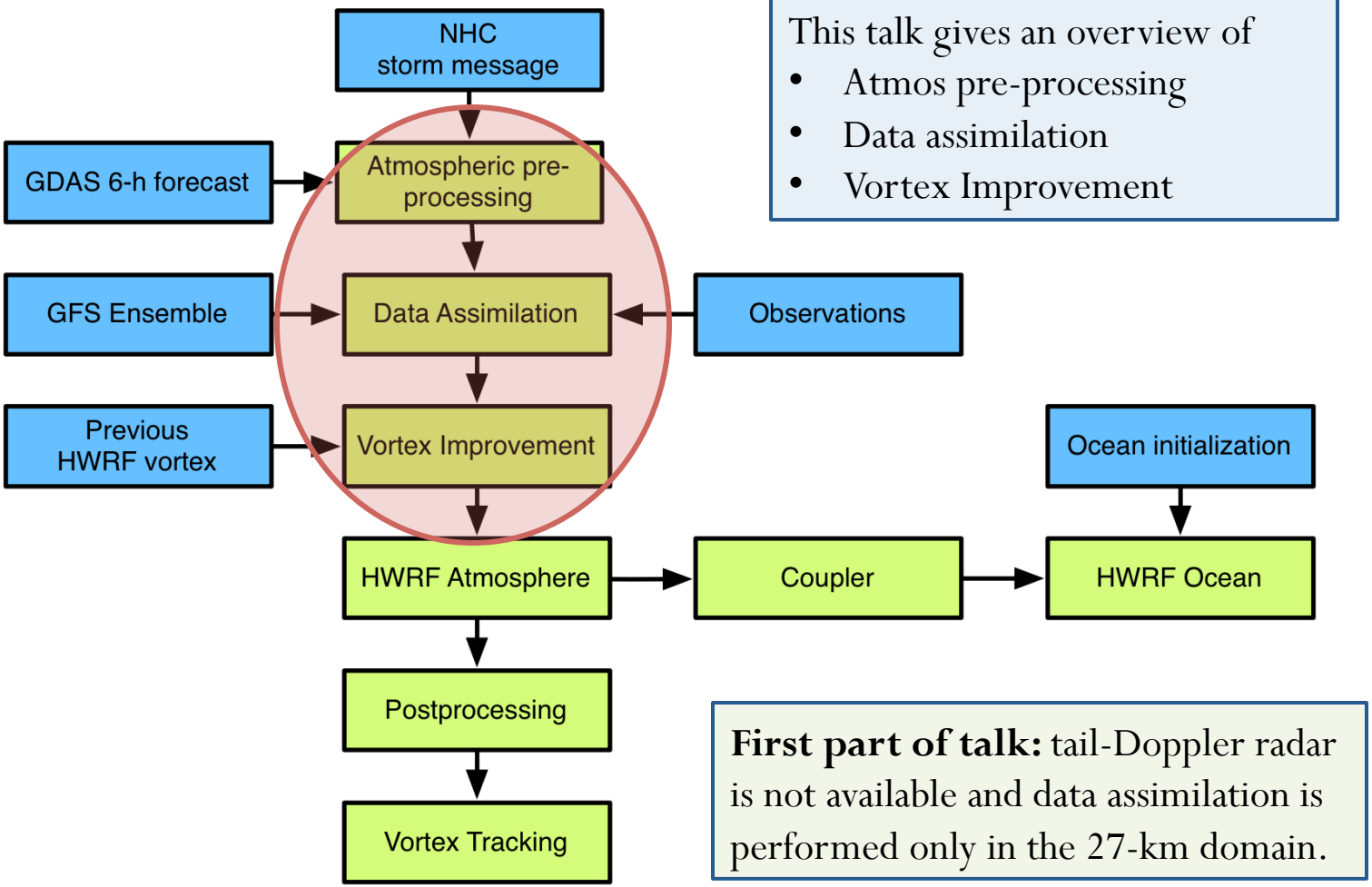
# HWRF 2013 Overview without inner core data assimilation

