



A Preliminary Diagnostic of CWB Seasonal Climate Forecast System

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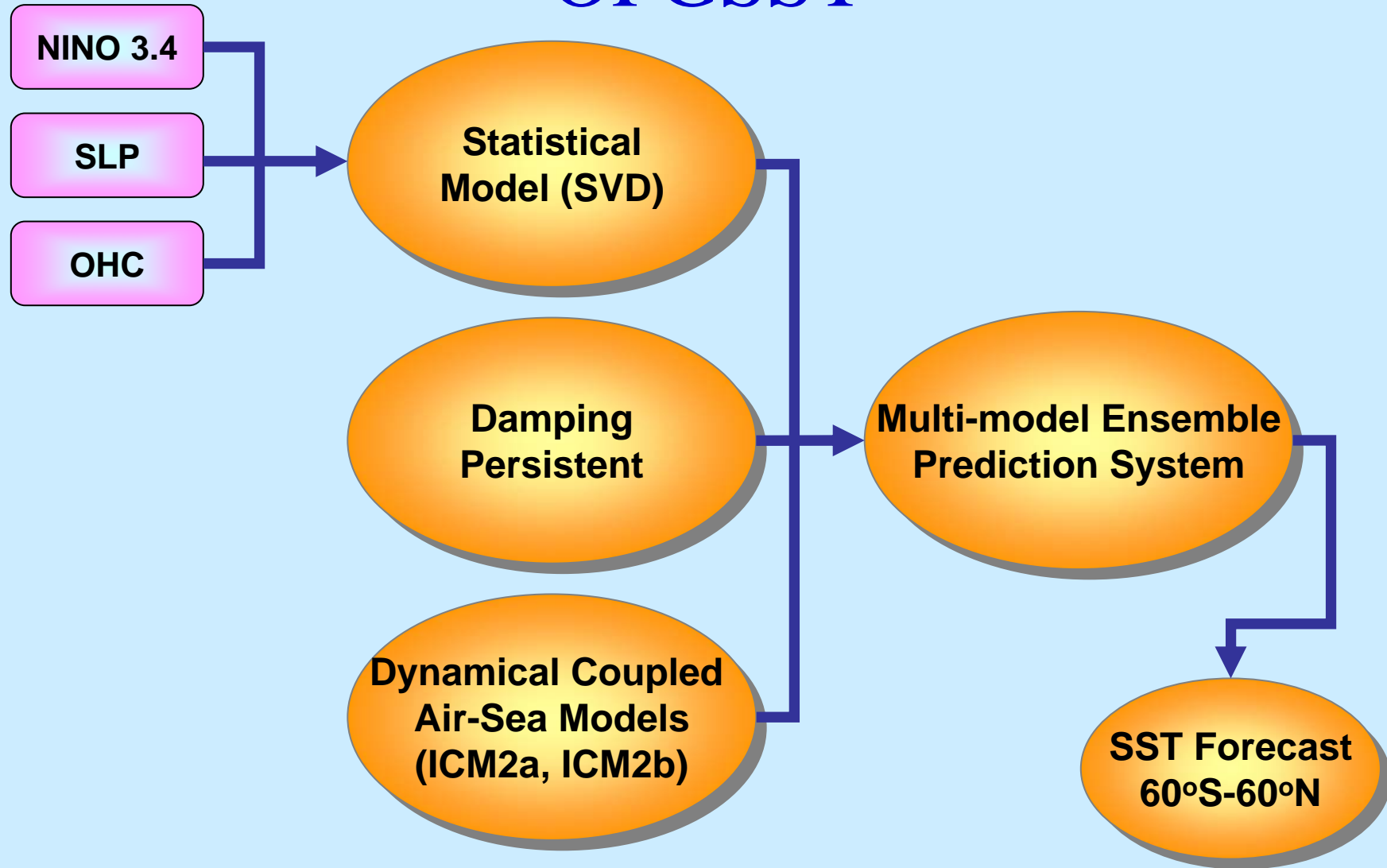


