

DIMOSIC (Different Models – Same Initial Conditions)

WGNE session 2020

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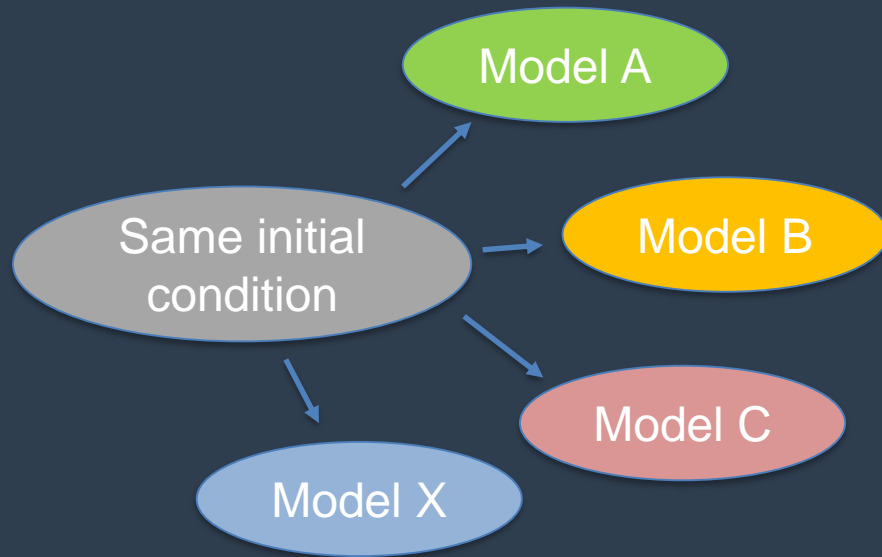
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Young Cheol Kwon, Junsu Kim (KMA)

Global model comparison: DIMOSIC

Different models – same initial conditions



Run several models from the same initial conditions for a set of dates covering one year

Model resolutions ~10-25 km
Initialised from ECMWF initial conditions
2018-06-06 to 2019-06-06, 00UTC, every 3rd day

Current status

- ECMWF/IFS – 9km **operations** / 47r1
- UK Metoffice/UM – 10km **ready**
- DWD/ICON - 13km **ready**
- MeteoFrance/ARPEGE – 5/25km - **ready**
- GFDL/SHiELD – 13km **ready**
- KMA/KIM – 25km **ready** / **working on update**
- CMC – X km **ready**
- JMA/GSM1705 – 20 km **ready**
- NRL/Neptune – **ongoing tests**

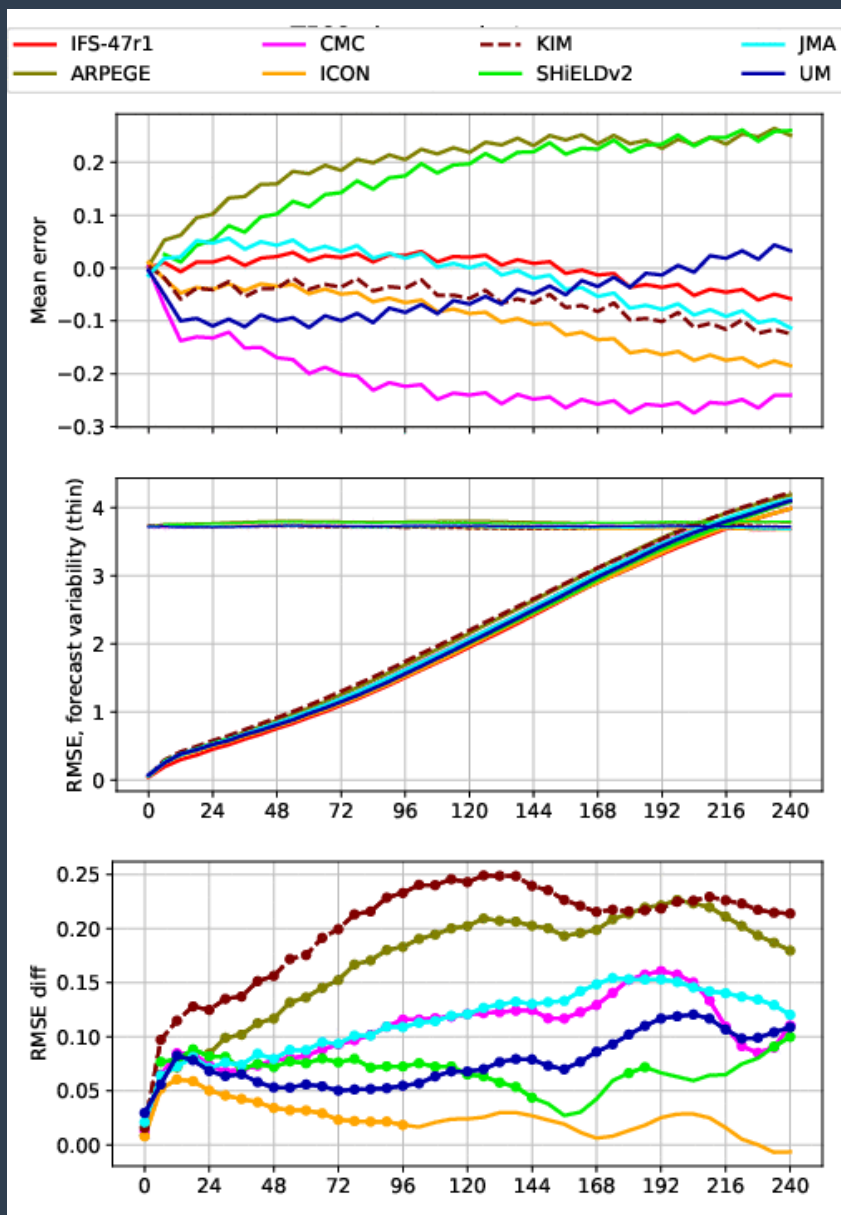
Dataset

- Parameters*:
 - Geopotential, temperature, U and V-wind and specific humidity at 1000, 850, 700, 500, 300, 200 and 100 hPa
 - MSLP, 10-metre u and v-wind, accumulated precipitation and top of the atmosphere radiation (LW and SW)
- Common grid:
 - The data is sent to ECMWF on 0.25 regular grid and interpolated to a 0.5 degree grid using an box-average method
 - Parameters converted to ECMWF archive standard
- Common orographic mask: Based on the maximum orography from all models and minimum geopotential based on all forecast runs. 20% extra tolerance added.