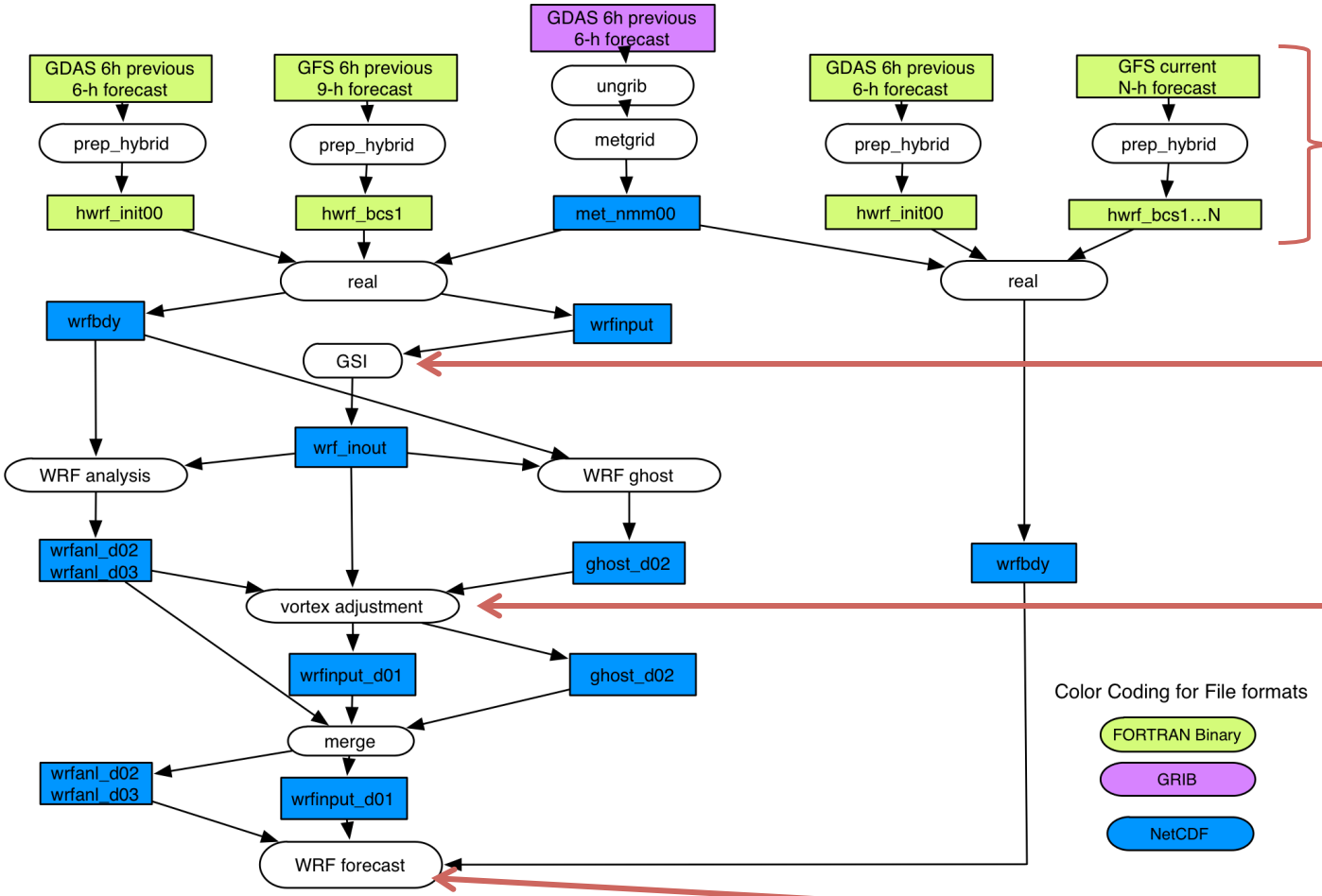



This talk gives an overview of

- Atmos pre-processing
- Data assimilation
- Vortex Improvement

**First part of talk:** tail-Doppler radar is not available and data assimilation is performed only in the 27-km domain.

# HWRF v3.5a Atmospheric Initialization without inner core data



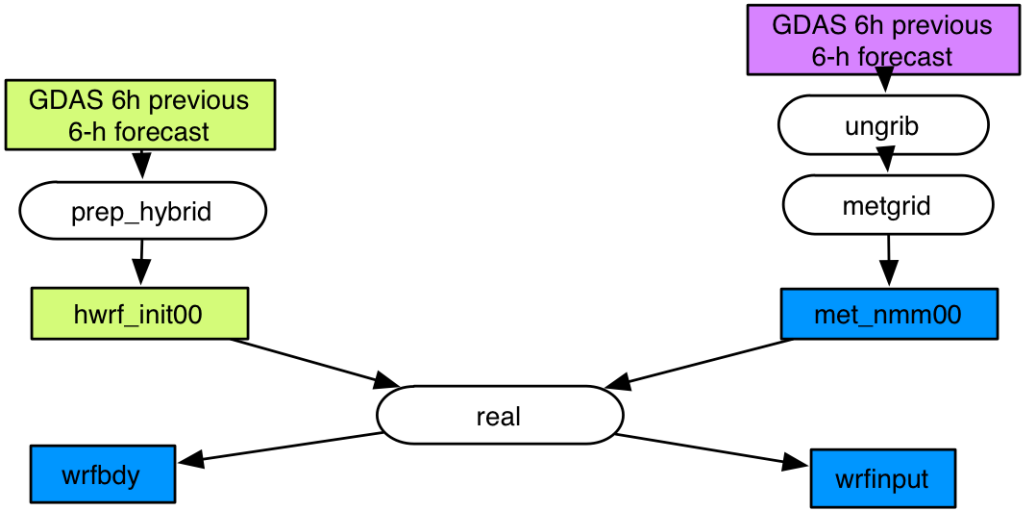

Global data from GDAS and GFS is used for IC/BC

Data Assimilation

Vortex Adjustment

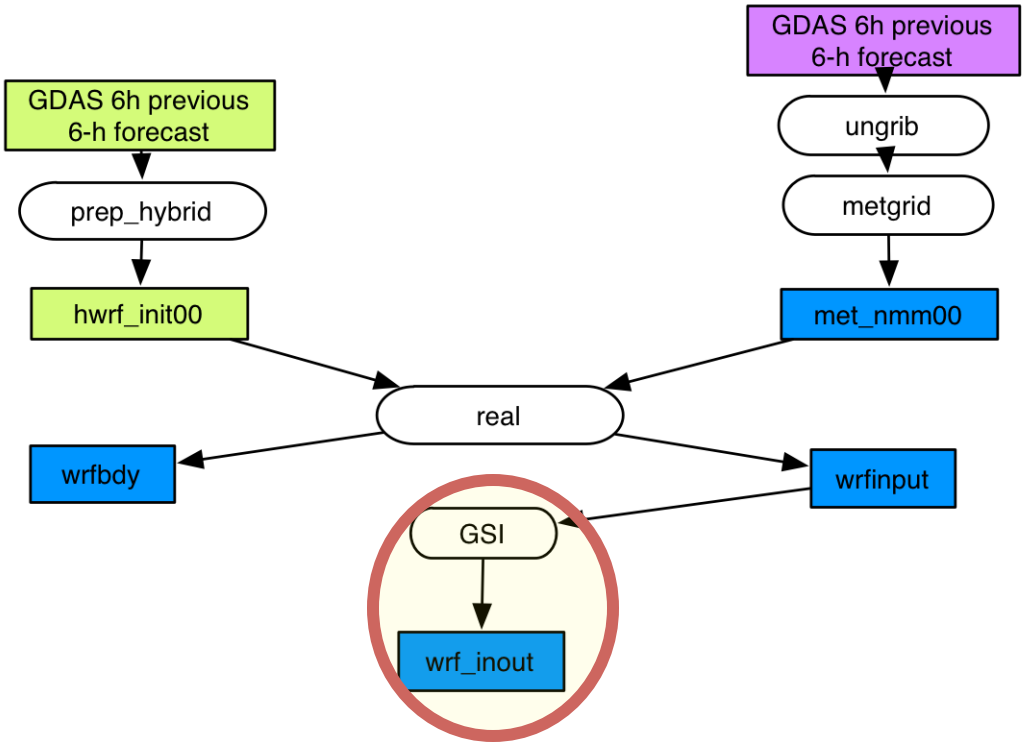
Forecast model

