

Next GEFS Implementation

Q4FY11

Proposal Changes

- Model and initialization
 - Using GFS V9.01 instead of GFS V8.00
 - Improved Ensemble Transform with Rescaling (ETR) initialization
 - Improved Stochastic Total Tendency Perturbation (STTP)
- Configurations
 - T254 (55km) horizontal resolution for 0-192 hours (from T190 – 70km)
 - T190 (70km horizontal resolution for 192-384 hours (same as current opr)
 - L42 vertical levels for 0-384 hours (from L28)
- Part of products will be delayed by approximately 20 minutes
 - Due to limit CCS resources
 - 40 nodes for 70 minutes (start +4:35 end: +5:45)
- Unchanged:
 - 20+1 members per cycle, 4 cycles per day
 - pgrb file output at 1*1 degree every 6 hours
 - GEFS and NAEFS post process output data format
- Why do we make this configurations?
 - Considering the limited resources
 - Resolution makes difference (example of T126 .vs T190)
- What do we expect from this implementation?
 - Preliminary results (NH 500hPa and SH 500hPa height and tracks)

GSI/GFS Changes (Fall 2010)

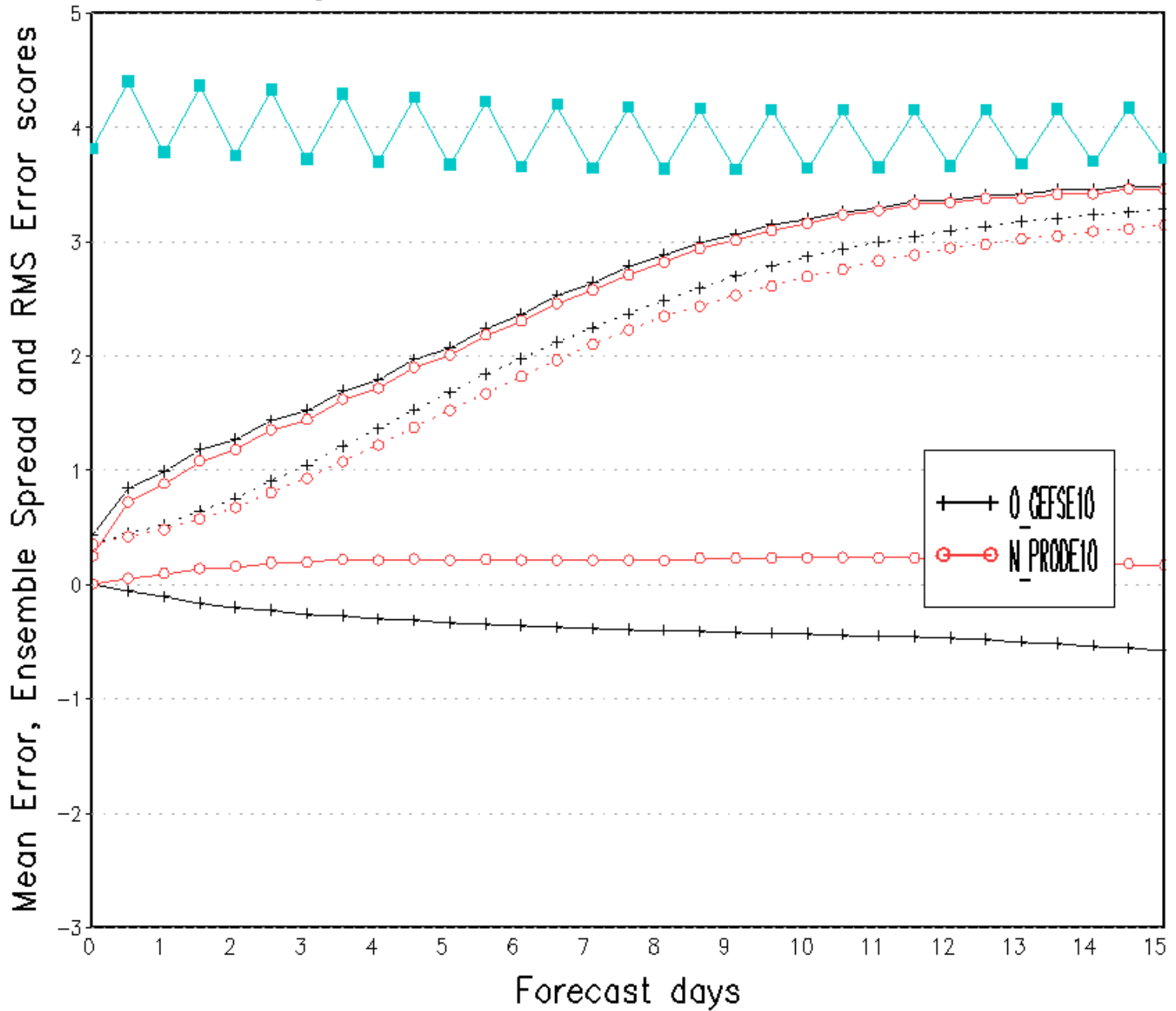
- **Assimilation Changes**

- Assimilate tropical storm pseudo sea-level pressure obs
- GPSRO changes - improved QC, re-tuned obs errors.
- Give more weight to profile data in upper troposphere / lower stratosphere
- Change evaporation efficiency parameter in SASCNV forward model to be consistent with current global_fcst model
- Extend satinfo to include N19 hirs/4, amsua, mhs (no N19 assimilation)
- Extend ozinfo and update code to recognize and read in N19 sbuv/2, GOME, and OMI ozone (no assimilation)
- Ability to process RARS (currently only EARS) 1b data
- Extensions to allow global_gsi to run from T878L91 spectral coefficient files
- Code optimization