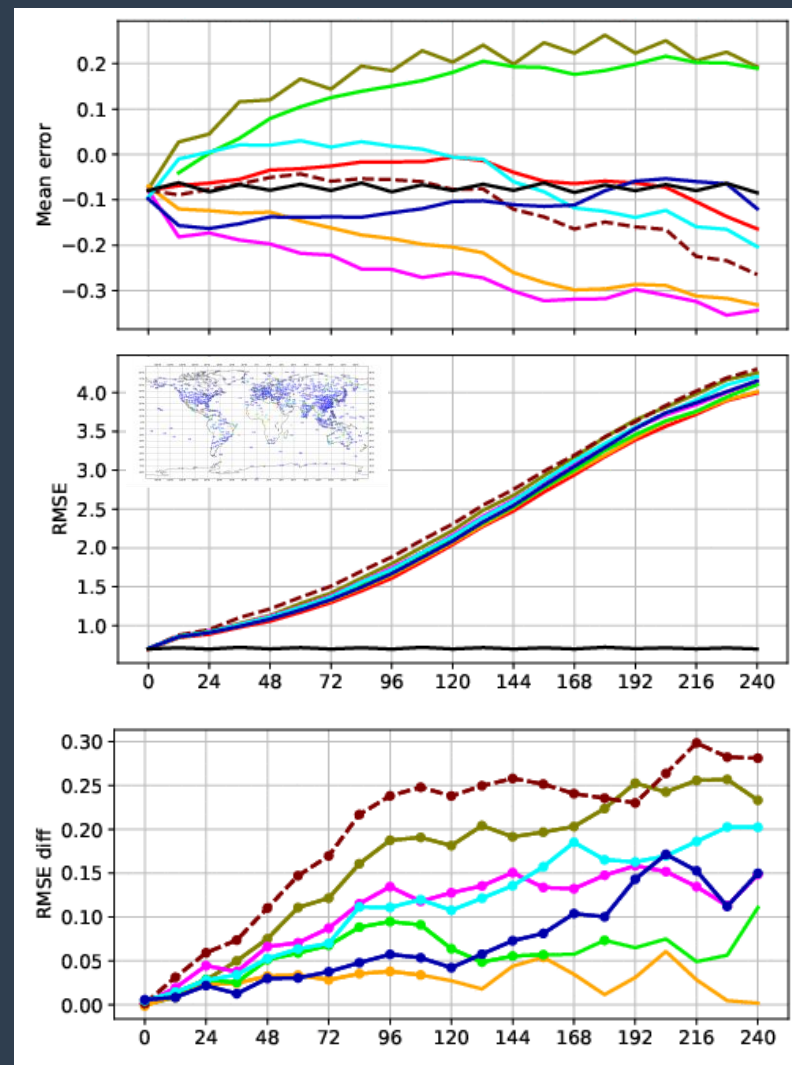
* Not all parameters are available for all models

