中央氣象局第二代動力統計氣候預報系統簡介

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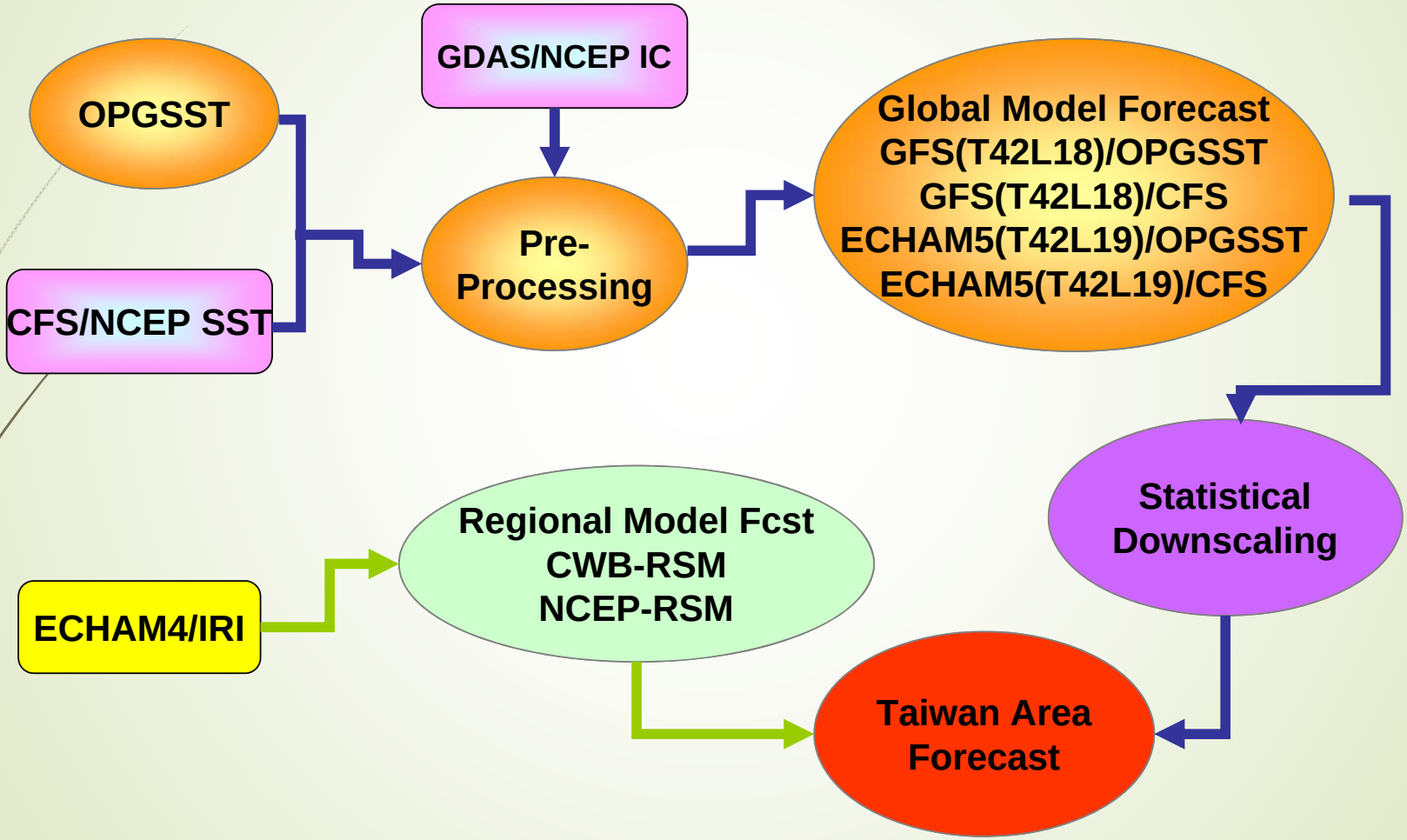
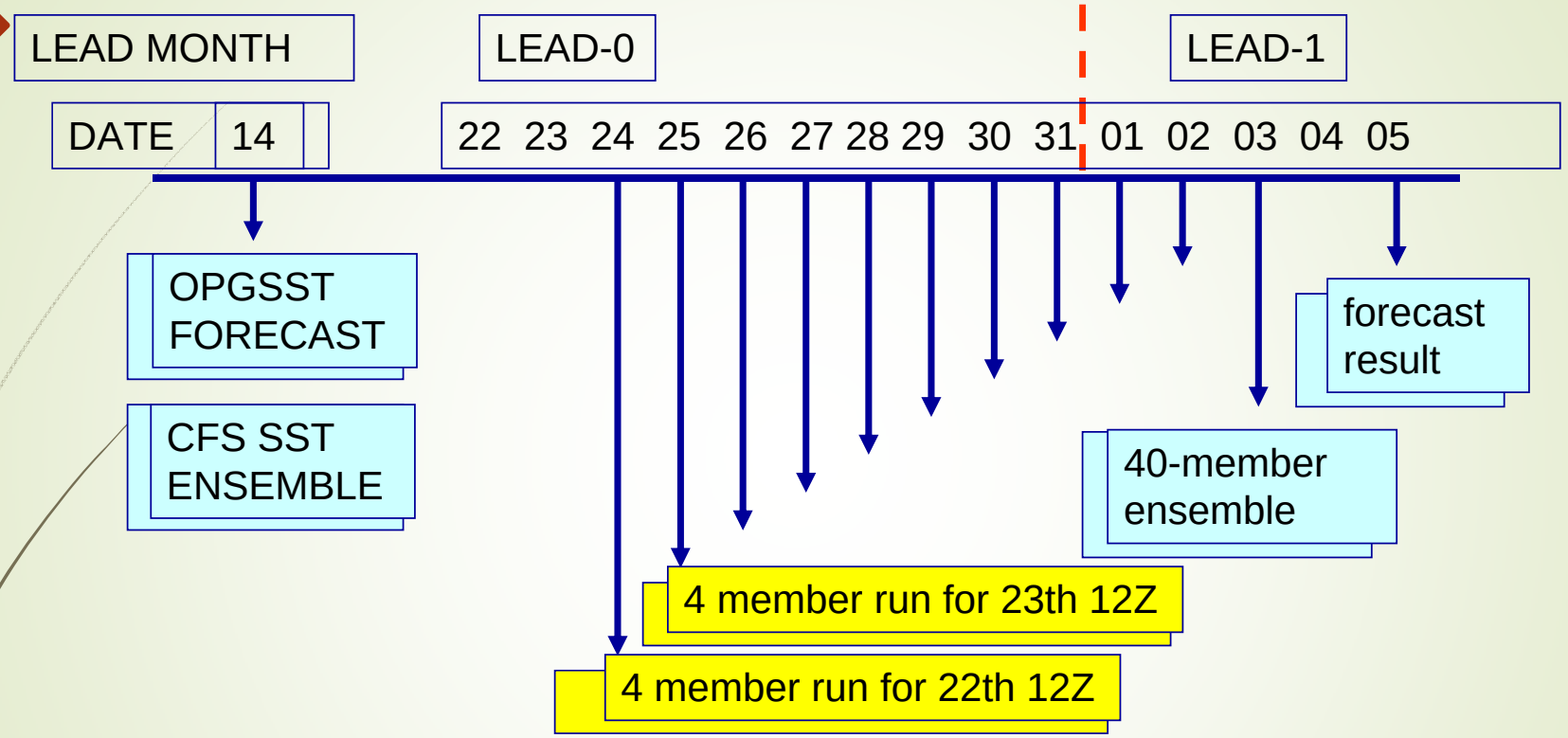
Operational Monthly and Seasonal Climate Forecast System