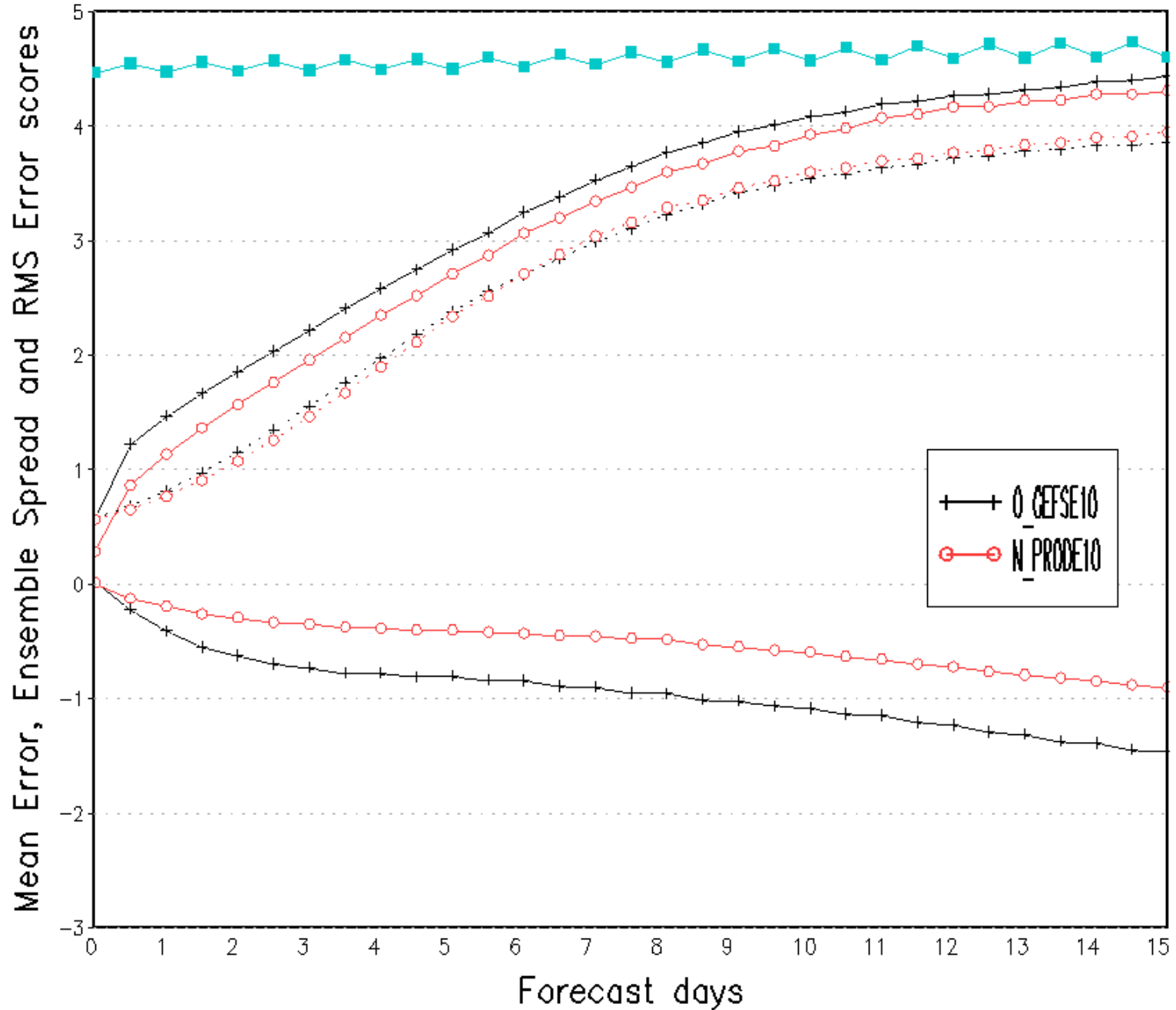
- **Model Changes:**

- Restructure the Global Model code
- Code unification between GFS & GEFS
- Consolidate Global Post codes used in GFS & GDAS
- Upgrade to ESMF 3.1.02rp
- Modify low cloud definition