T500, N.Hem, mean error and RMSE

Against ECMWF analysis

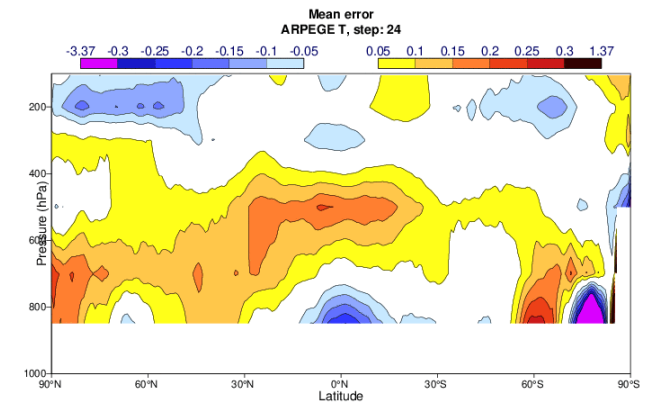
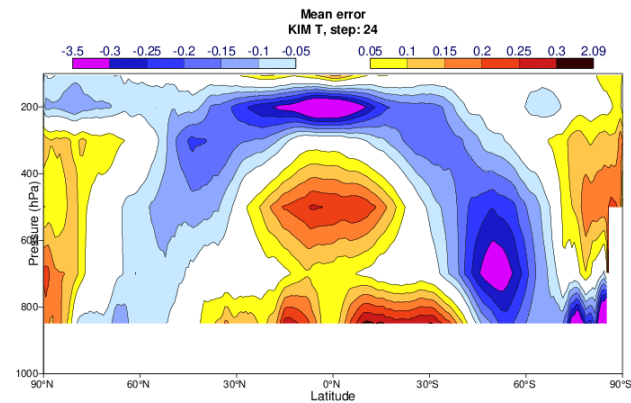
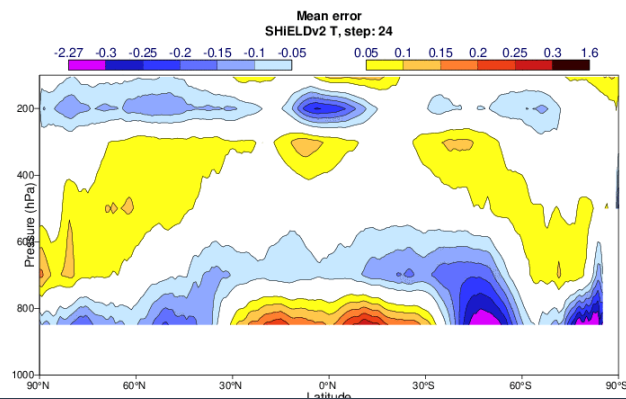
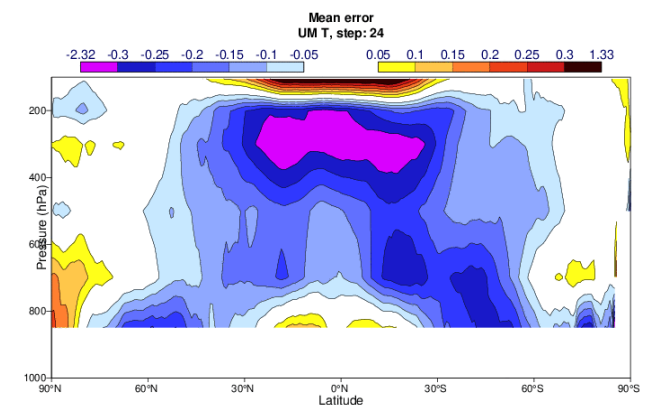
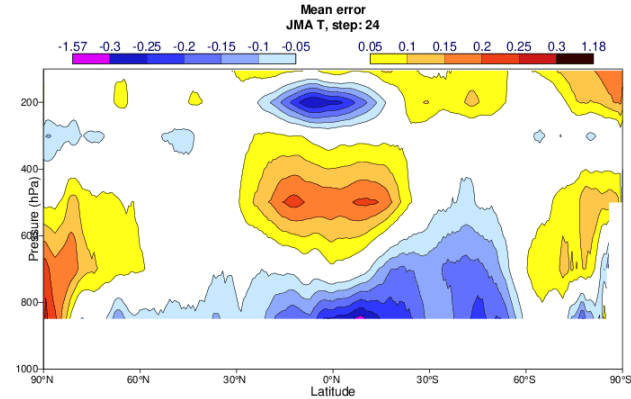
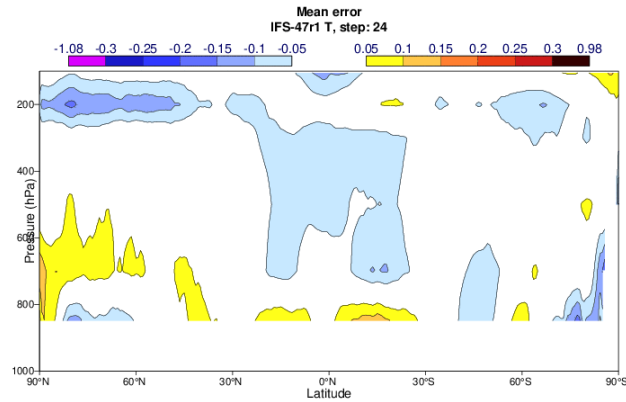
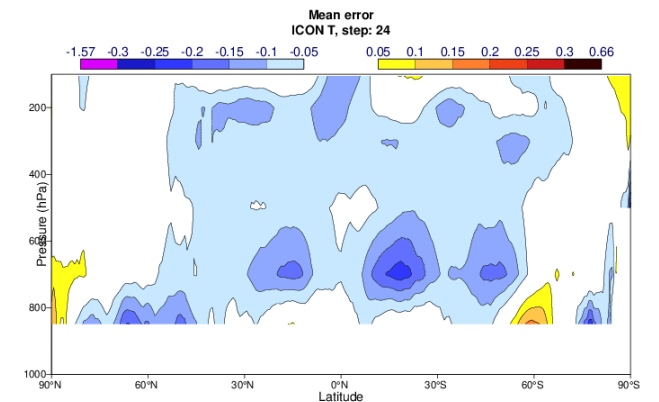
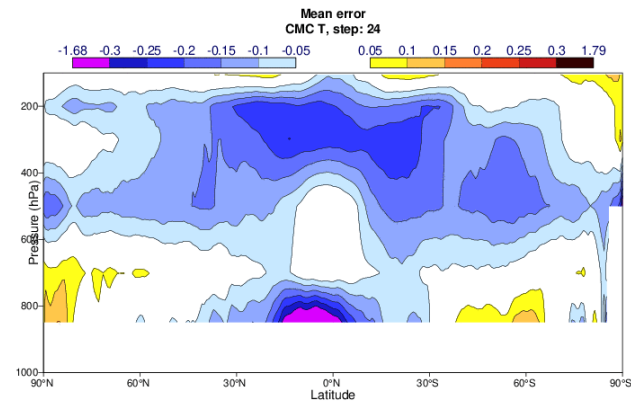