Components

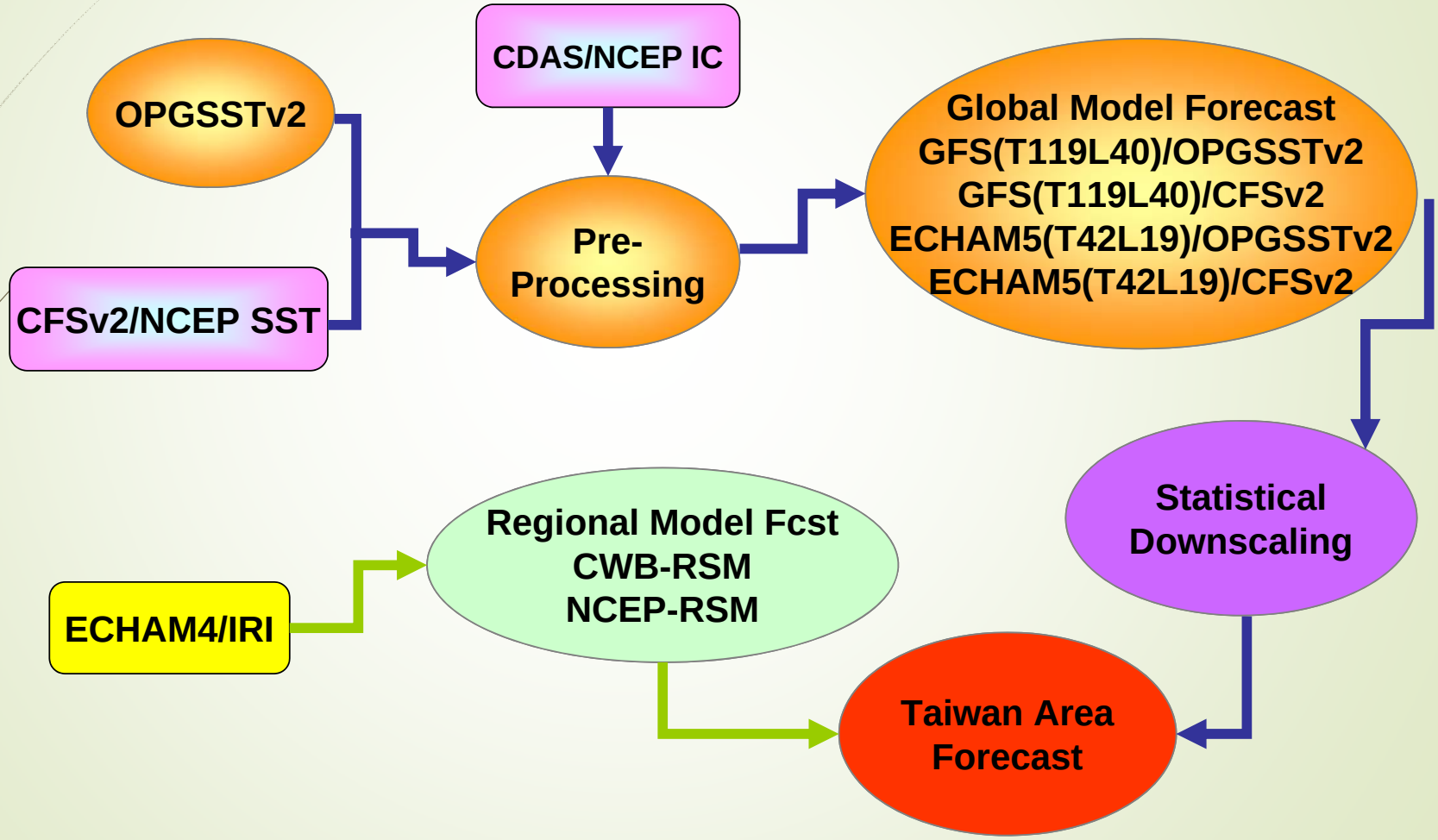
- Optimized Global Sea Surface Temperature (OPGSST) Forecast System
- Pre-processing System for Atmosphere Models
- Two-tier Dynamical Forecast System (40 members)
- Statistical Downscaling System
- Dynamical Downscaling System

Operational Forecast Schedule



- IC: last 10 days of lead 0 from NCEP/GDAS.
- 4 members run in all IC+2 days (GFS/OPGSST, GFS/CFS, ECHAM/OPGSST, ECHAM/CFS) with 7 months forecasting.
- Each member need about 40 minutes for model running and another 30 minutes for post process.

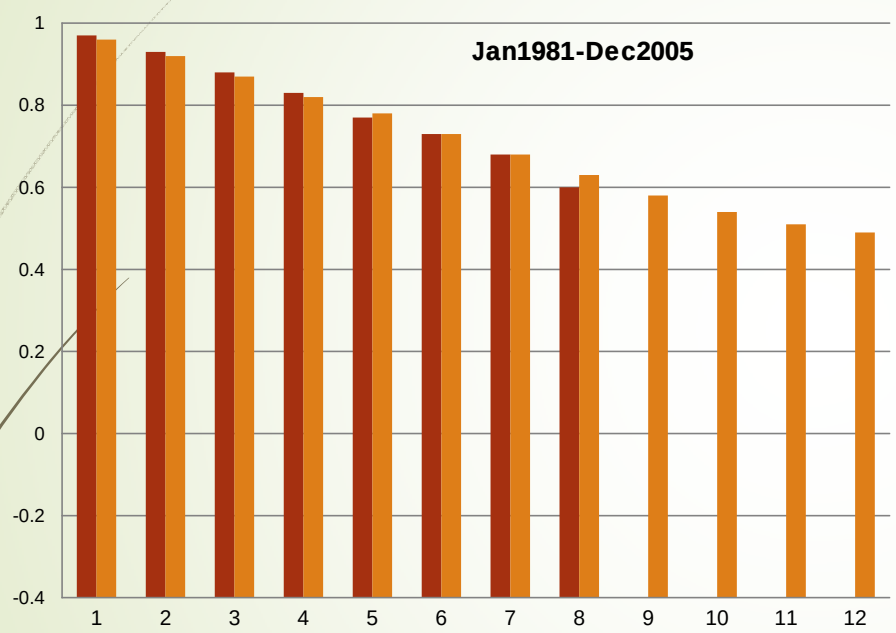
2nd Generation Monthly and Seasonal Climate Forecast System

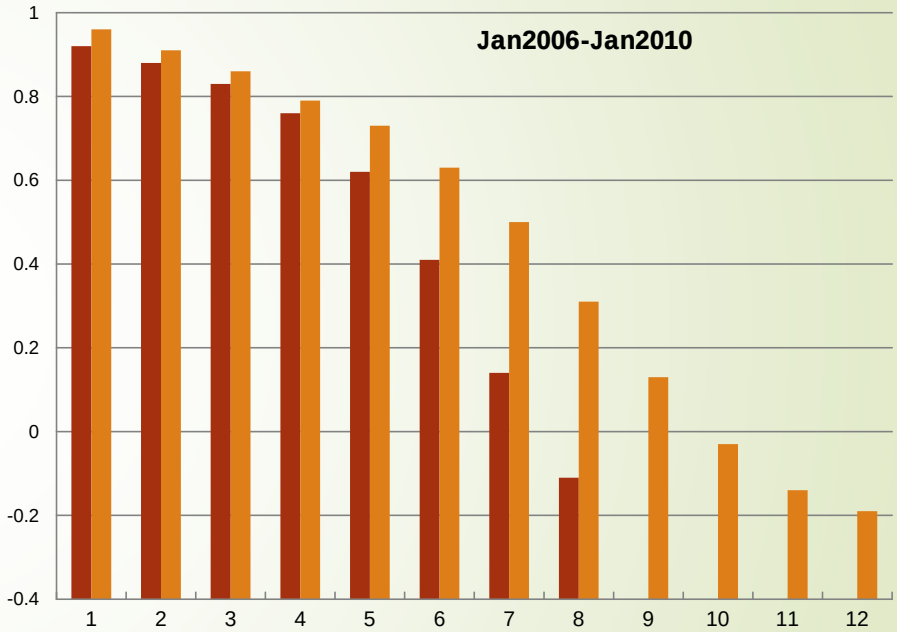


Components

- Optimized Global Sea Surface Temperature Version 2 (OPGSSTv2) Forecast System
- Pre-processing System for Atmosphere Models
- Two-tier Dynamical Forecast System (120 members)
- Statistical Downscaling System
- Dynamical Downscaling System