- Output additional parameters for TIGGE & ICAO
- Introduce more accurate algorithm for several diagnostic variables

NH 850 mb Temperature Average For 00Z02AUG2010 – 00Z09OCT2010



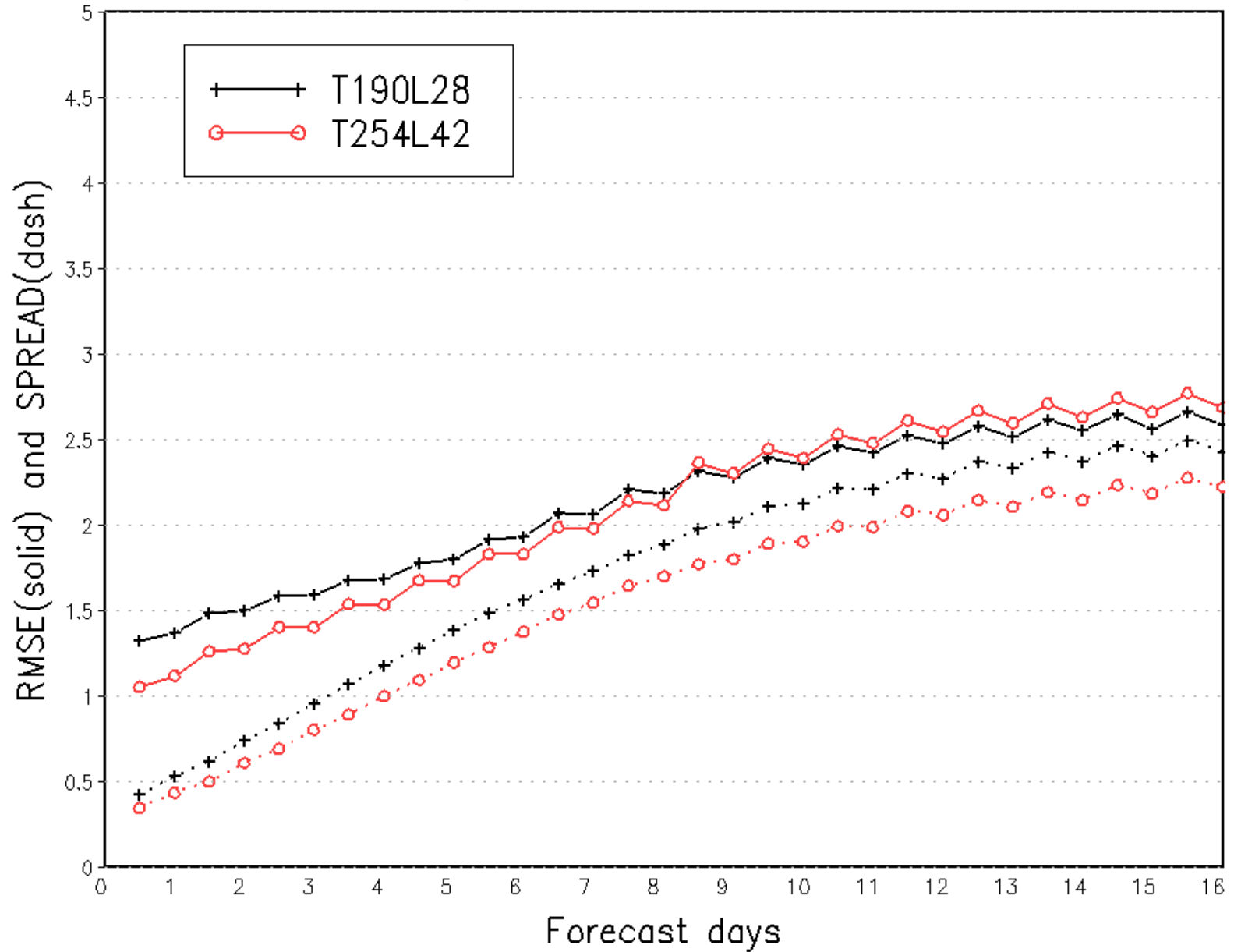
SH 850 mb Temperature Average For 00Z02AUG2010 – 00Z09OCT2010