# Preprocessing global data for initial conditions



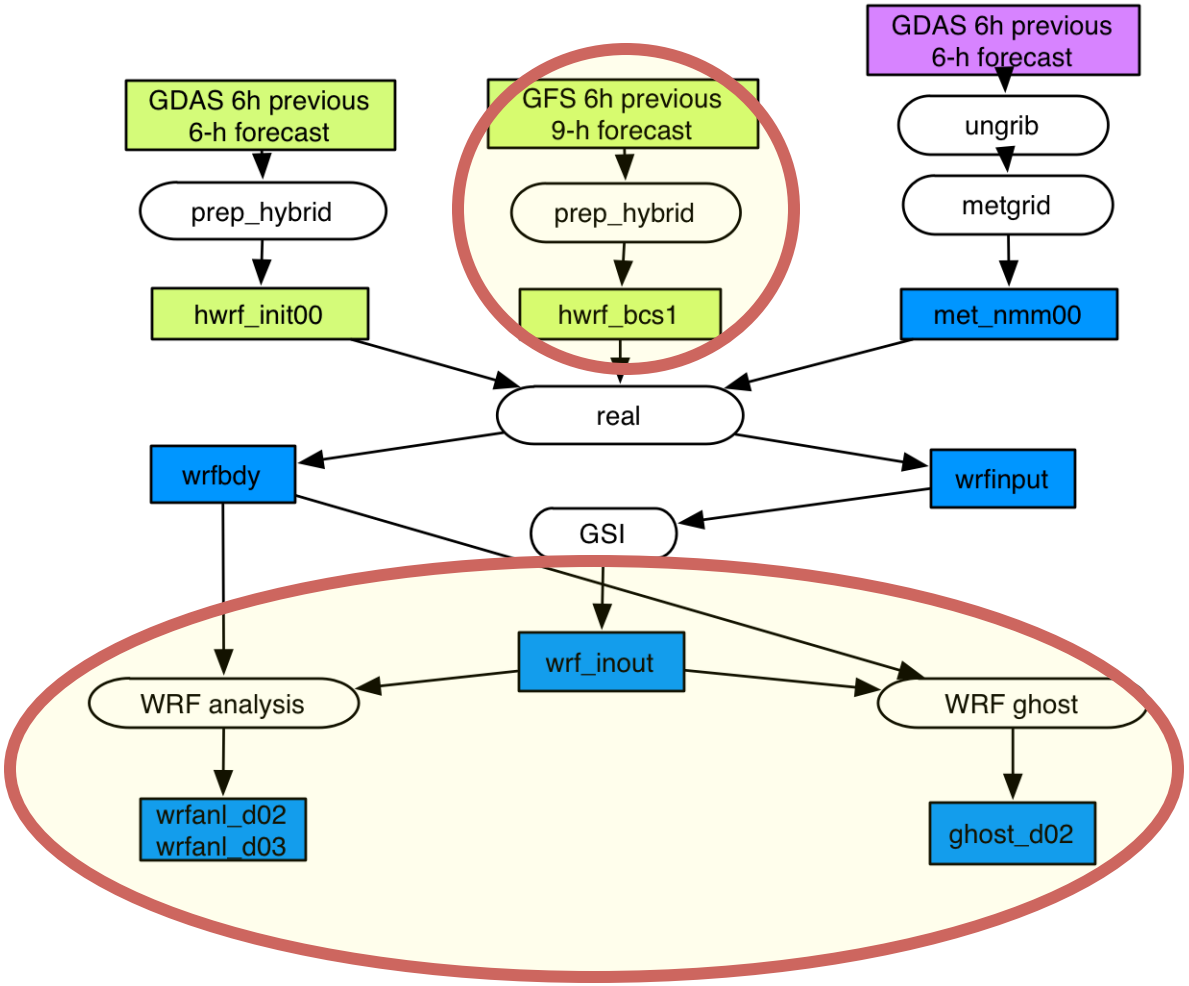

1. Preliminary ICs for d01 use the 6-h forecast of the 6-h GDAS.
   - E.g., 12 UTC HWRF uses 6-h forecast of the 06 UTC GDAS, valid at 12 UTC.
2. Initial conditions use GDAS spectral coefficients, on GDAS native vertical levels (binary format). Since WPS cannot process this use *prep_hybrid* tool.
3. The lower boundary information (soil T, q; topography, etc.) is obtained from the GRIB GDAS file through WPS.
4. Preliminary ICs generated using *real*.

