GEFS extended forecast

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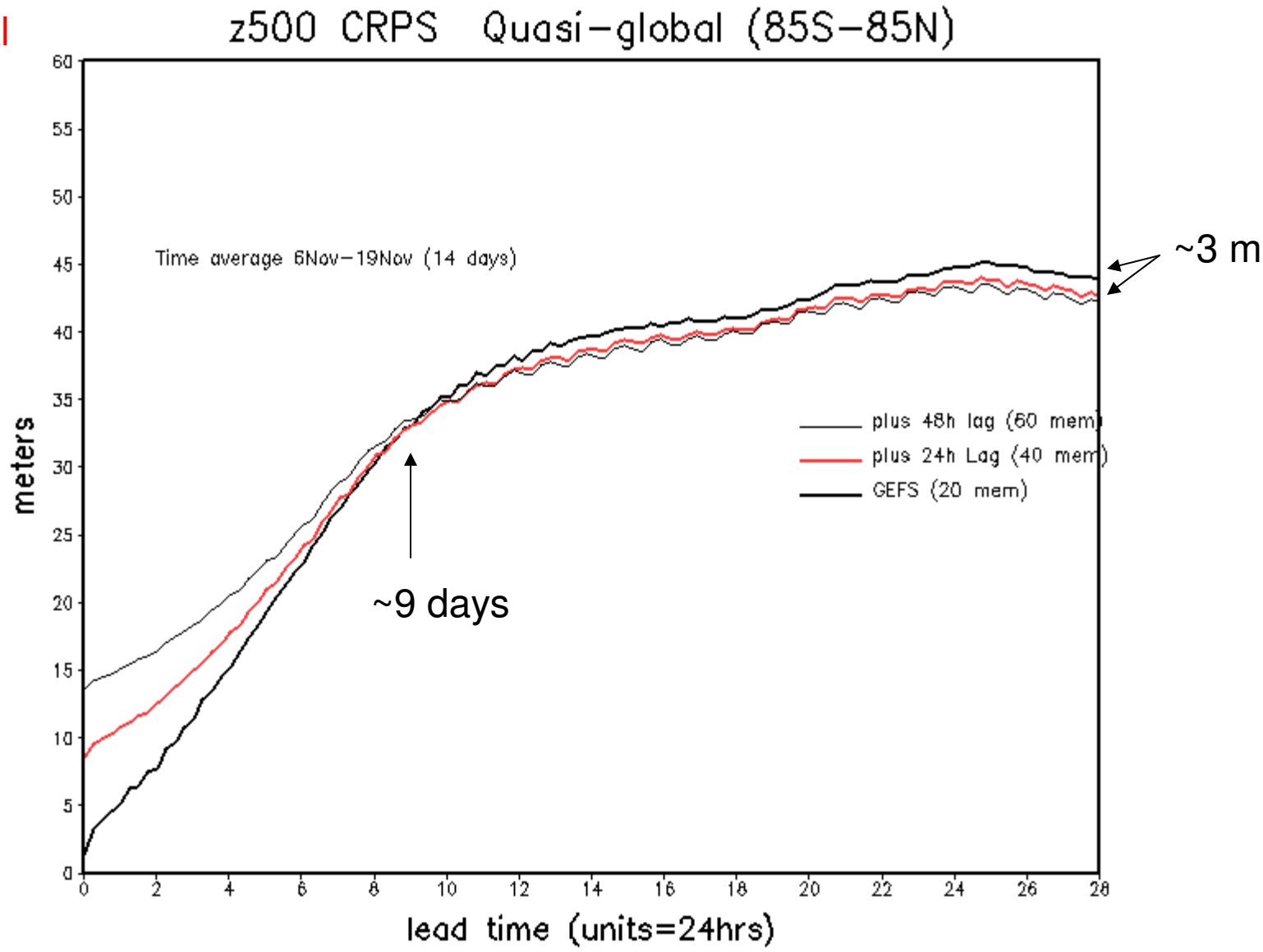
Acknowledgement: Qin Zhang CPC/NCEP