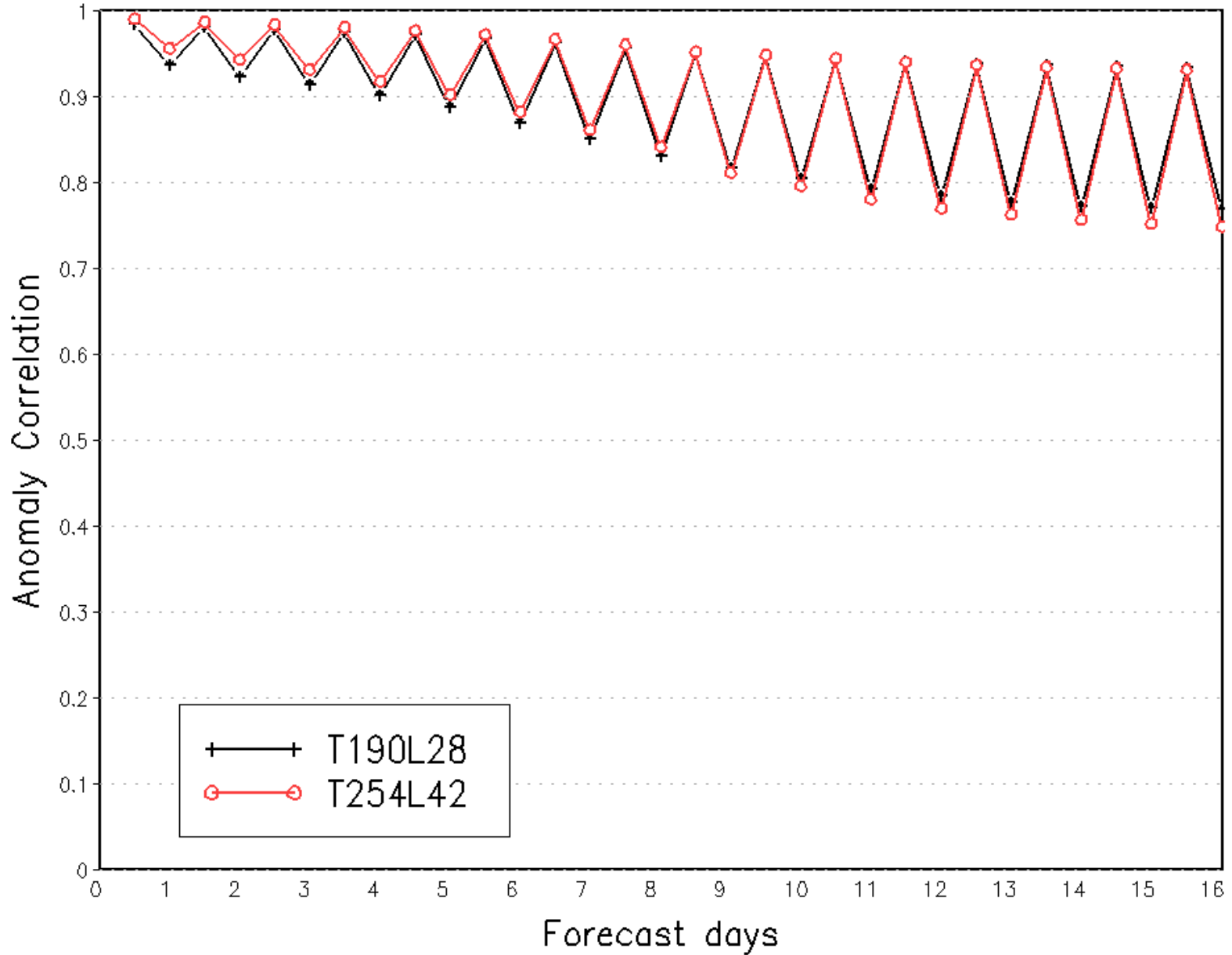
Tentative Results

- Improvements due to removal of inconsistency, model upgrade and resolution change.
- Major improvement in SH and TR