Against radiosondes



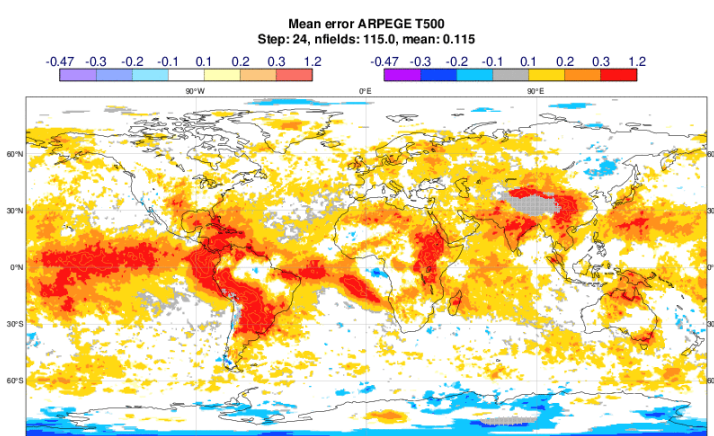
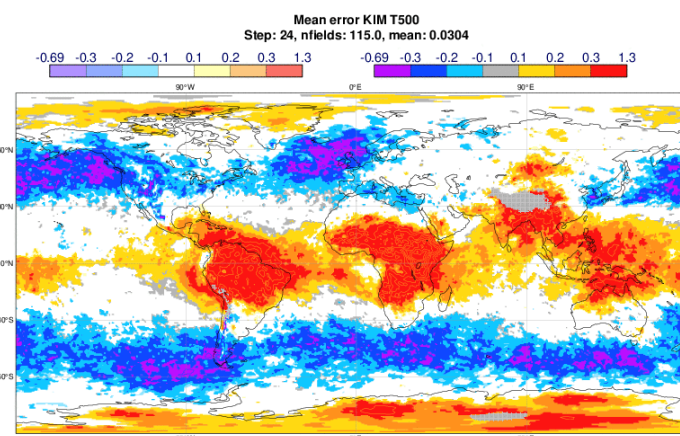
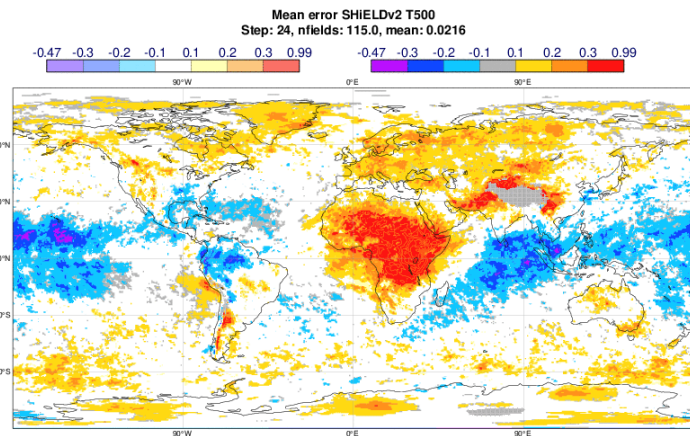
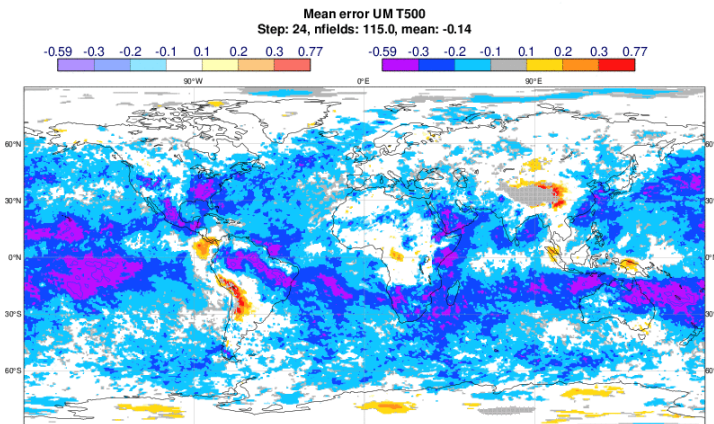
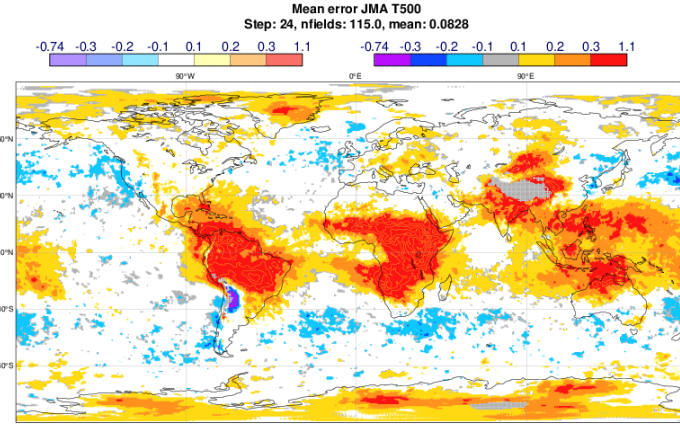
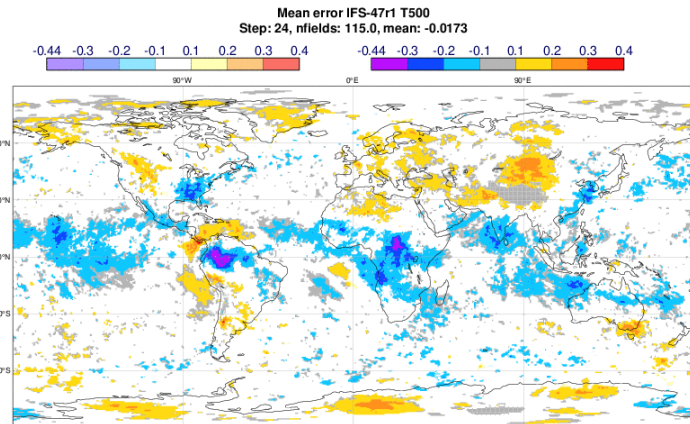
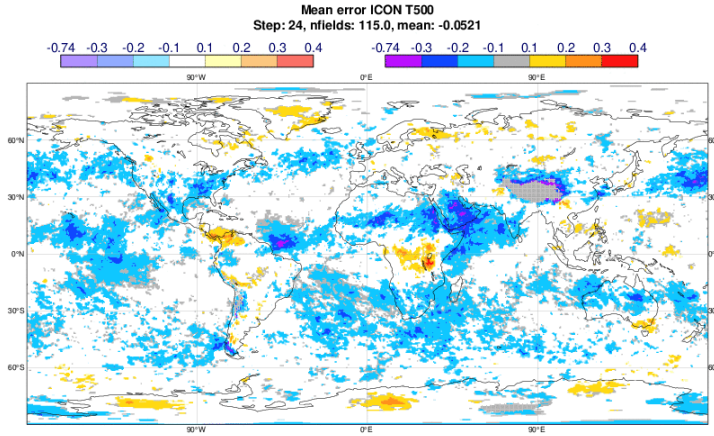
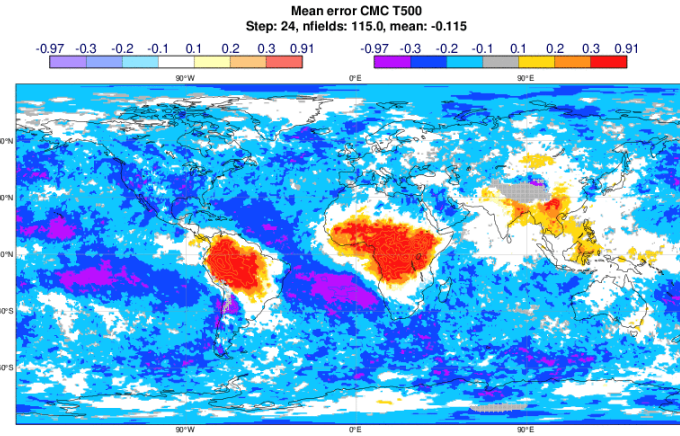
Difference to ECMWF RMSE