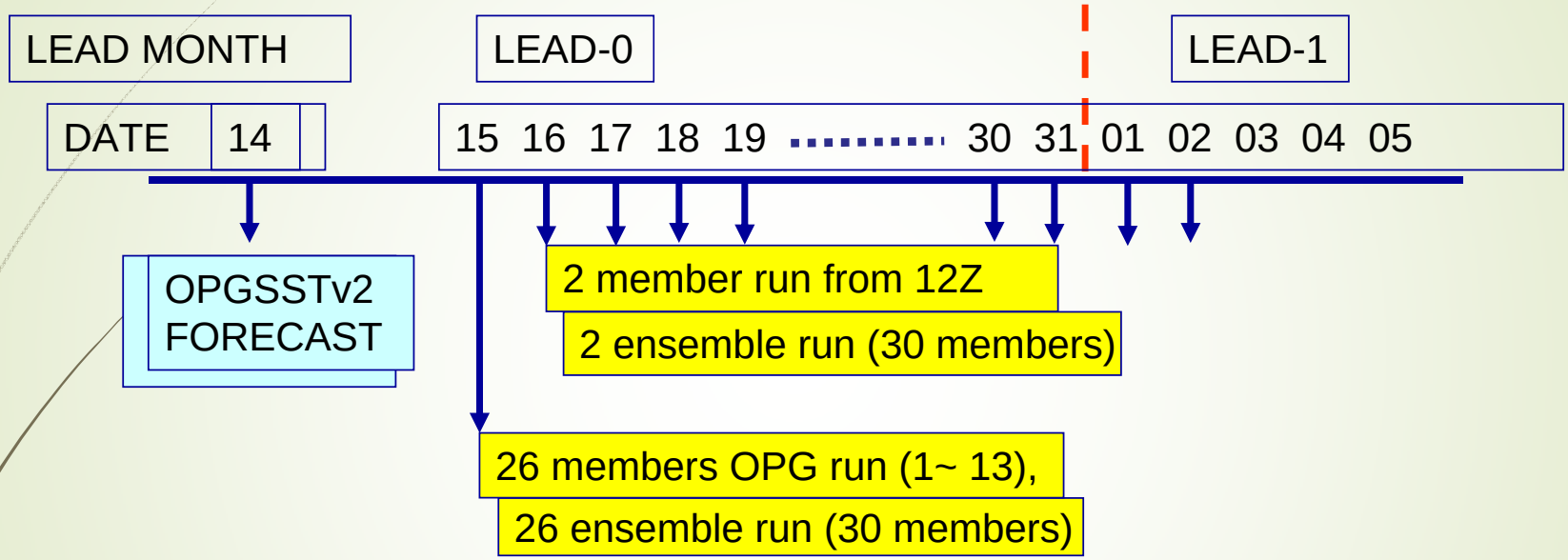
OPGSST V1 vs. V2





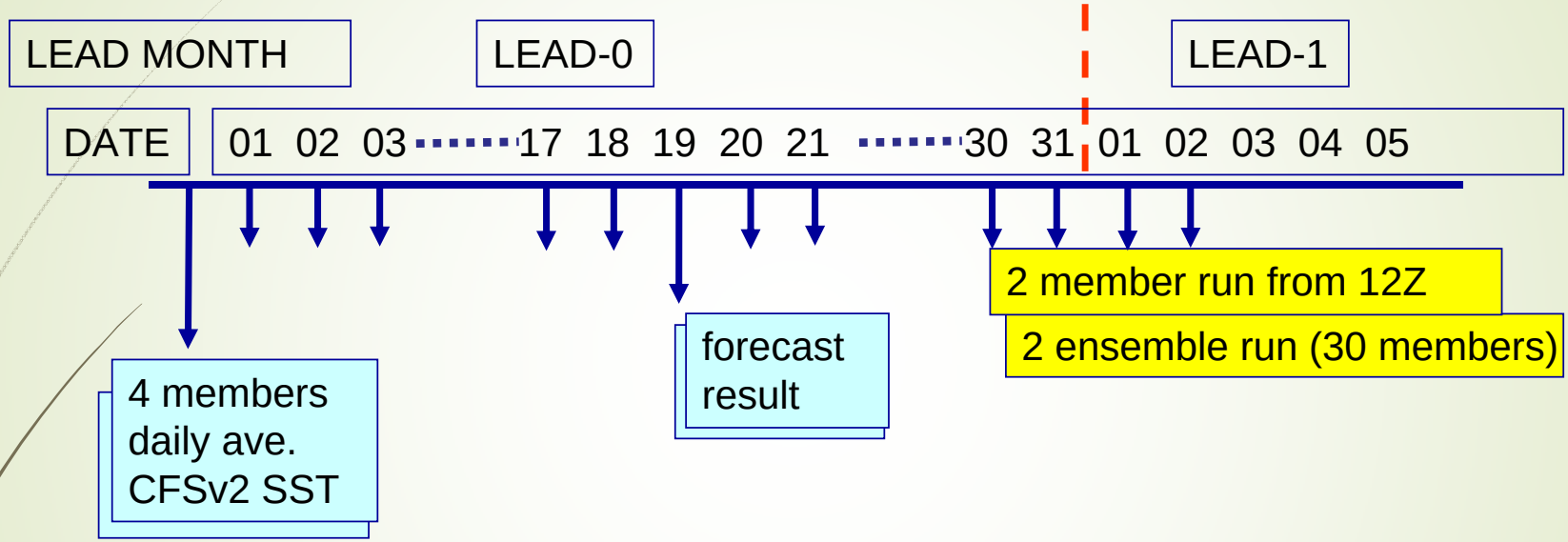
opgsst1.1 opgsst2.0

Operational Forecast Schedule v2
OPGSSTv2



- IC: 12Z every day from CDAS/NCEP
- BC: OPGSST forecast on 14th of every month (monthly output).
- On 15th of each month, run 26 members and 26 ensemble (from day 1st to day 13th of IC for GFS/OPGSST, ECHAM/ OPGSST) with 9 months forecasting. For day 16 to day 2nd of the next month, run 2 member and 2 ensemble per day.
- Ensemble is the averaged of past 30 days forecast.
- Each member need about 9 hours for model integration and another 30 minutes for post process.

Operational Forecast Schedule v2 CFSv2/NCEP



- IC: 12Z every day from CDAS/NCEP
- BC: Daily averaged SST (monthly output) from CFSv2/NCEP.
- Run 2 member and 2 ensemble per day (GFS/CFSv2, ECHAM/CFSv2) with 9 months forecasting.
- Ensemble is the averaged of past 30 days forecast.
- Each member need about 9 hours for model integration and another 30 minutes for post process.

GCM Description

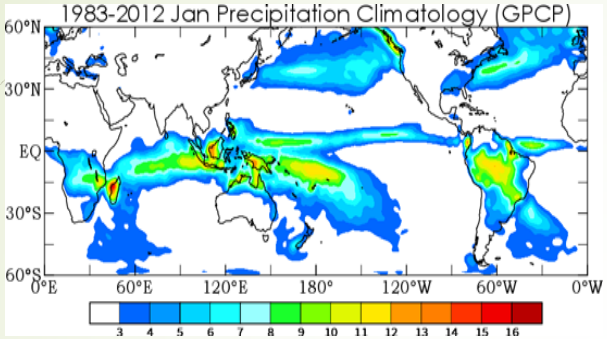
	T119L40	T42L18
Radiation	Unified two-stream calculation with K-correlated method (Fu and Liou 1992,1993; Fu et al. 1997)	Harshvardihan et al (1987)
Cumulus	Simplified Arakawa-Schubert (Pan and Wu 1994)	Relax Arakawa-schubert (Moothi and Suarez 1992)
Large scale precipitation	Predict cloud water scheme (Zhao and Carr 1997)	Based on RH
Vertical turbulence mixing	First-order closure of nonlocal scheme (Troen and Mahrt 1986, Hong and Pan 1996)	TKE-ε scheme (Detering and Etling 1985)
Land model	Noah land surface model – 4 layers (Ek et al, 2003	Bucket method (Manebe 1969)
Shallow convection	Turbulent diffusion-based approach Li (1994)	Turbulent diffusion-based approach Li (1994)
Gravity wave drag	Palmer et al. (1986)	Palmer et al. (1986)

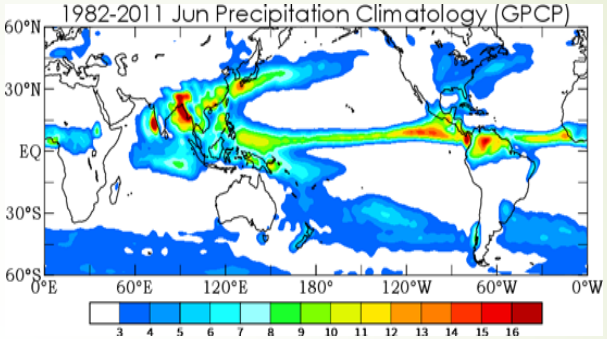
Precipitation Climatology (1982-2011, initial: DEC,MAY)