- Relatively less improvement in NH, especially in z500

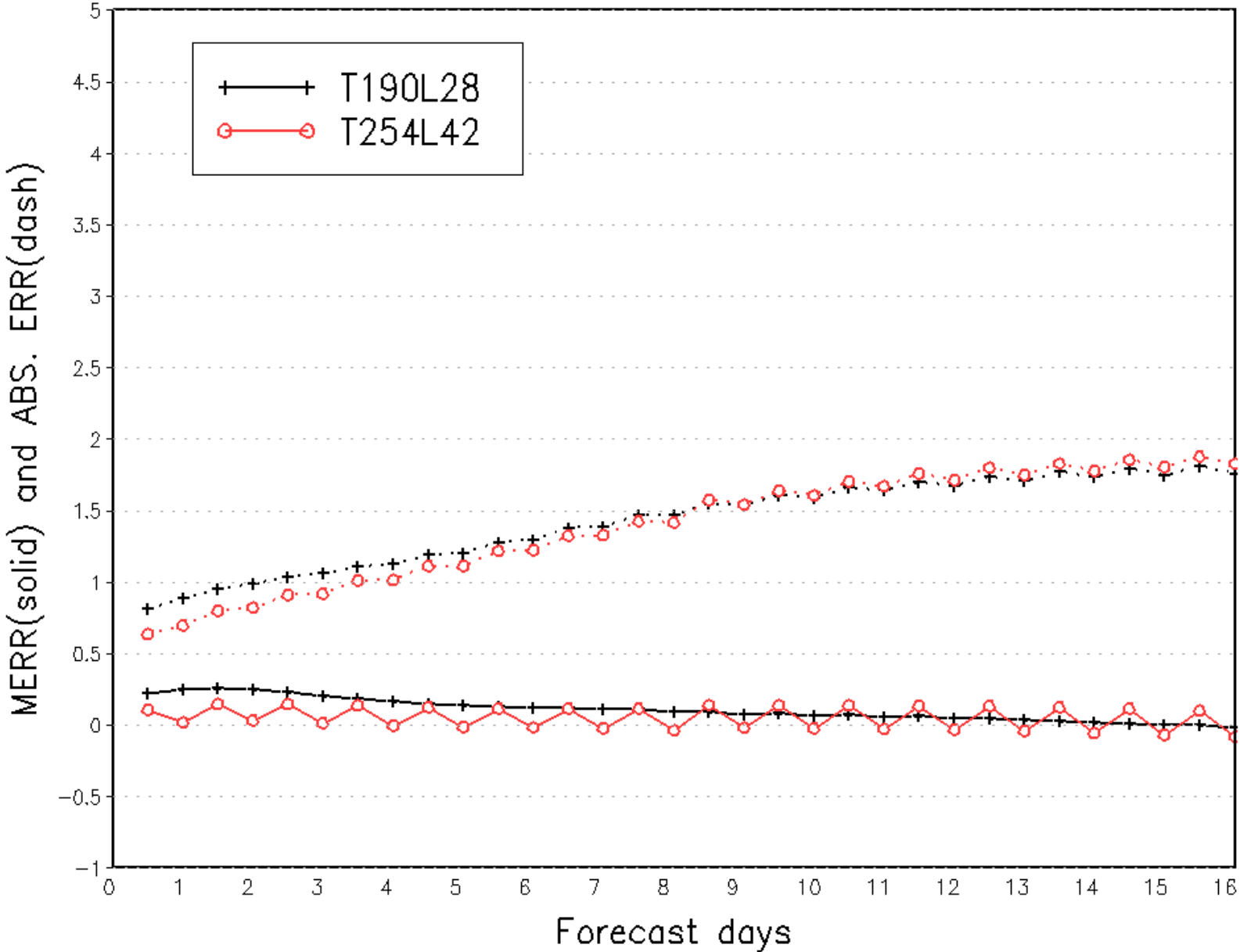
Northern Hemisphere 2 Meter Temp.
Ensemble Mean RMSE and Ensemble SPREAD
Average For 20100802 - 20100930