# Data Assimilation - no inner core data




The wrfinput_d01 is modified through data assimilation using GSI.
When inner core data assimilation is not performed, GSI is only run on d01.

# Downscaling to 9- and 3-km



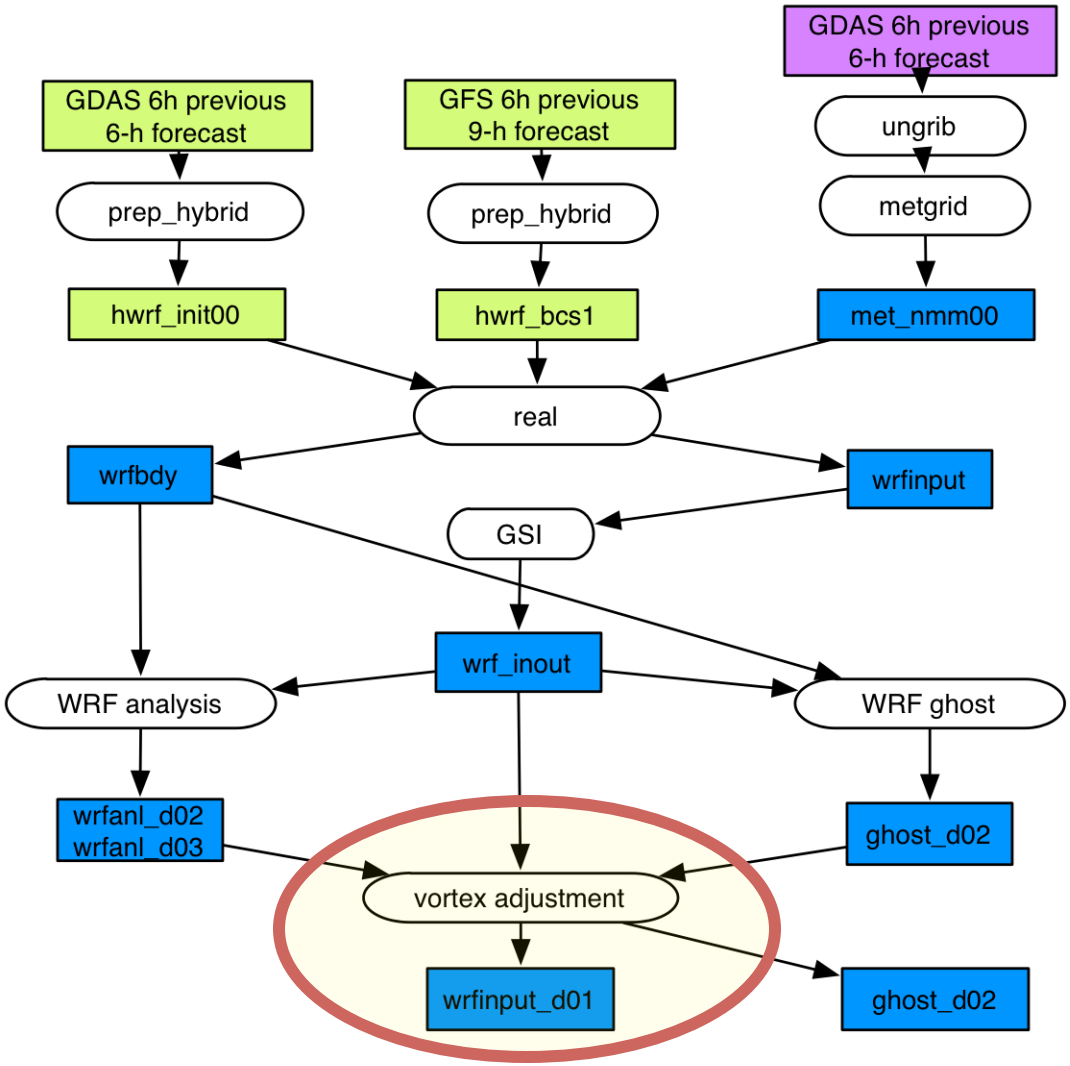

Two triple-domain 90-s WRF runs are used to downscale the d01 data to 9- and 3-km grids.

Boundary conditions for these runs are obtained from the 9-h forecast of the 6-h previous GFS.

The WRF analysis run uses the same domains as the HWRF forecast run. The WRF ghost run used a larger 3-k domain.