Mean temperature error +24h, against ECMWF analysis



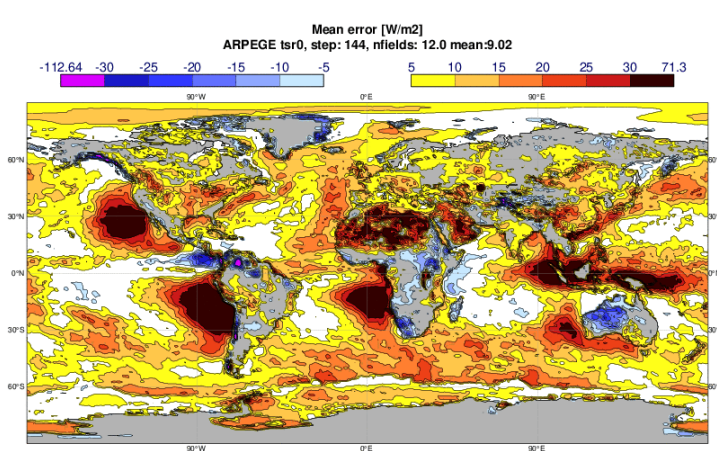
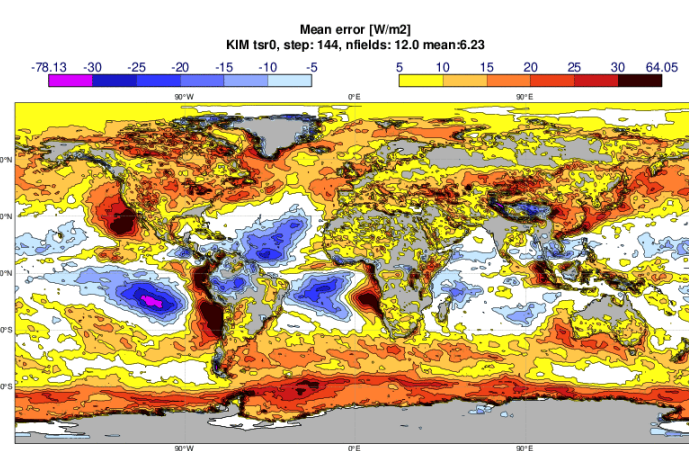
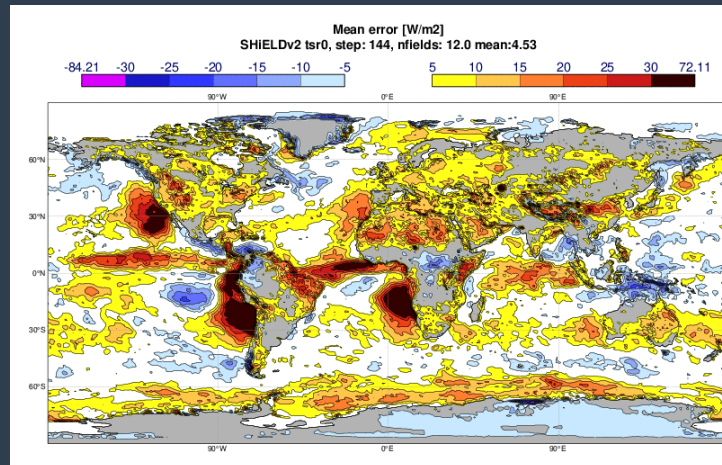
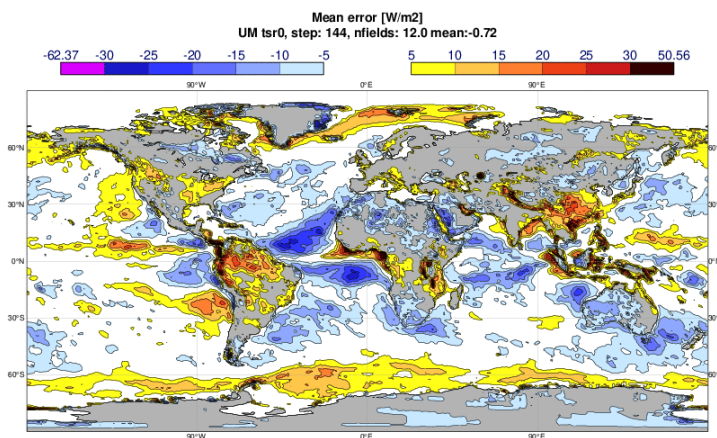
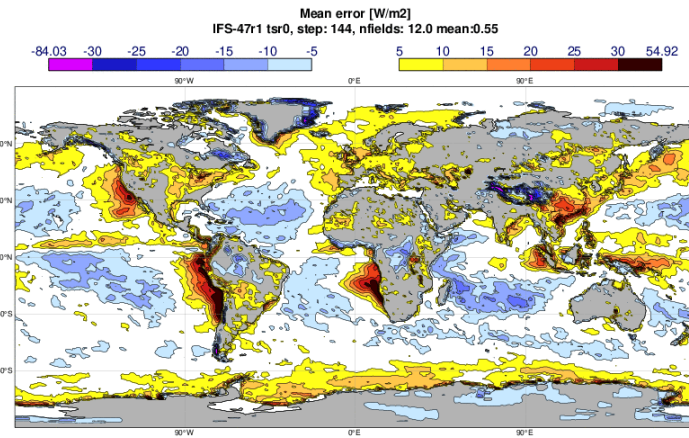
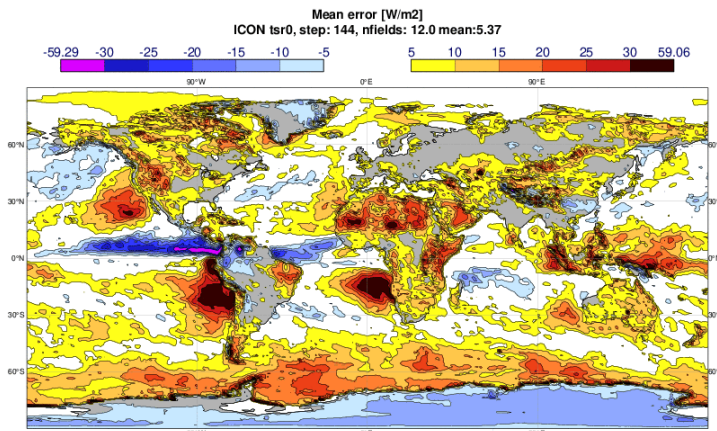
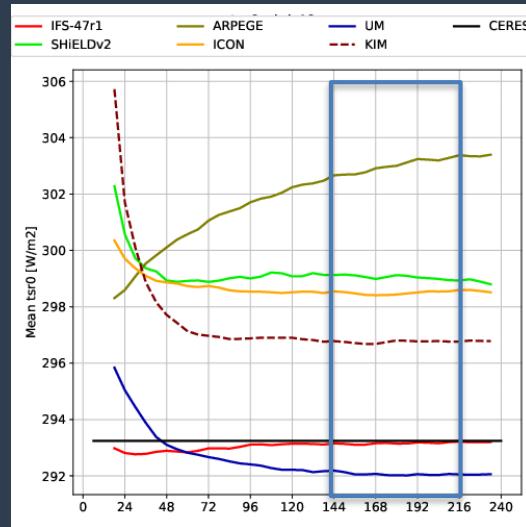
Mean T500 error +24h, against ECMWF analysis