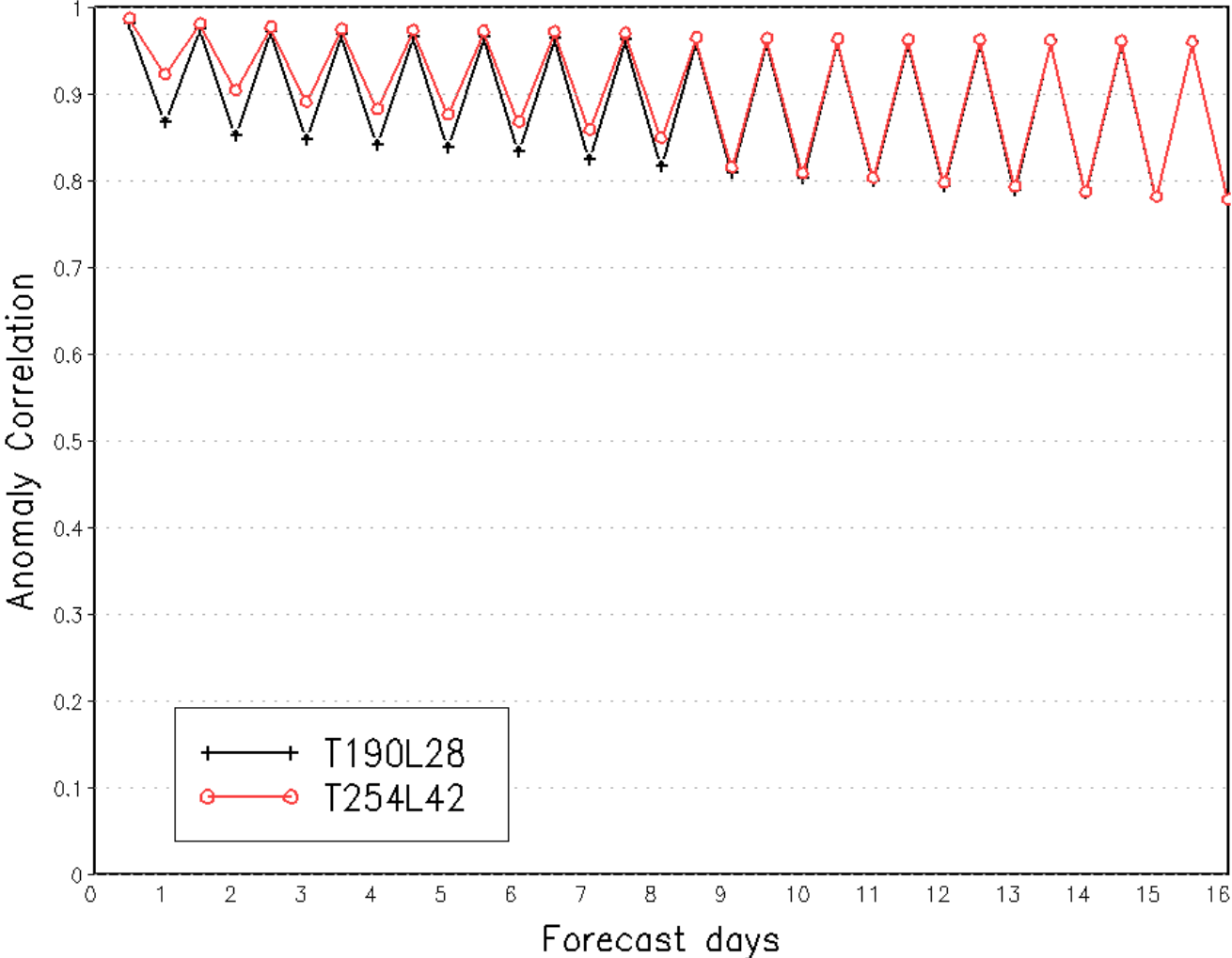
Northern Hemisphere 2 Meter Temp.
Ensemble Mean Anomaly Correlation
Average For 20100802 – 20100930