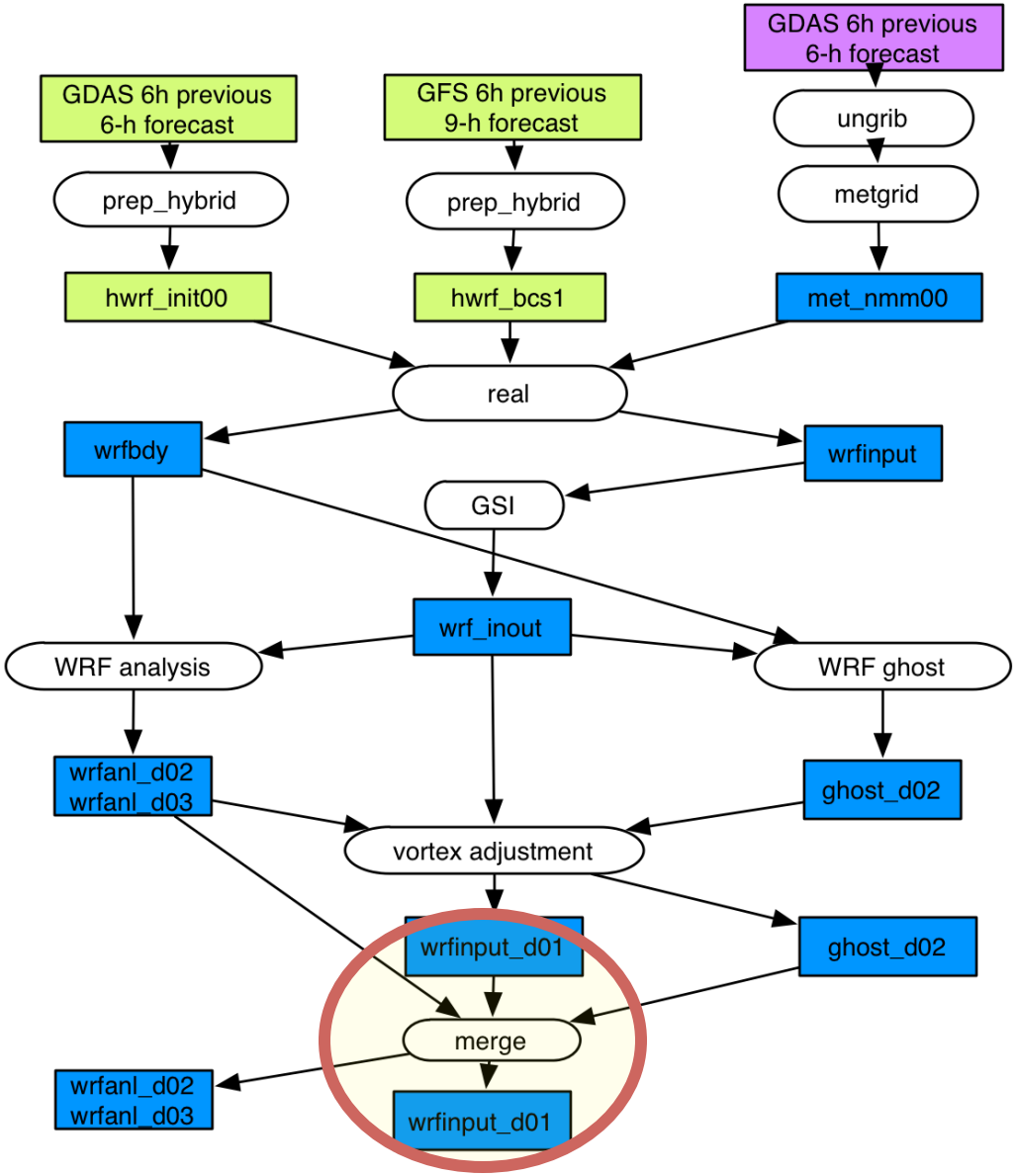
The ghost domain is used when inner core data assimilation is performed. Here it is just a place holder.