(Bold colours mark statistical significant to 95%)



Mean error against CERES Net (downward) short-wave radiation day 6-9

40N-40S mean values (24-hour smoothing)



Tropical cyclones

Track Error

Produced with GFDL tracker

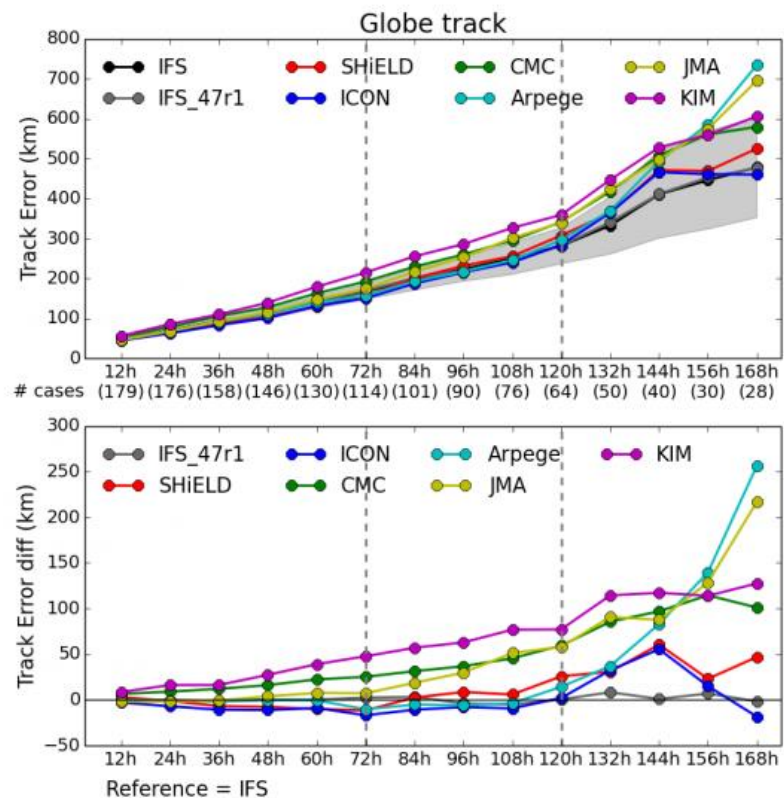


Figure 2: Global TC track errors and the track error differences (with respect to the IFS) along with the forecast lead time.

Precipitation intensity compared to GPM

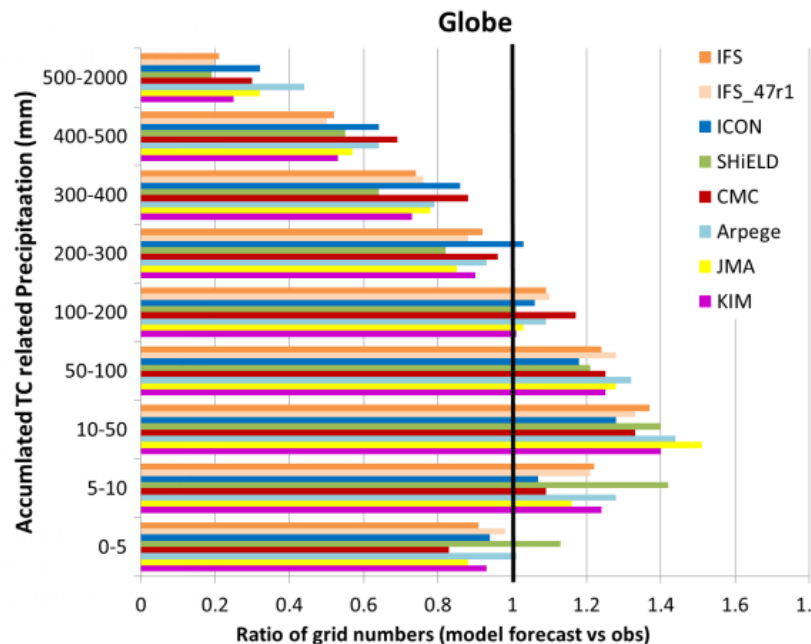
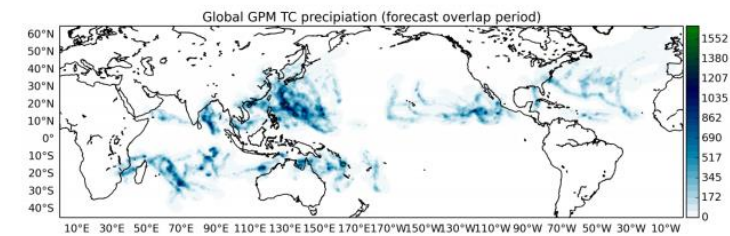


Figure 21: The ratios of model forecasted grid number to the GPM grid number (only counted at each model's forecast TC times) in 9 bins of accumulated TC related precipitation for the entire globe.

TC related precipitation is defined as the total precipitation within the radius of 350km around the TC center.