Configurations and evaluations

- Configurations
  - Operational GEFS with horizontal resolution increasing (first 180 hours only).
  - No stochastic adjustment
  - No bias correction
  - Out to 30 days forecasts (35 days planning for final implementation)
  - Once per day for 00UTC only
- Evaluation for retrospective experiments
  - Period: Nov. 1st – Dec 31st 2007
  - Purposes:
    - How far information from initial state is retained in the uncoupled system
    - Assess whether including past forecasts benefits skill for long leads
    - Set a performance benchmark for 30-days forecasts to compare with coupled runs:
    - Review the improvement of MJO prediction

Lagged 30days GEFS to form Lag-super-ensemble

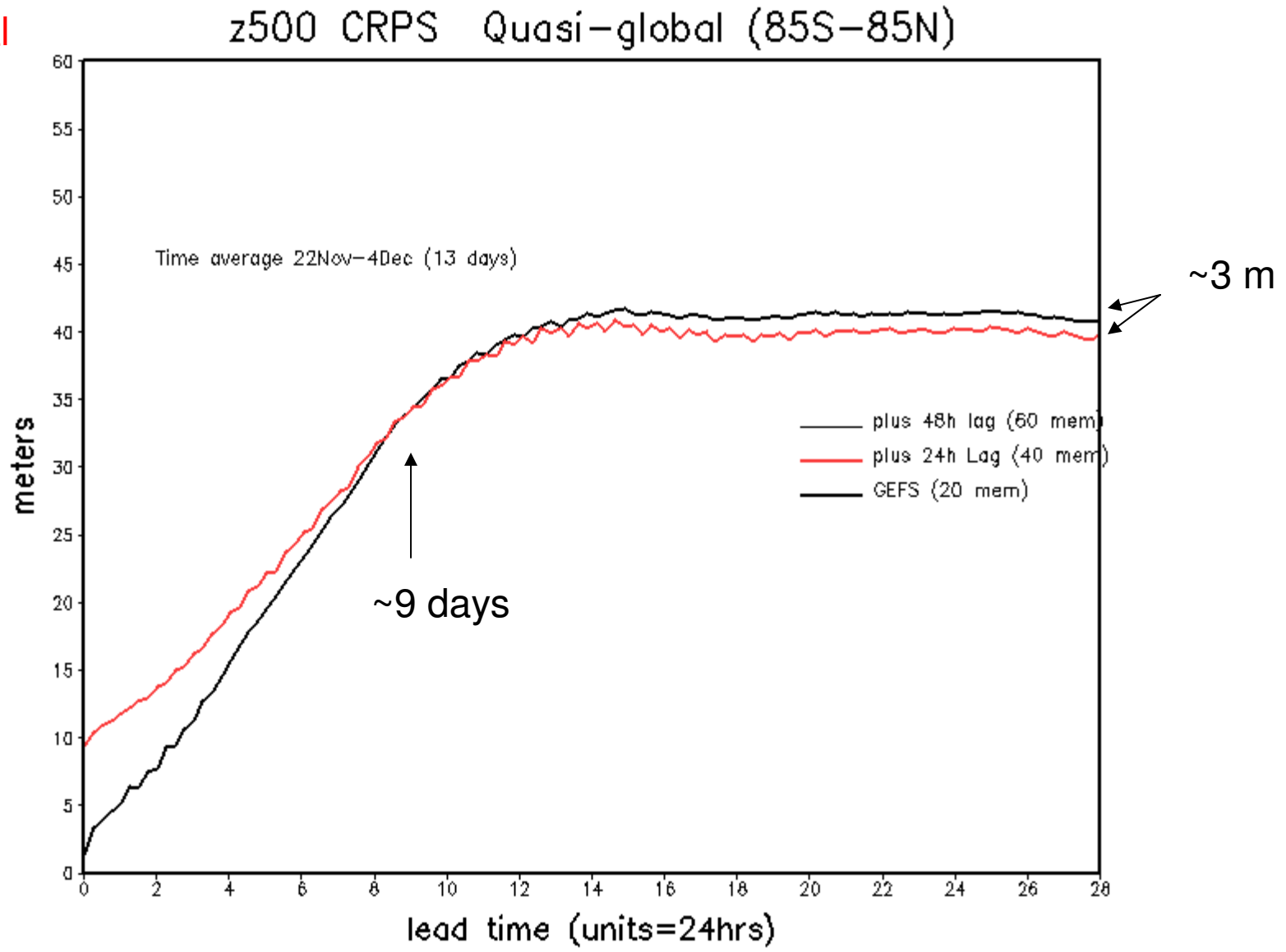
Experimental 30-days forecasts



Lag-super-ensemble has better CRPS beyond 9 days.