Components

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

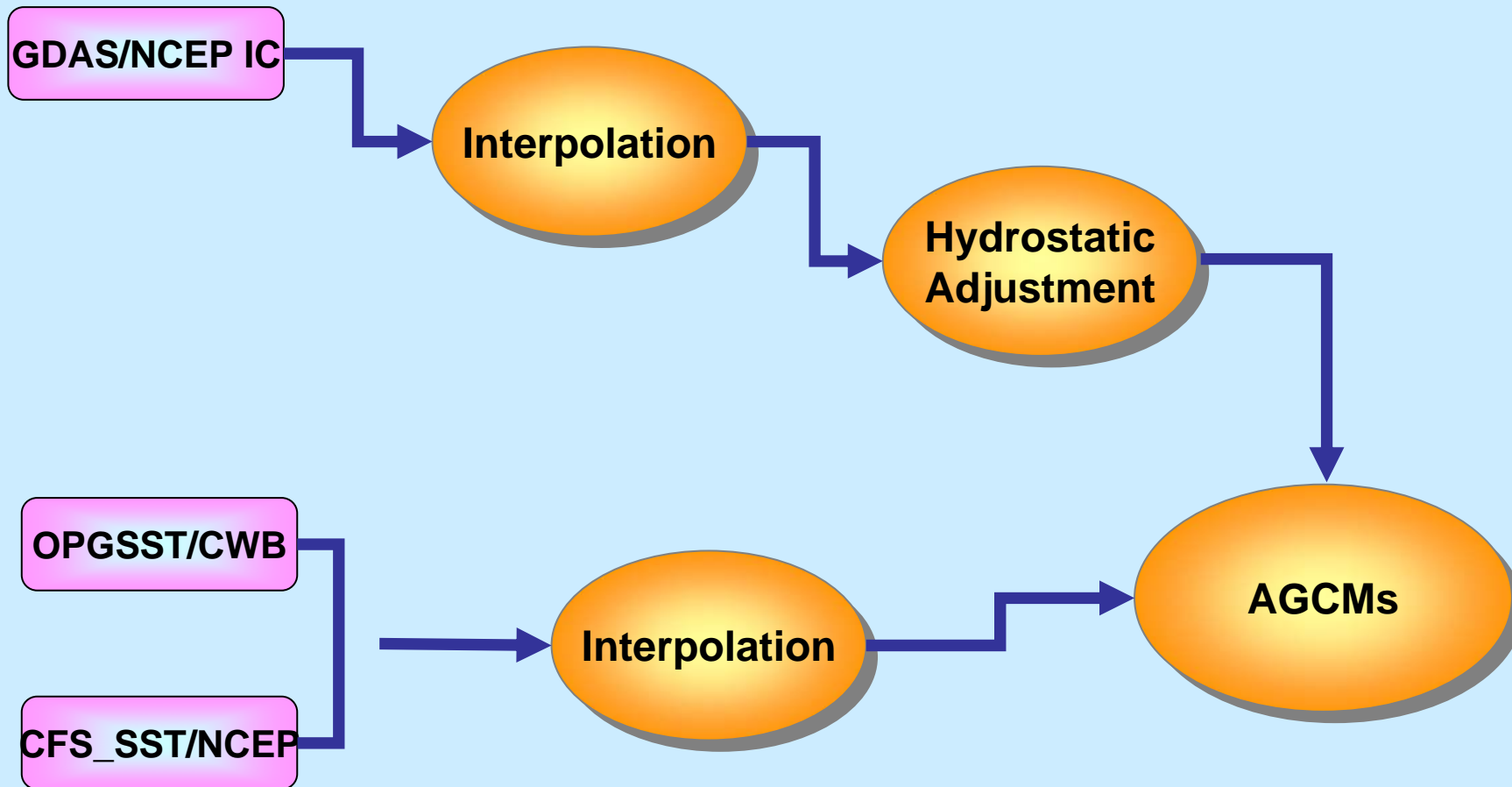


OPGSST



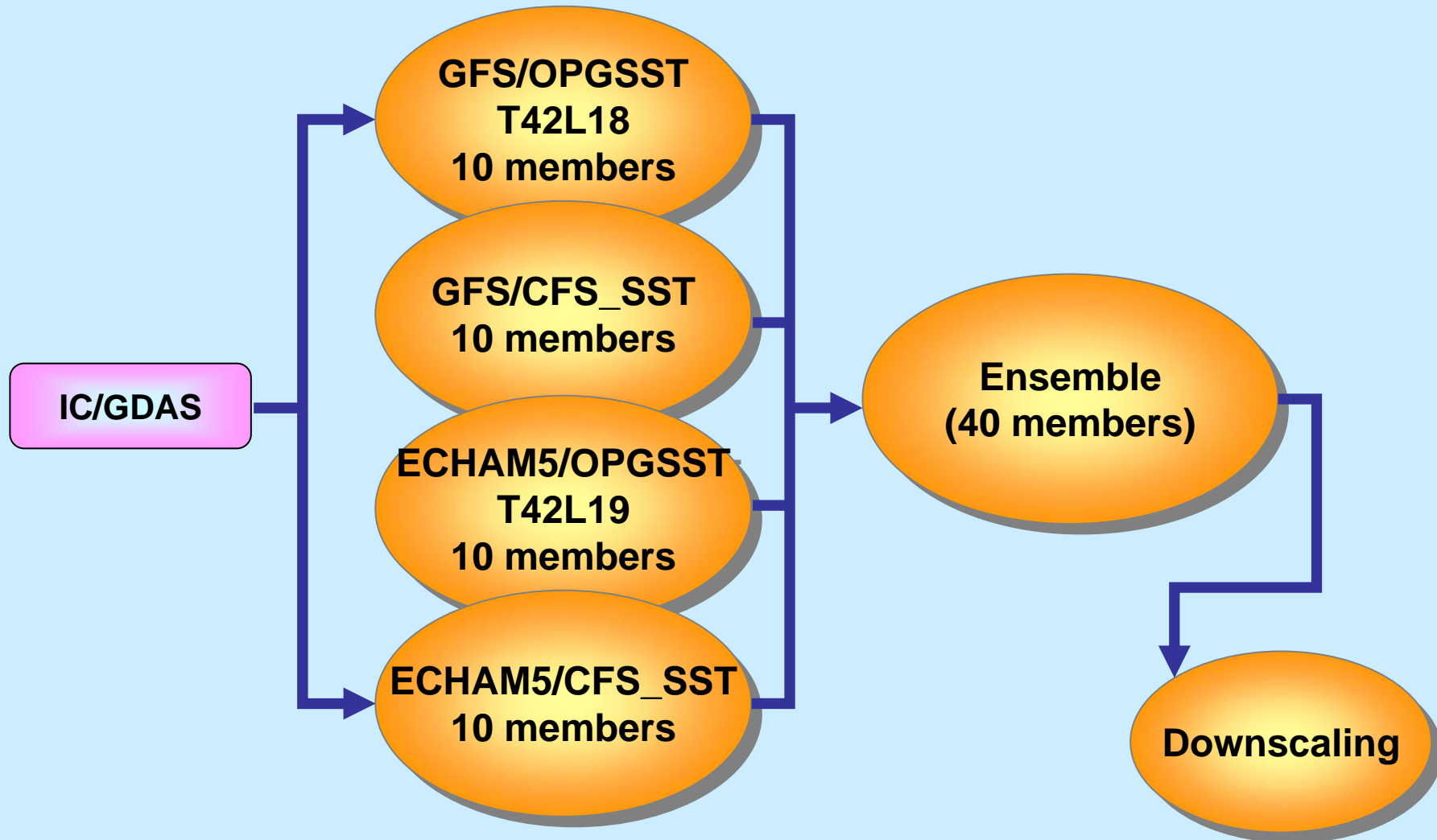


Pre-processing





Two-tier Dynamical Forecast



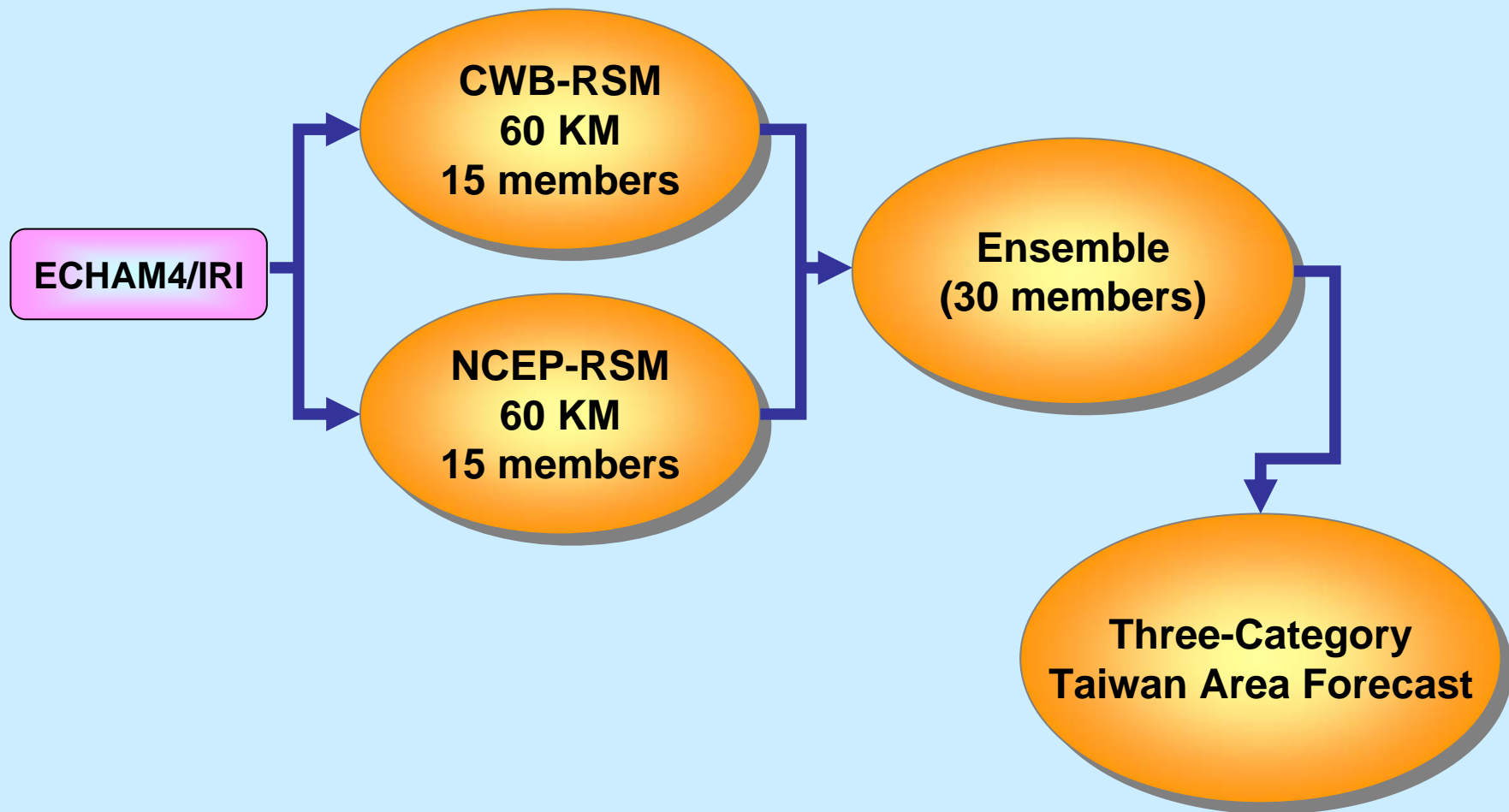


Statistical Downscaling System

- Target variables are station rainfall and temperature in Taiwan,
- Searching larger scale predictors and their domains through correlation analyses,
- Filtering out small scale noises using EOF by retaining the first 15 modes for both the observation and the model output,
- Correcting the model anomaly bias through the SVD-based coupled pattern method,
- Projecting Taiwan station variables into the model coupled patterns to construct a statistical downscaling model using SVD,
- Forecasting station variables with large-scale predictors,
- Ensemble of multi predictor forecasts with historical hit rates as a weighting.