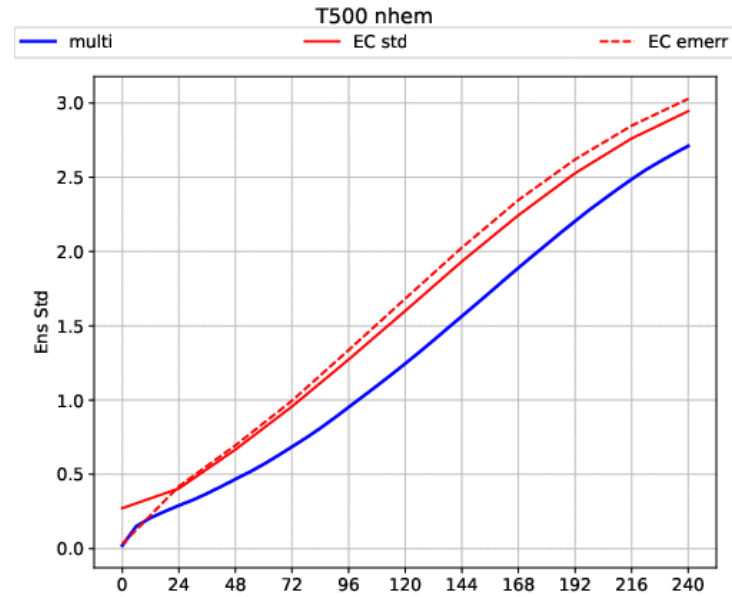
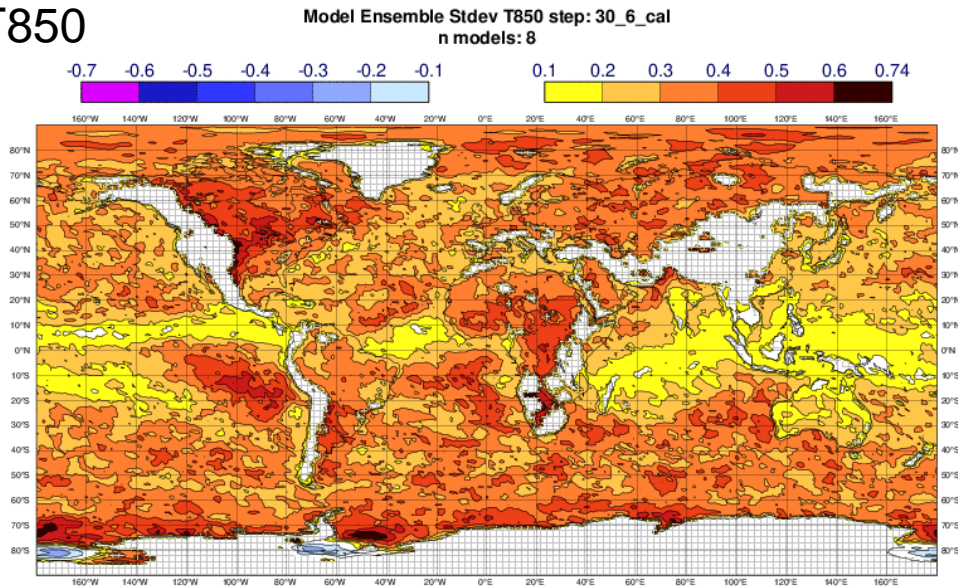
a. Accumulated total precipitation



Thanks to Jan-Huey Chen and Linjiong Zhuo (GFDL)

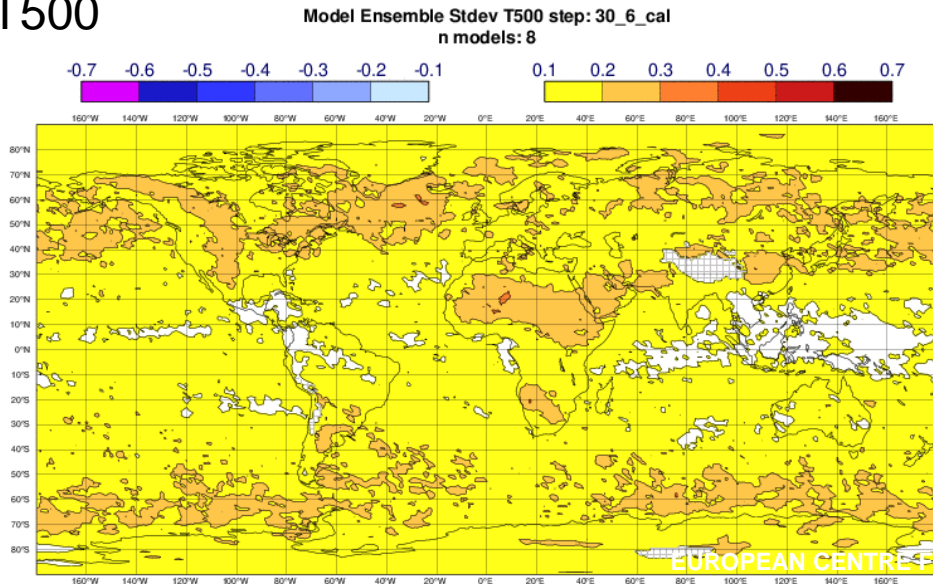
Model ensemble spread growth 30h-6h

T850

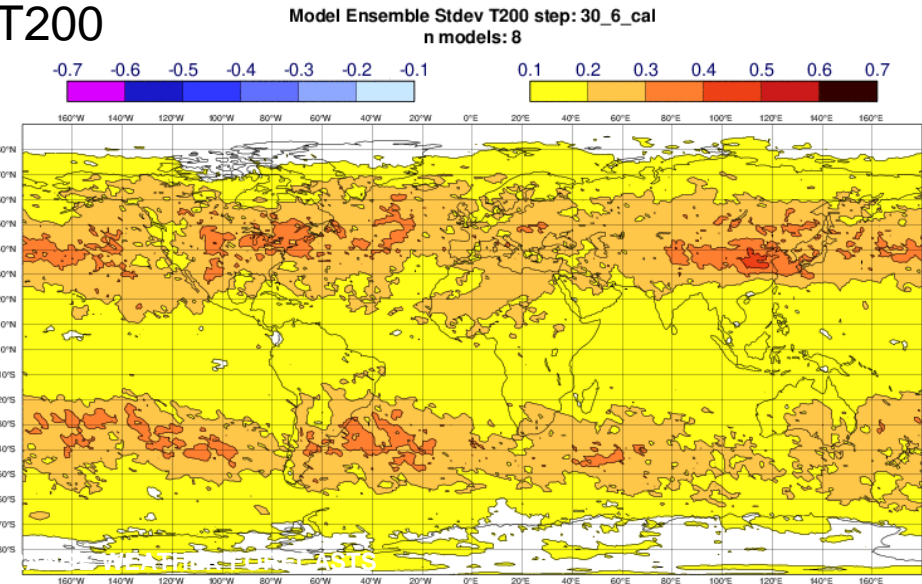


- All forecasts calibrated to ECMWF analysis mean climate before calculating the standard deviation
- Spread growth calculated between 30h and 6h to minimise initialisation issues