# Vortex initialization



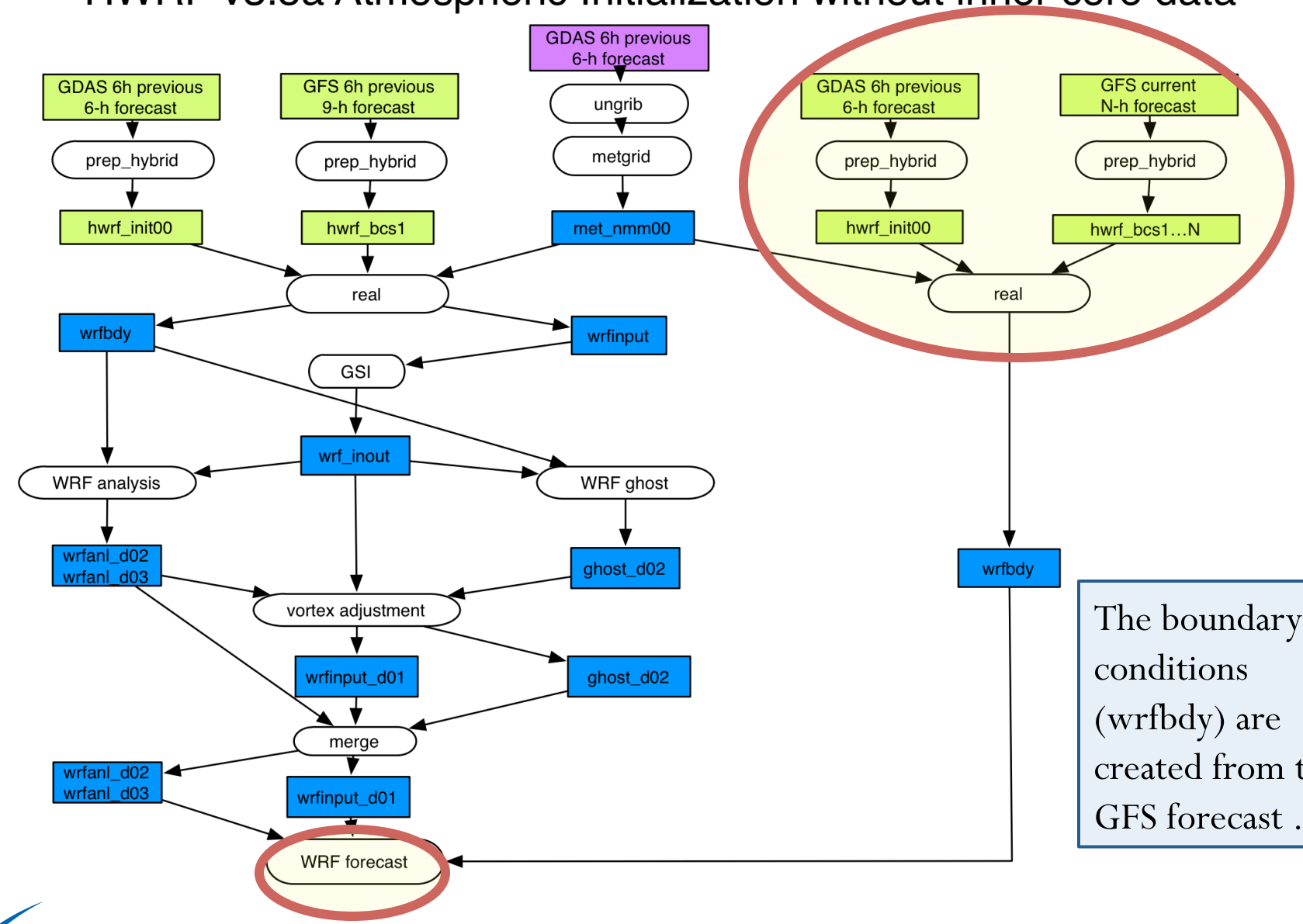

The downscaled, high-resolution, initial conditions conditions are further modified by the vortex initialization. If adjusts the location, intensity, and structure of the vortex according to current observations (TCVitals).

# Merging initial conditions



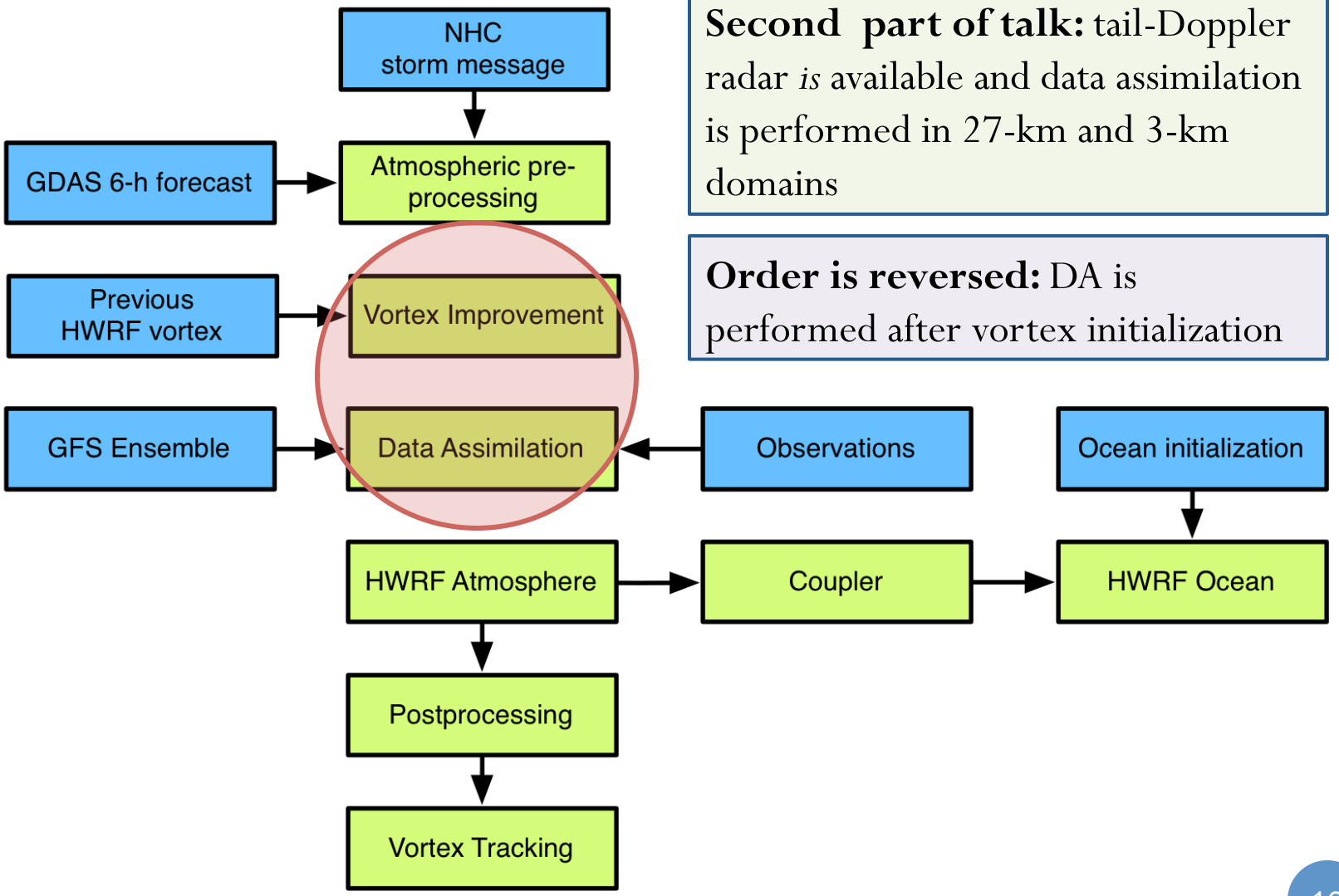

After the vortex adjustment, the various domains need to be reconciled, or merged, to generate the final ICS.