Lead:0 (Jan) ini:DEC

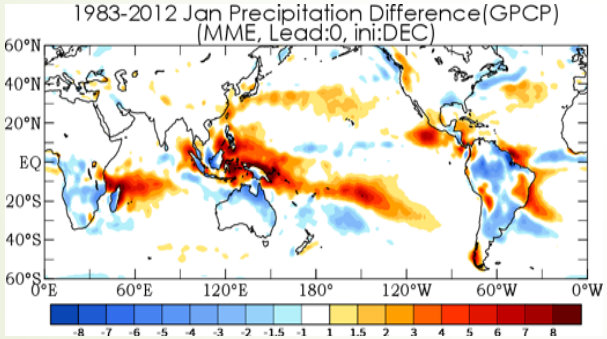
Lead:0 (Jun) ini:MAY

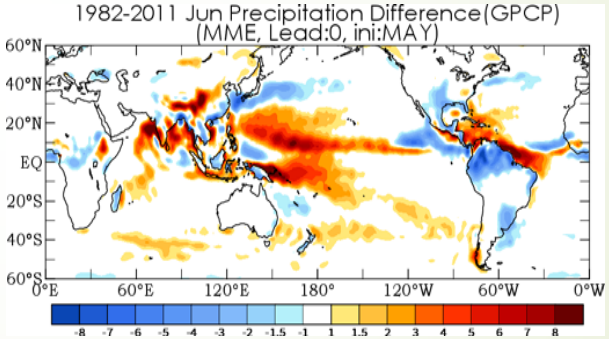
CFSR



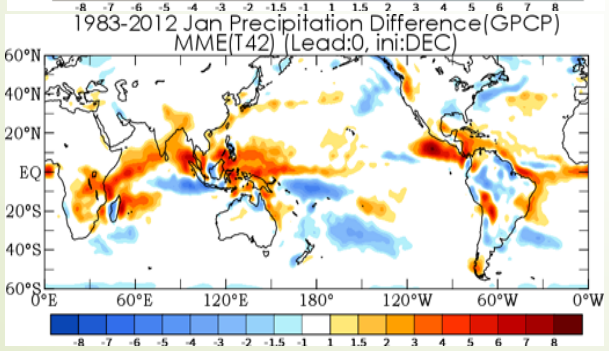


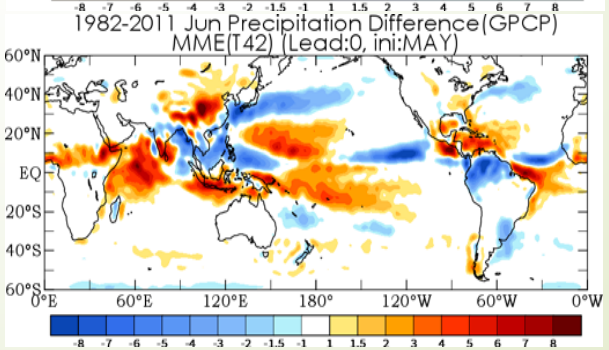
MME (T119)





MME (T42)



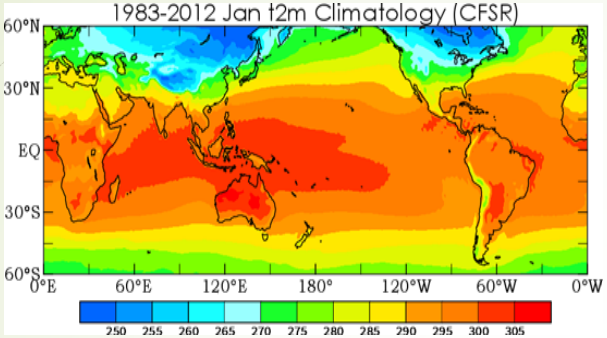


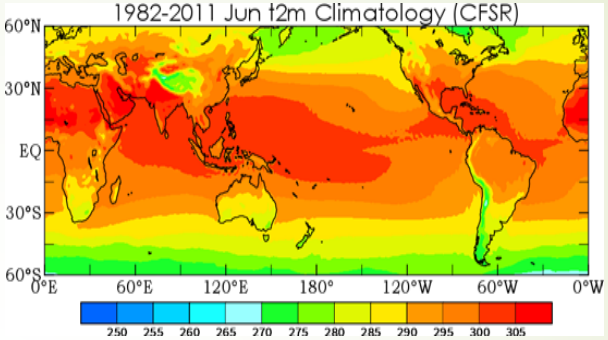
T2m Climatology (1982-2011, initial: DEC,MAY)

Lead:0 (Jan) ini:DEC

Lead:0 (Jun) ini:MAY

CFSR





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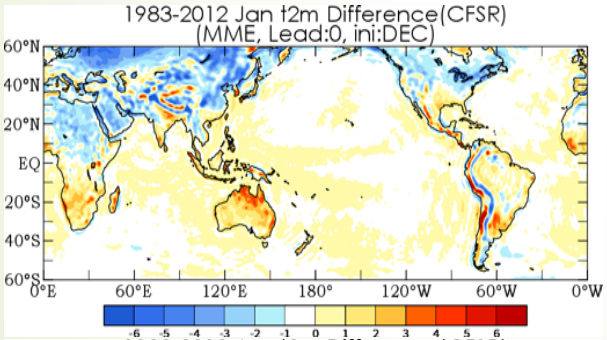
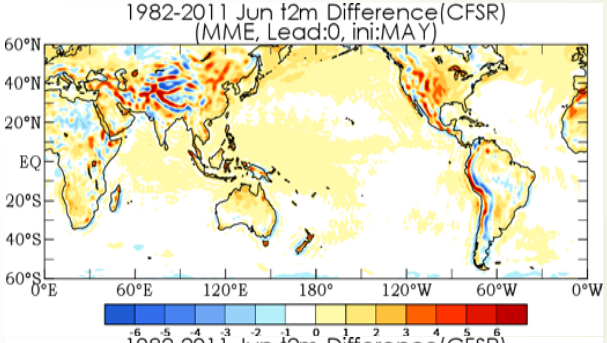
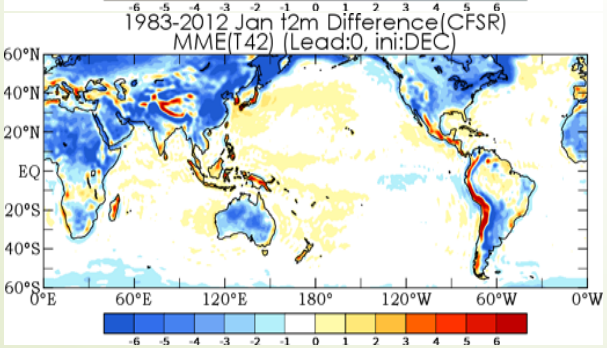
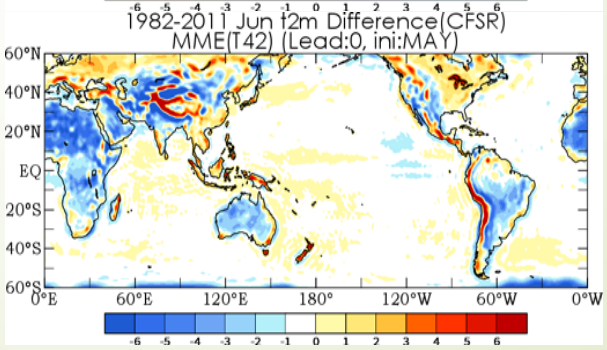




MME (T42)

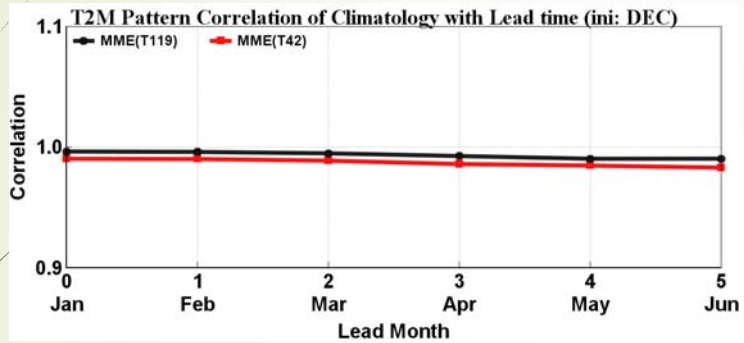




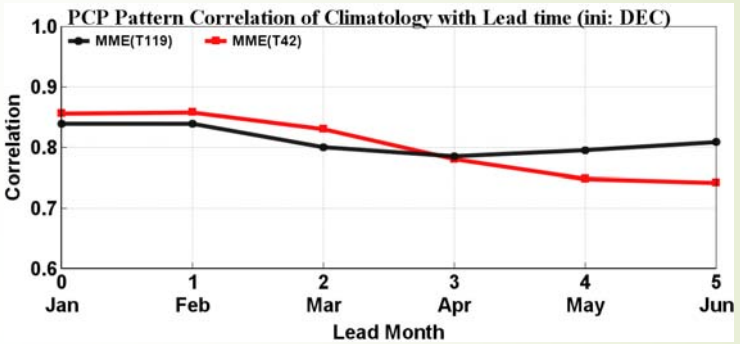
Pattern Correlation of T2m, Precipitation Climatology with Lead month