Lagged 30days GEFS to form Lag-super-ensemble

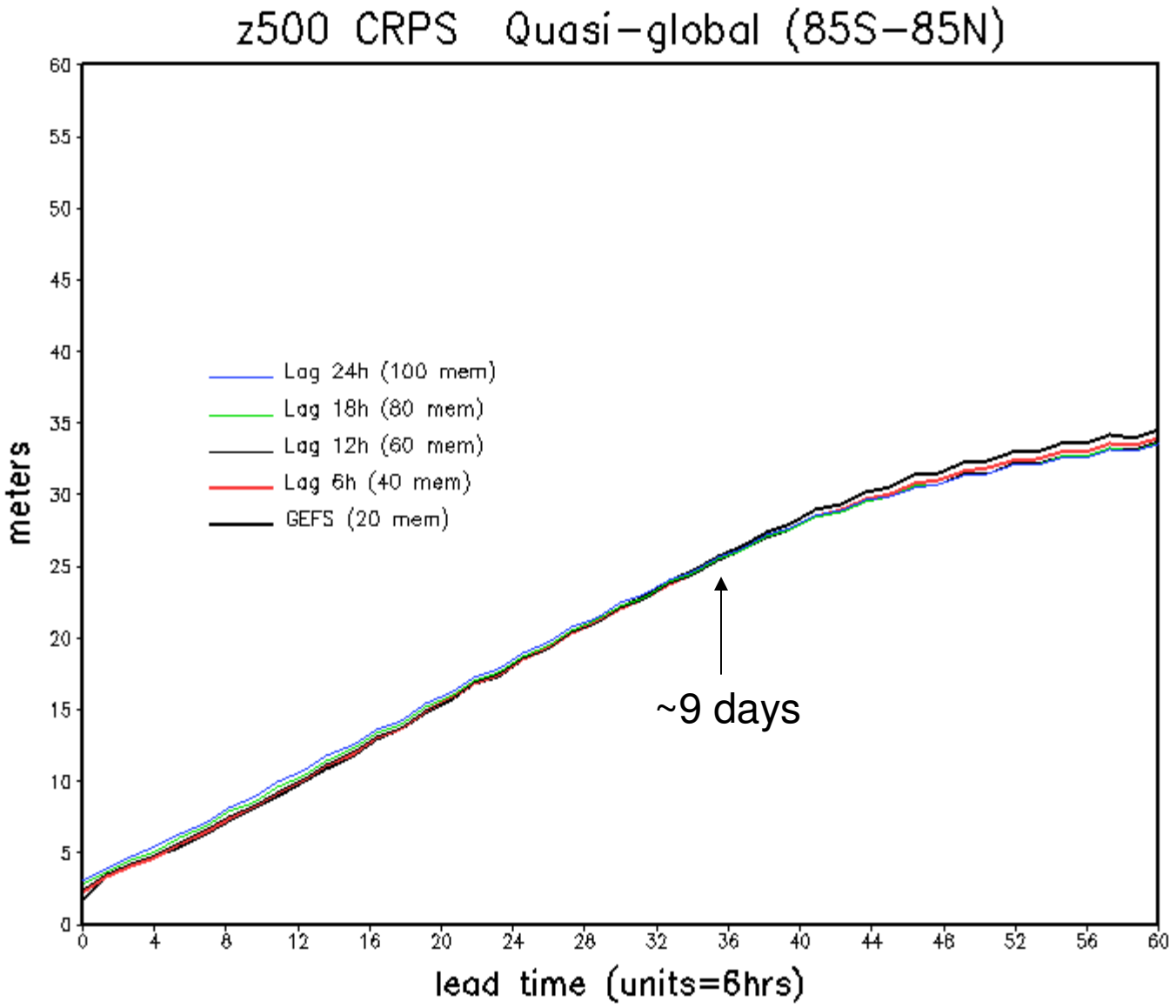
Experimental 30-days forecasts



Similar results for a second half of data

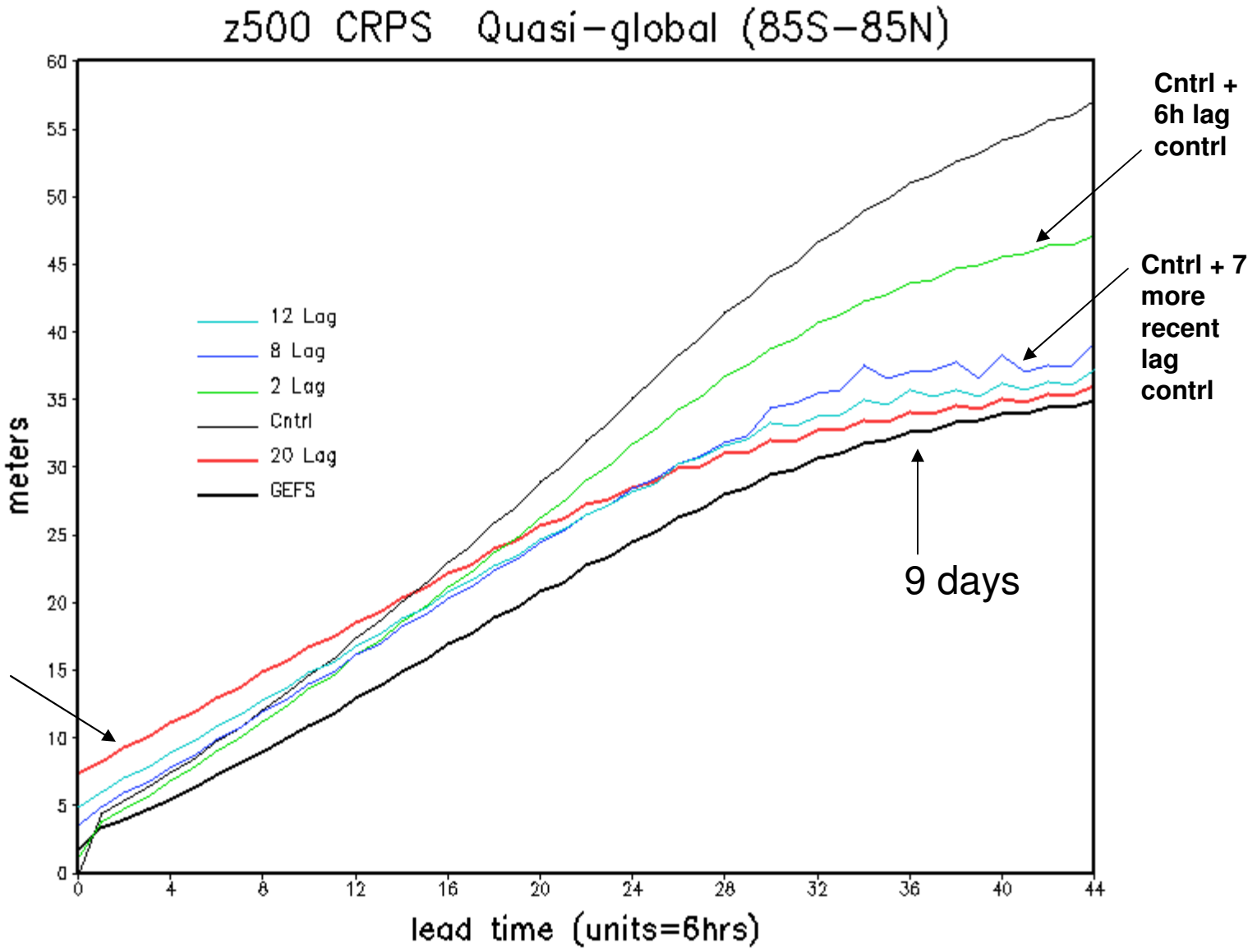
Lagged GEFS to form Lag-super-ensemble

Operational 16-days forecasts



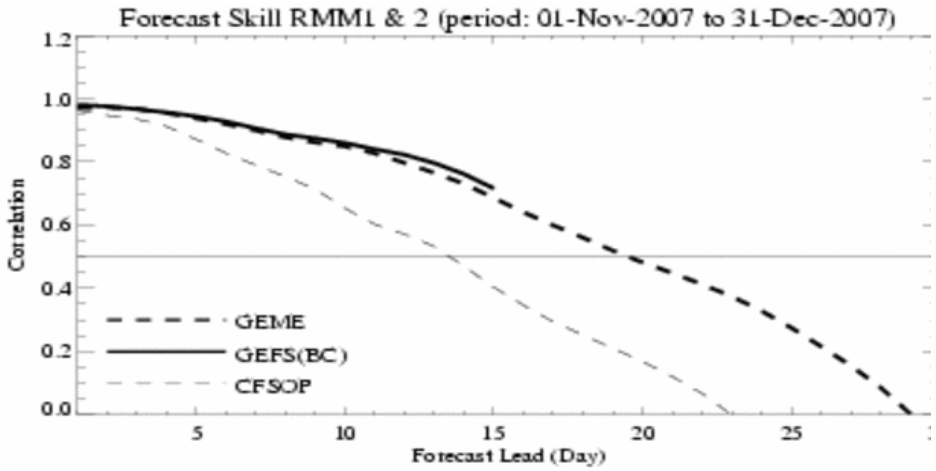
Lagged control members to form ensemble

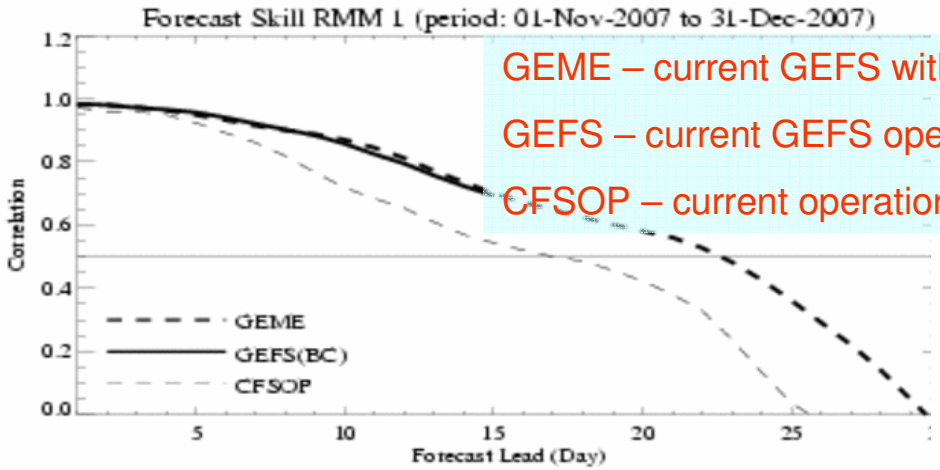
Operational 16-days forecasts

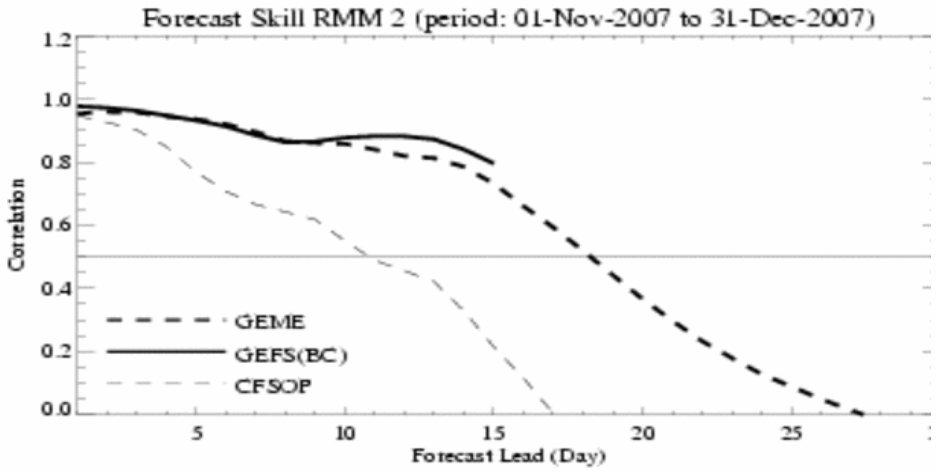