# HWRF v3.5a Atmospheric Initialization without inner core data




The boundary conditions (wrfbdy) are created from the GFS forecast .

# HWRF 2013 Overview with inner core data assimilation

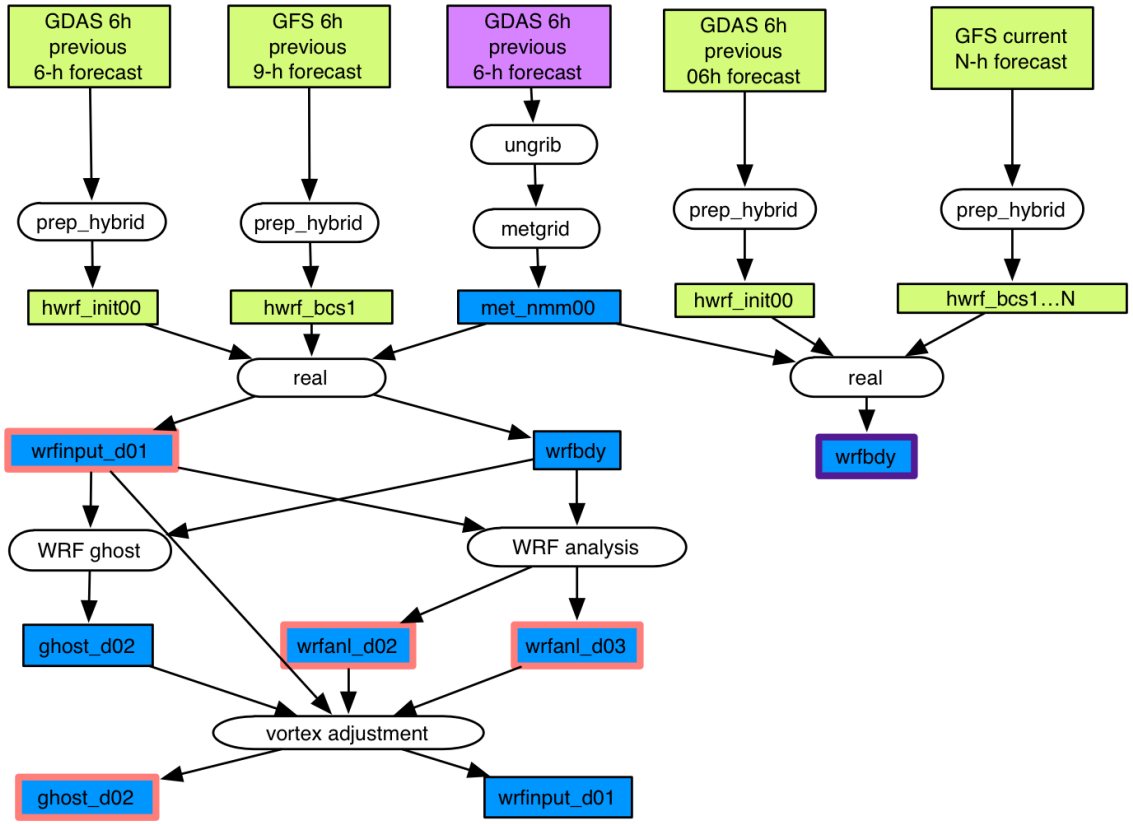



**Second part of talk:** tail-Doppler radar *is* available and data assimilation is performed in 27-km and 3-km domains

**Order is reversed:** DA is performed after vortex initialization

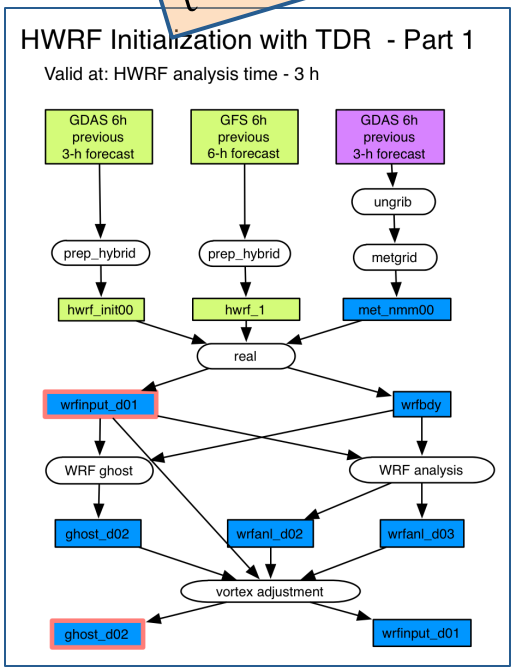
# HWRF Initialization with TDR - Part 2

Valid at: HWRF analysis time

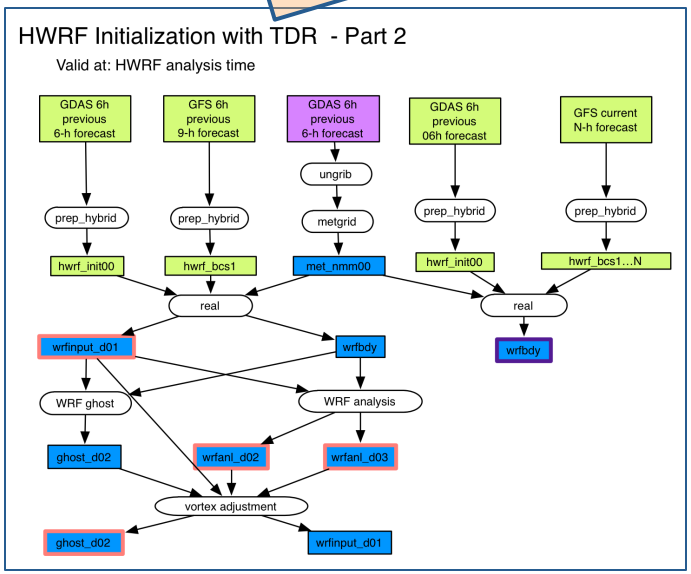



Same figure as before, except DA does not appear. It is performed AFTERWARDS.