ini:DEC

T2m

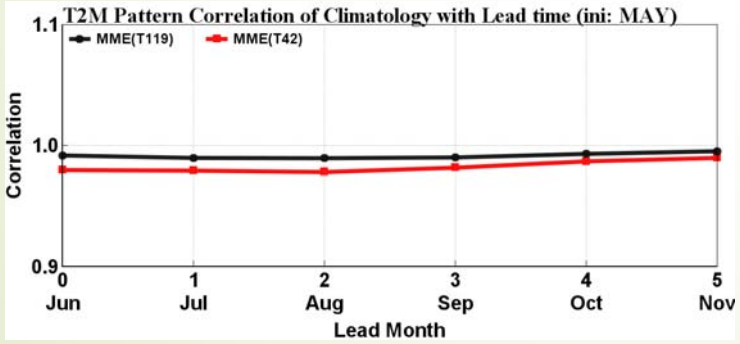


Precipitation

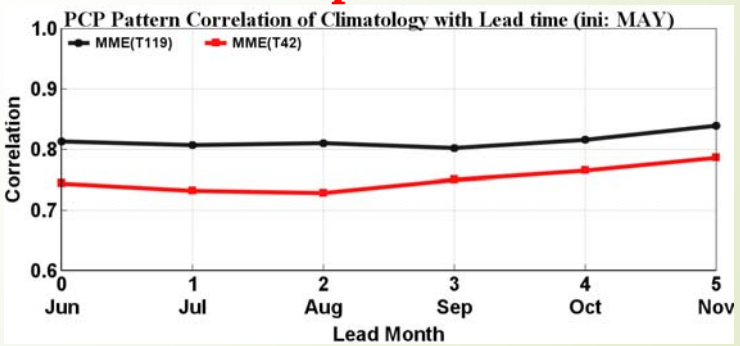


ini:MAY

T2m



Precipitation

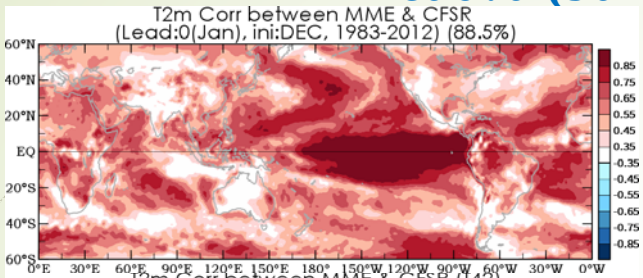


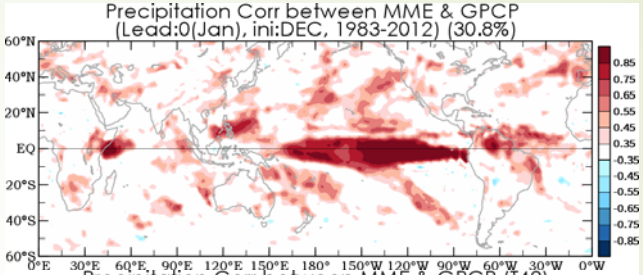
MME(T119) MME(T42)

T2m & Precipitation Anomaly Correlation (Lead:0)

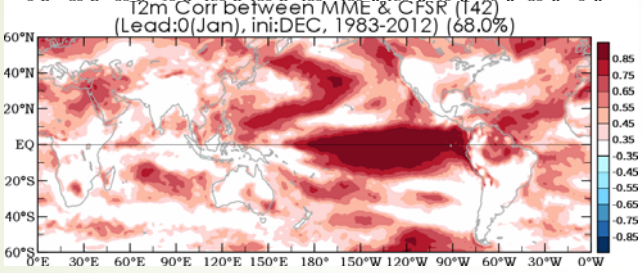
Lead:0 (Jan) ini:DEC

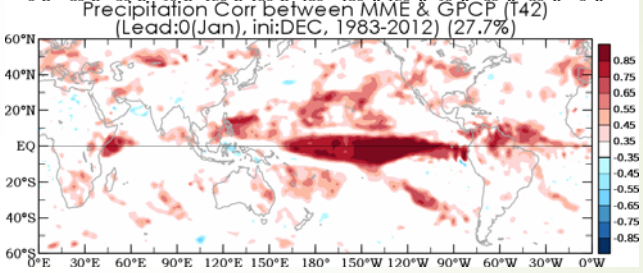
MME (T119)





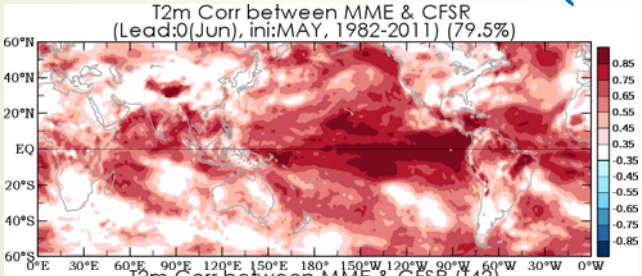
MME (T42)

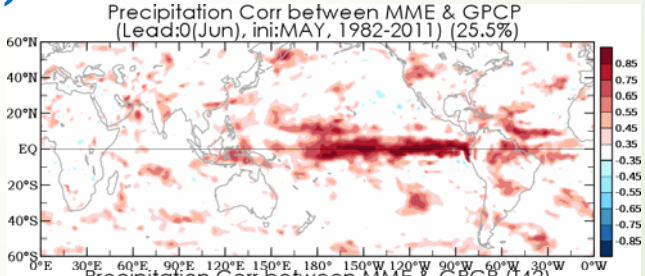




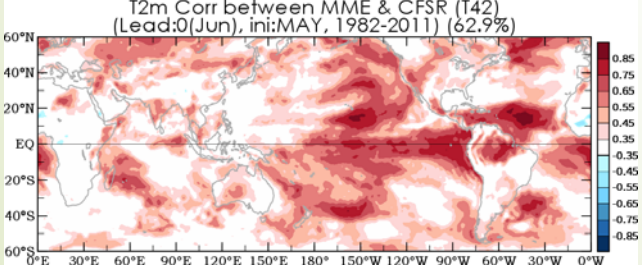
Lead:0 (Jun) ini:MAY

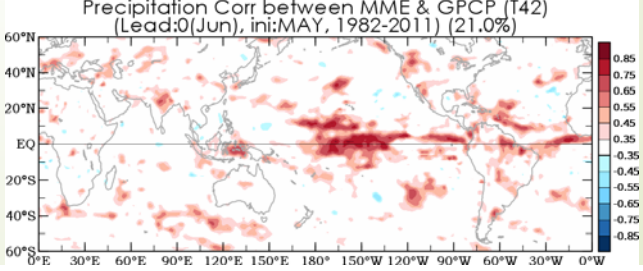
MME (T119)





MME (T42)

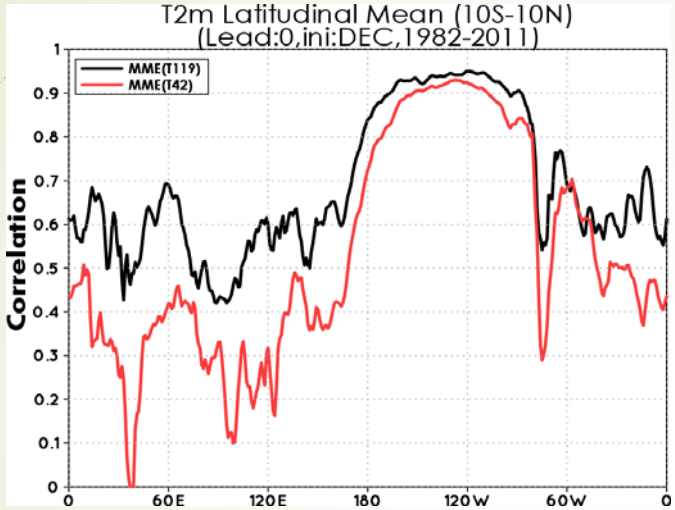




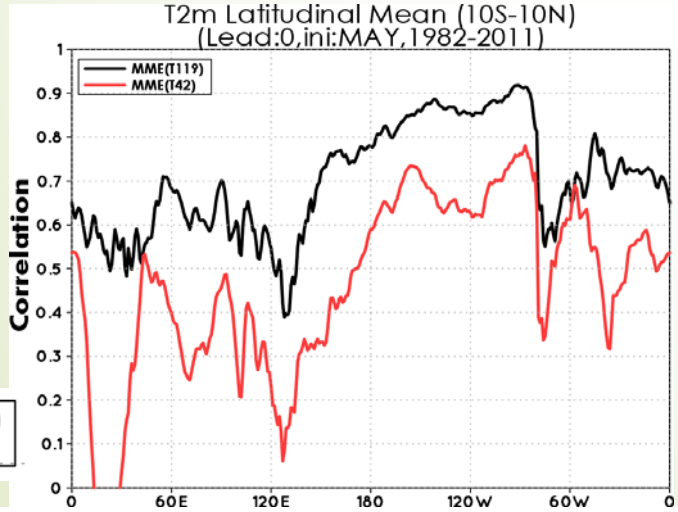
Zonal Mean of Temporal Correlation (10S-10N)