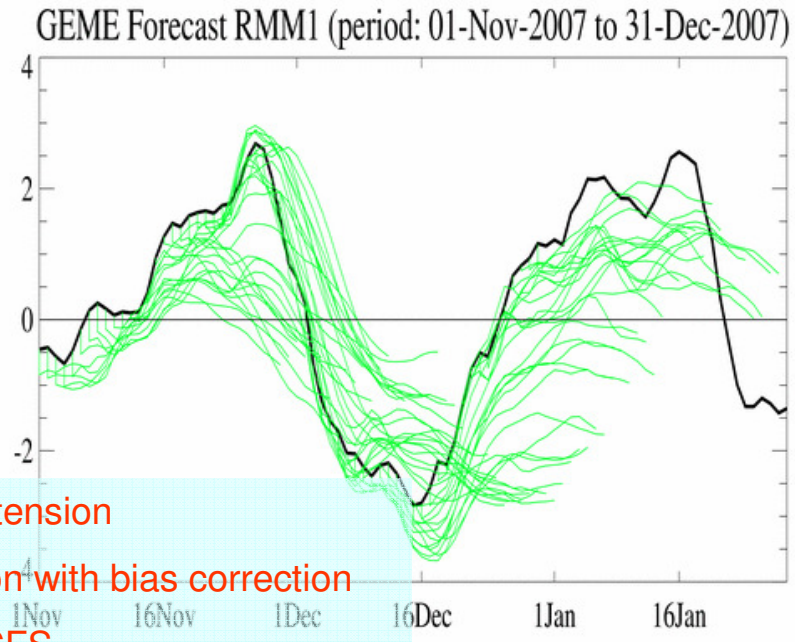
All cntrl runs from lead 0 to 4.75 days

Except for initial error, GEFS outperforms the rest of ensemble control forecasts out to 11 days. 20 lag ensemble (in red) approach GEFS at long lead.





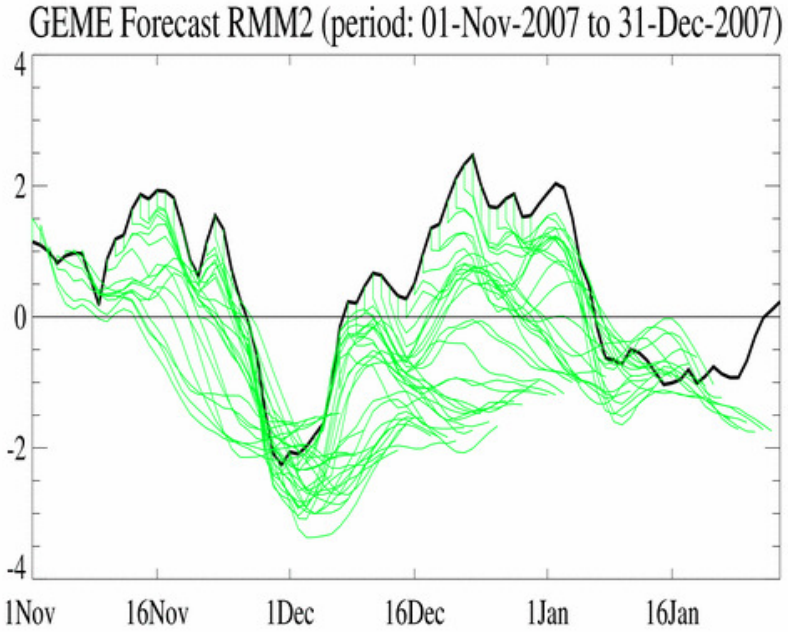




GEME – current GEFS with extension

GEFS – current GEFS operation with bias correction

CFSOP – current operational CFS



Courtesy of Qin Zhang

Preliminary Results

- For this retrospective experiments, including past forecasts reduces the CRPS 500hPa at leads beyond 9 days.
- Performance of Lag-super-ensemble GEFS is better than GEFS alone for leads beyond 9 days
  - Possibly because the ensemble size is much larger (a fair comparison would be to run same size ensembles)
  - All perturbations are centered on best analysis of corresponding initial times, therefore performance is not deteriorated as in the case when ensemble is formed with lagged control forecasts
  - GEFS outperforms ensembles formed from lagged control members
- GEFS outperforms ensembles formed from past control forecasts
- GEFS produces the skillful (ac>0.5) forecast for MJO prediction
  - Based on two months (61 cases) statistics
  - Out to 23 days (ac>0.5) for first EOF mode for raw forecast
  - About 20 days (ac>0.5) for combined 1st and 2nd EOF modes
  - About a week extended skill for GEFS when comparing to current CFS forecasts