Northern Hemisphere 2 Meter Temp.
Ensemble Mean Error and Ensemble Abs. Error
Average For 20100802 - 20100930



Tropical 2 Meter Temp.
Ensemble Mean Anomaly Correlation
Average For 20100802 - 20100930



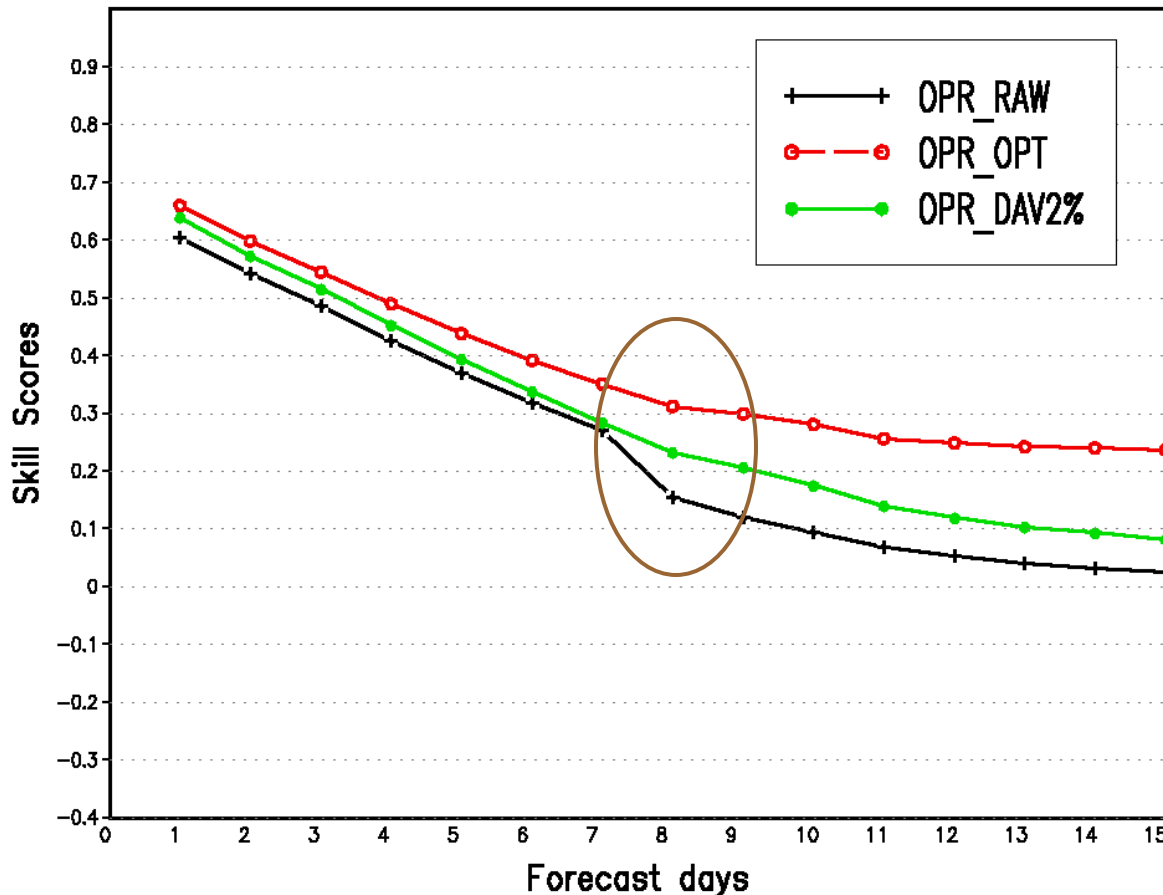
T2m verification, a potential issue

- T2m skill drop after truncation at day 8.
- Primarily due to drop in Anomaly Correlation.
- This was seen before 2005 with T126/T62 resolution
- Can be partially recovered by bias correction (Bo Cui)
- Resolution of Topography and extrapolation is an issue
- Other possible factors are under investigation

Raw, Optimal & Actual Bias Corrected Ensembles

Bo Cui, 2006

RPSS of 2m Temperature
Northern Hemisphere, Annual Mean



- Raw operational ens.

abrupt drop of RPSS around day 7 is caused by model configuration change at 180h, resolution from 1° to 2.5°

- Decaying average

gives a pretty good bias correction as compared to the verifying analysis