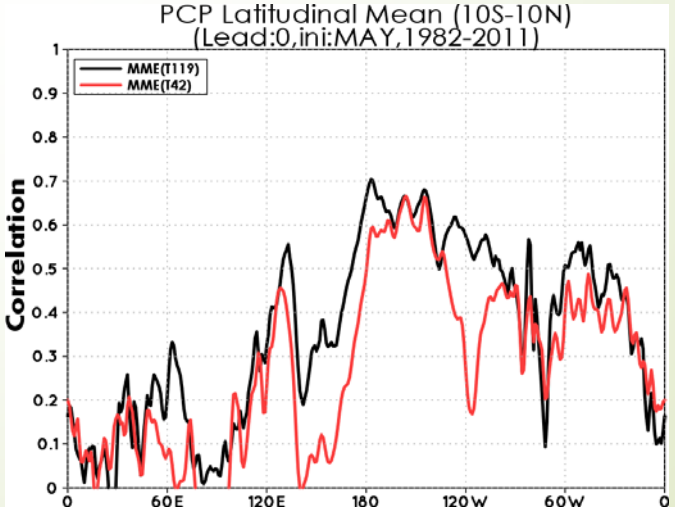
T2m ***Precipitaion***

Lead:0 ini:DEC



Lead:0 ini:MAY



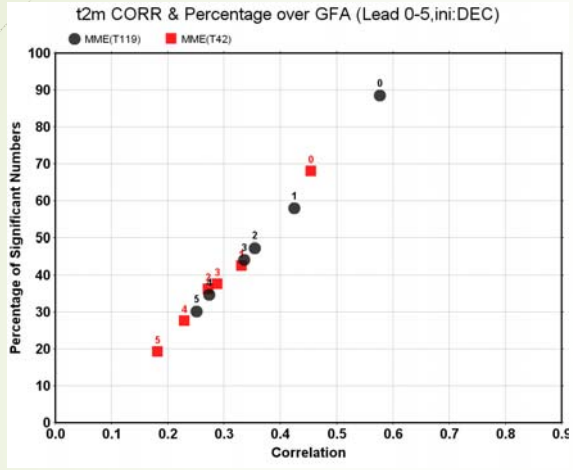


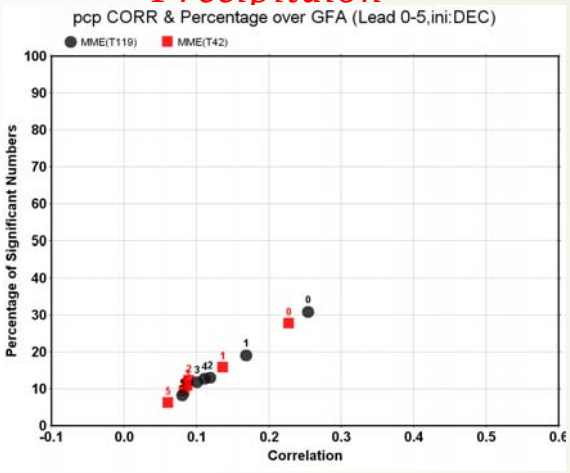
MME(T119)
MME(T42)

T2m and Precipitation (60S-60N Area Mean)
Anomaly Correlation and
Percentage of grid points with significant
(Lead:0-5, ini:DEC, MAY)

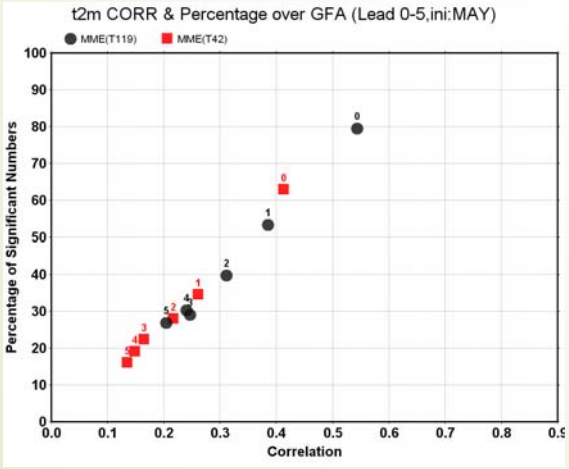
T2m *Precipitaion*

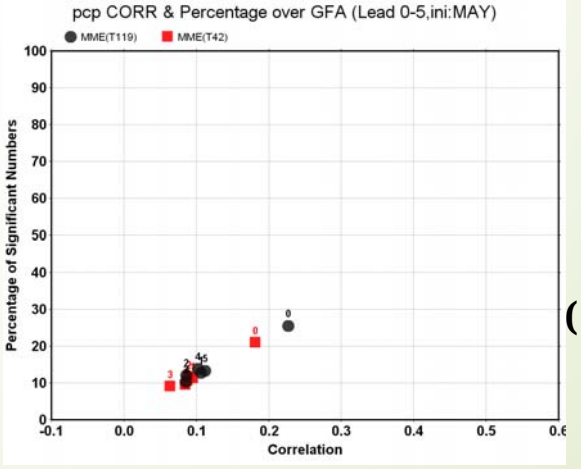
ini:DEC





ini:MAY





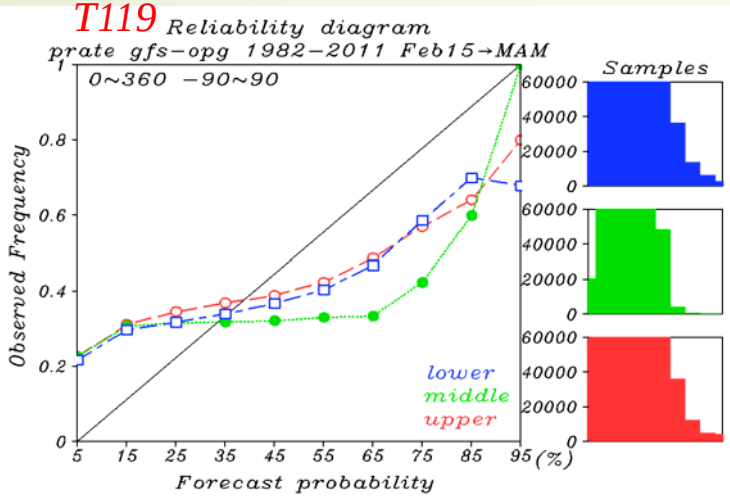
(ps. Number is Lead month)

Global-Domain Reliability Diagram
(***GFS-OPG*** , Lead:0-2, ini: FEB)