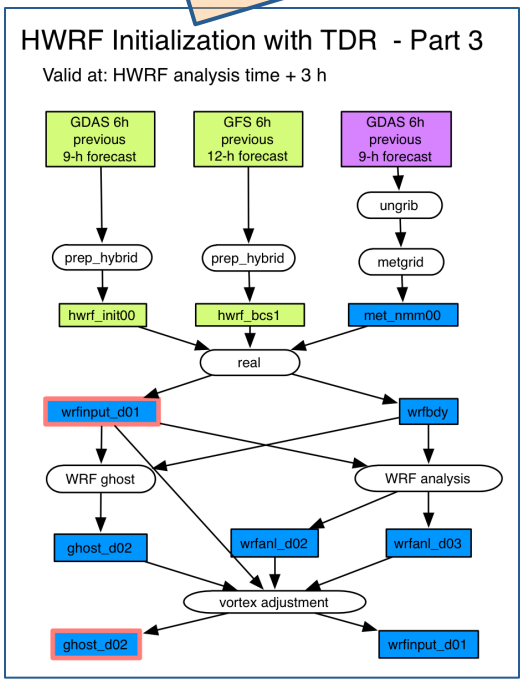
t = -3 h




t = 0 h




t = +3 h

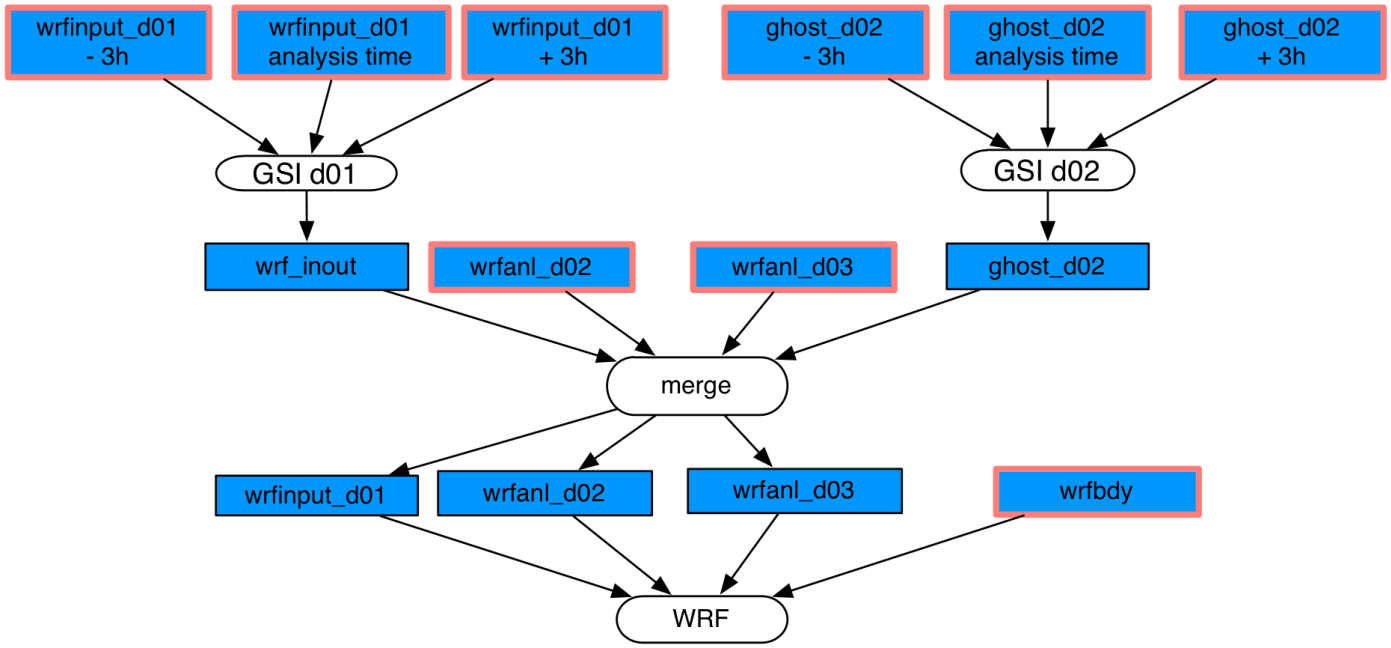



Because the TDR data spans a window in time (takes a while for plane gather data)…

Must create analyses at t-3h and t+3h, so GSI can interpolate analyses to obs time

Therefore, repeat procedure 3 times (except LBC for forecast only created once)

# HWRF Initialization with TDR - Part 4




Two runs of GSI are performed (27- and 3- km), each ingesting 3 time levels

Results are merged to create initial conditions

# Upcoming talks

In the next talks, you will learn more about

- The Community GSI package
- How GSI was customized for HWRF
- The algorithm used for vortex initialization