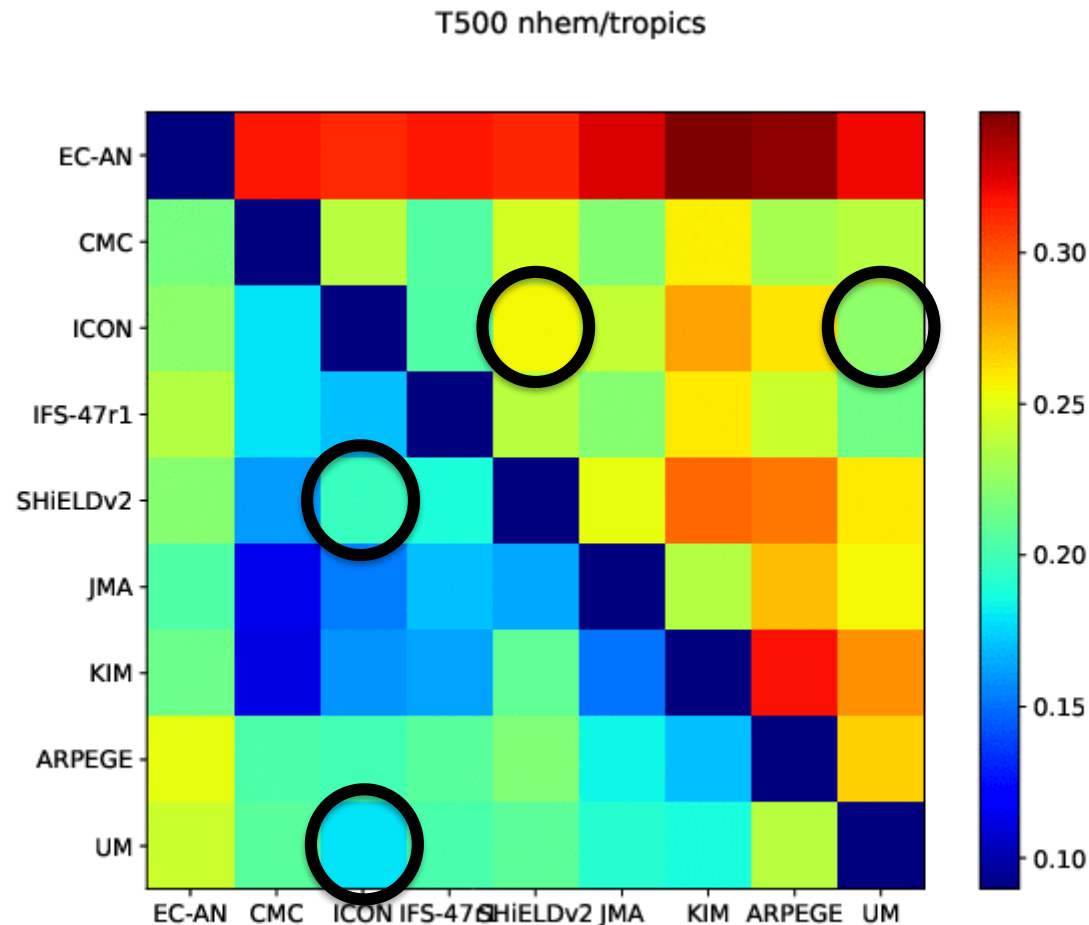
T500



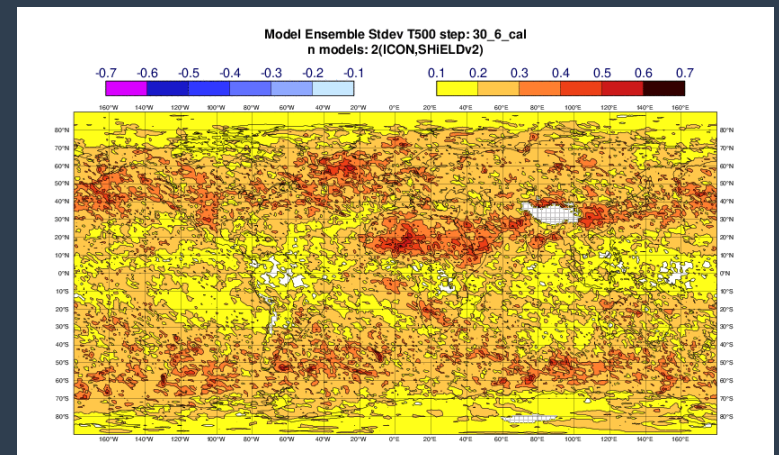
T200



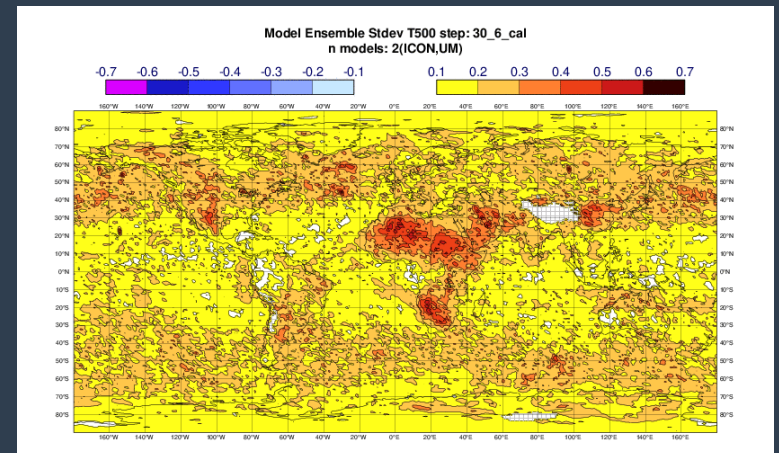
RMS-difference T500 between pairs of models N.Hem (upper-right), Tropics (lower-left)



ICON vs. SHEILD



ICON vs. UM



Summary

- Great response from participants!
- Interesting differences in biases to explore
- Possibility to see which models that are more similar than others

Future plans

- Start to dig into the results!
- Explore the model ensemble spread vs. stochastic model schemes
- Warm-conveyor belt diagnostics

Annual Mean Precipitation Distribution Compared to GPM Observation (Bias Plot , unit: mm/day)