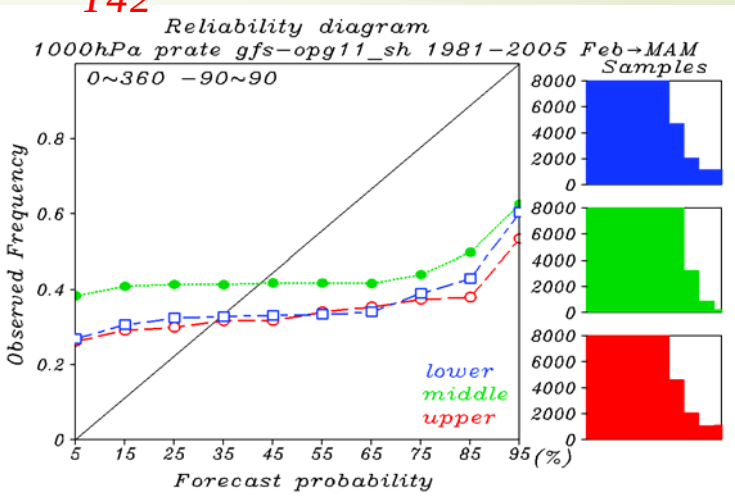
Prec

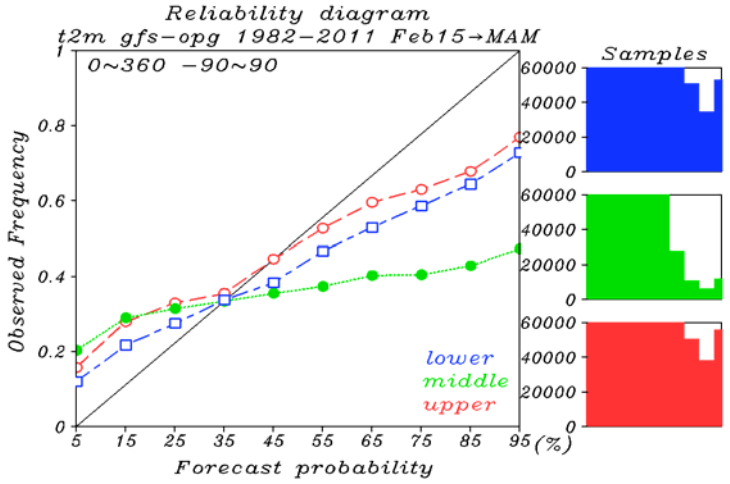
T2m

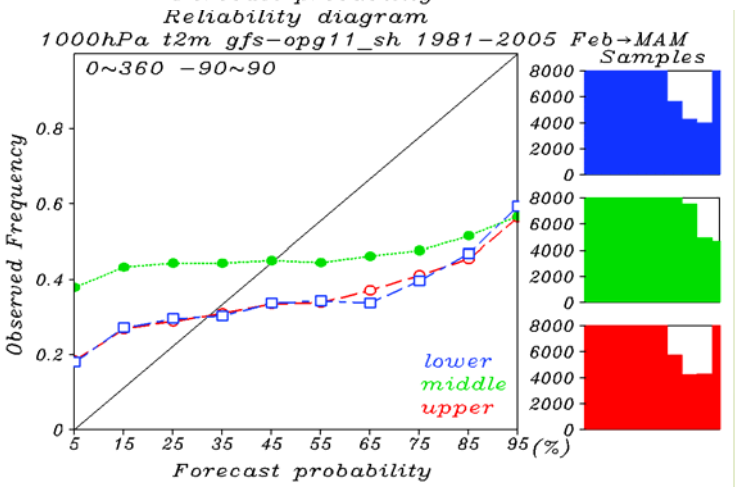
T119



T42





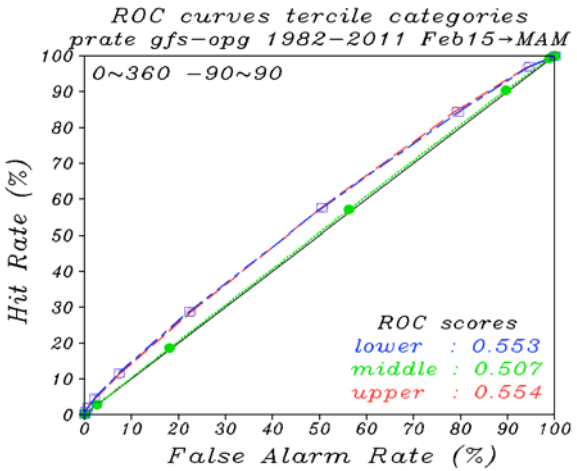


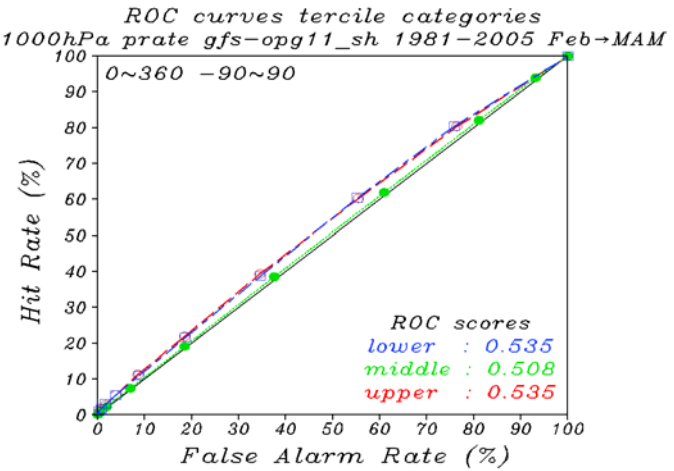
Above
Near
Below

Global-Domain ROC
(***GFS-OPG*** , Lead:0-2, ini: FEB)

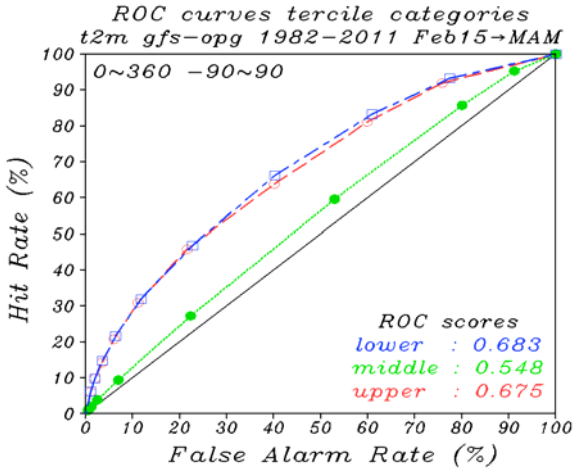
T119 *T42*

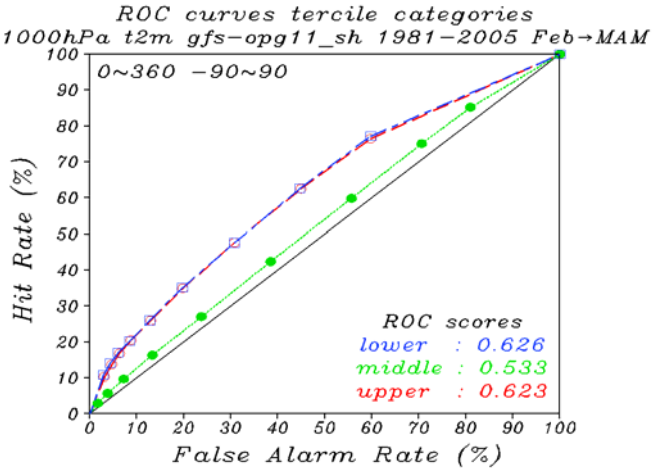
Prec





T2m



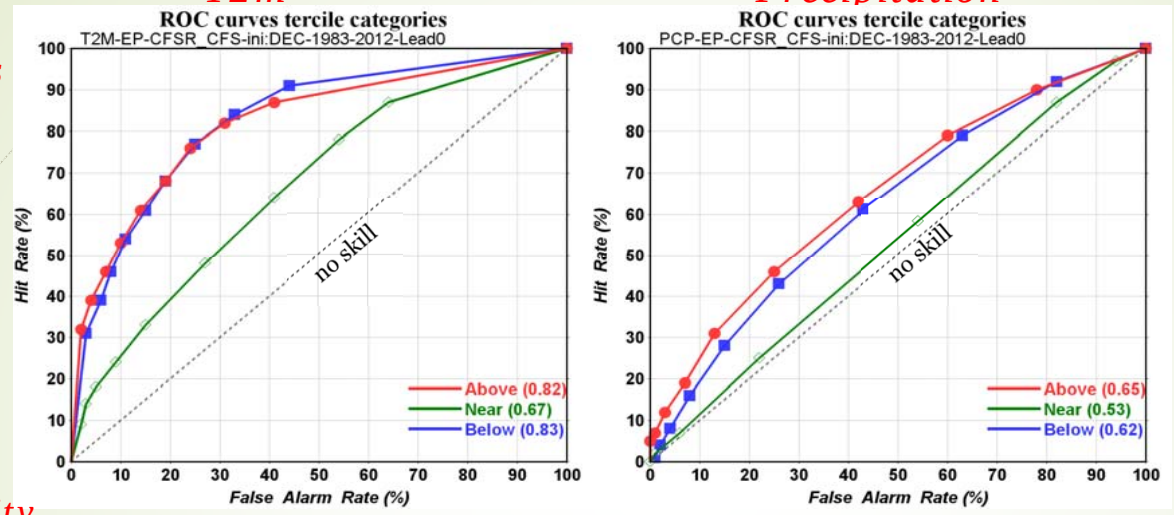


Above
Near
Below

EP-Domain (180W-80W, 30S-30N) Probabilistic Skill Score (ROC & Reliability Diagram) (***T119-OPG*** , Lead:0, ini: DEC)

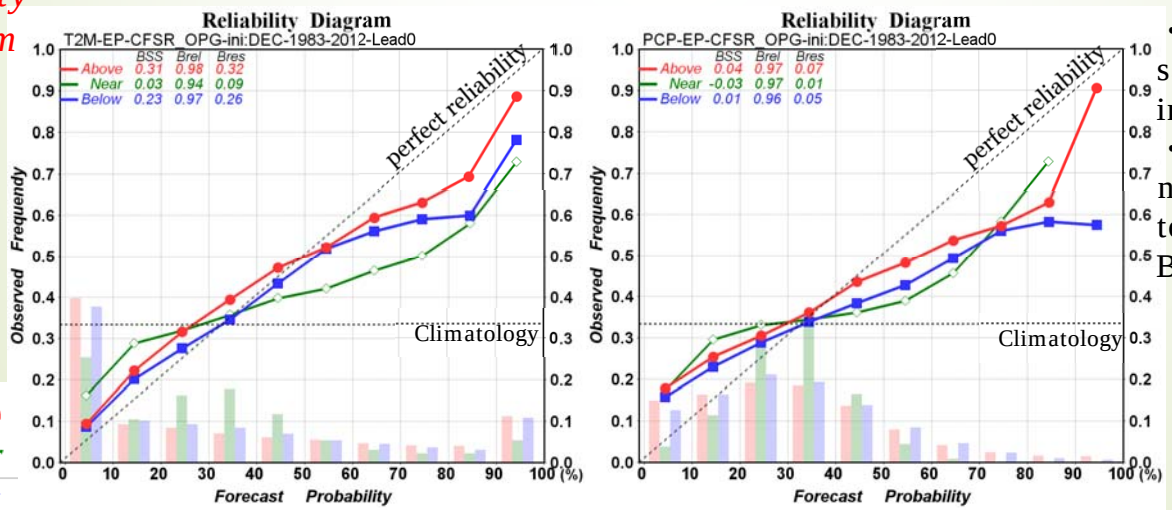
T2m *Precipitation*

ROC Curves



- AROC is calculated by integrating the area beneath the ROC curve
- AROC > 0.5 (skill)

Reliability Diagram

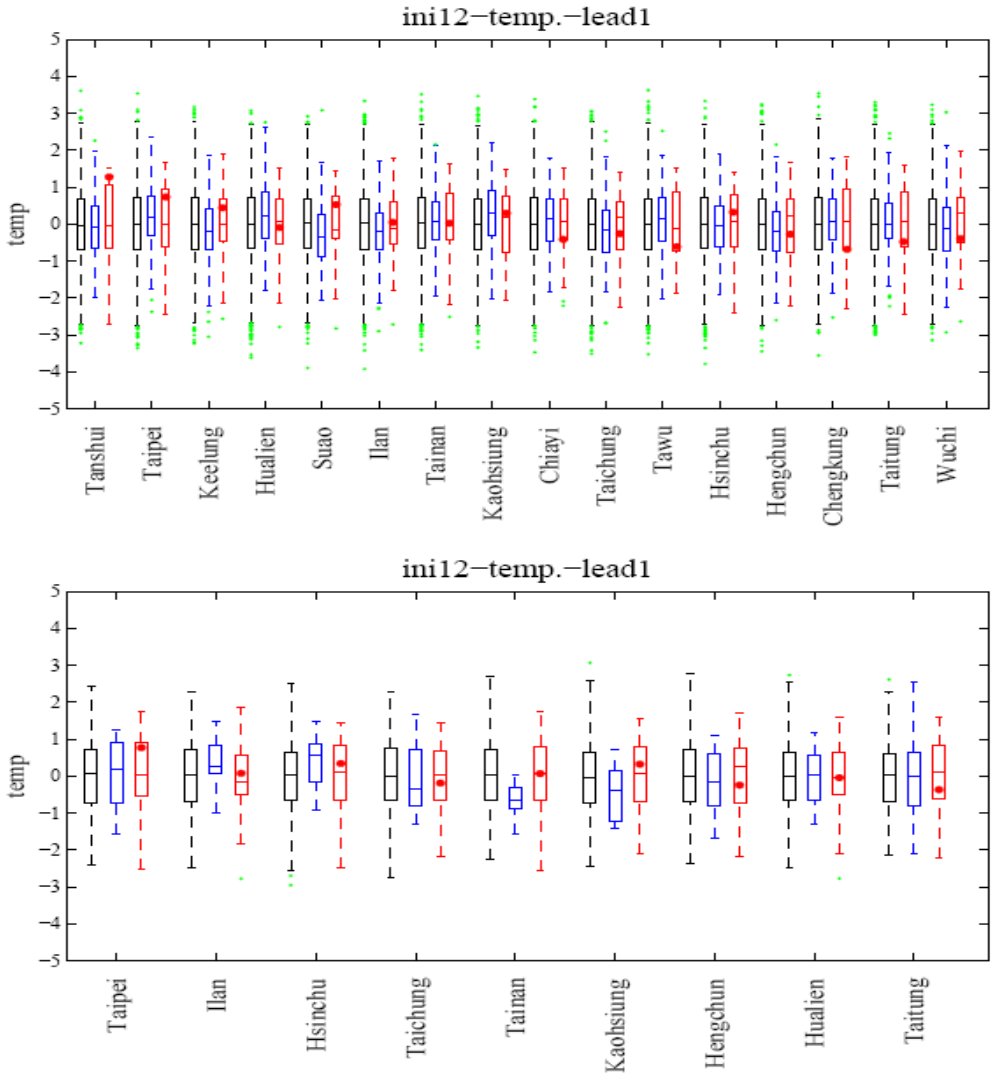


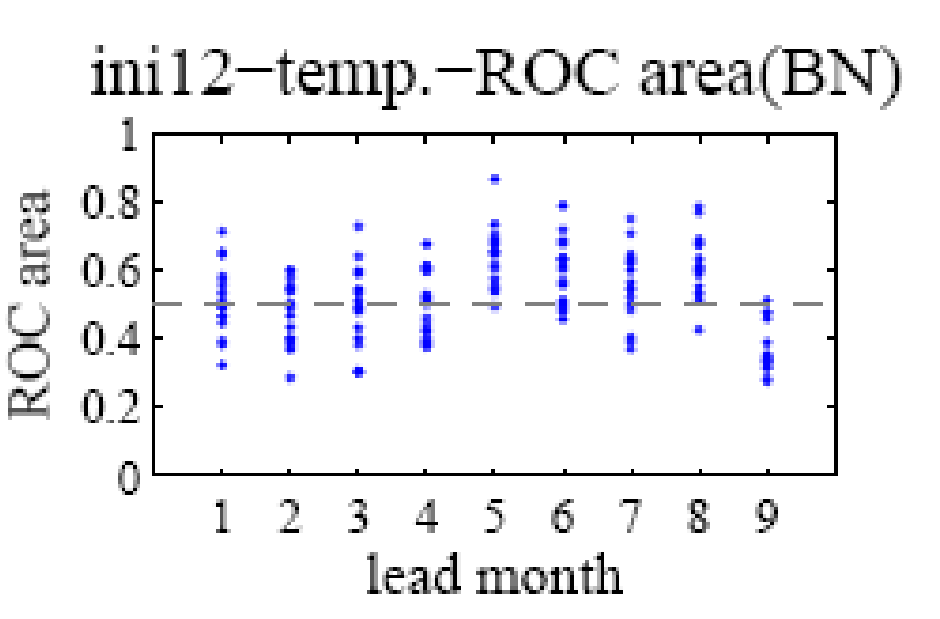
- Bar is numbers of samples forecast result in each 10 bins.
- BSS = 0 indicates no skill when compared to the reference forecast BSS=1(Perfect score)

Above
Near
Below

Downscaling

(***T119-OPG*** , Lead:0, ini: DEC)





Summary

- In general ,the second generation global atmospheric model has better results compared to the first generation global atmospheric model.
- Compared between variables, results for 2-meter temperature are better than precipitation.
- The operation schedule of the 2nd generation Climate is in January 2016.