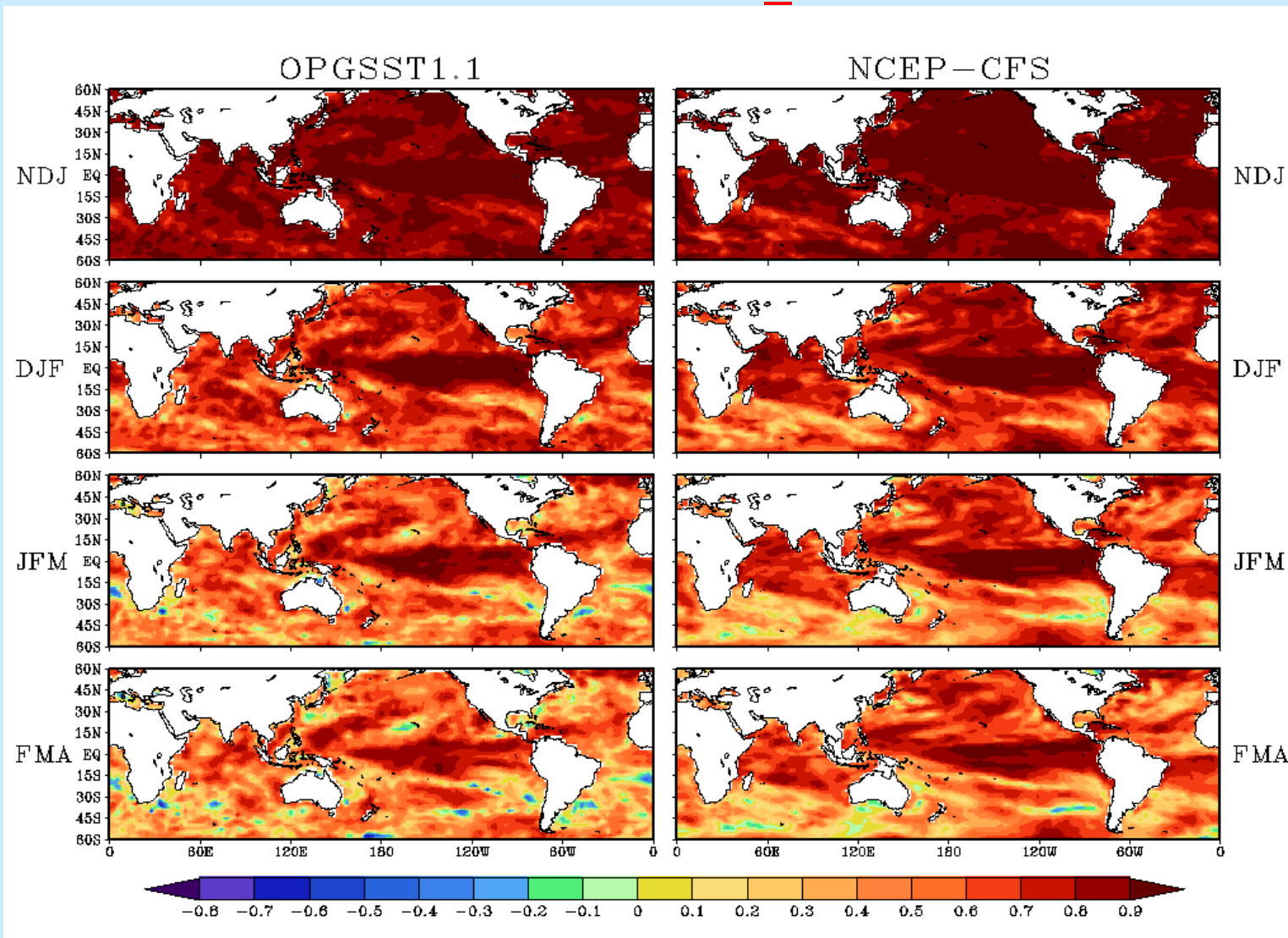
Dynamical Downscaling





Forecast skill (1981-2003)

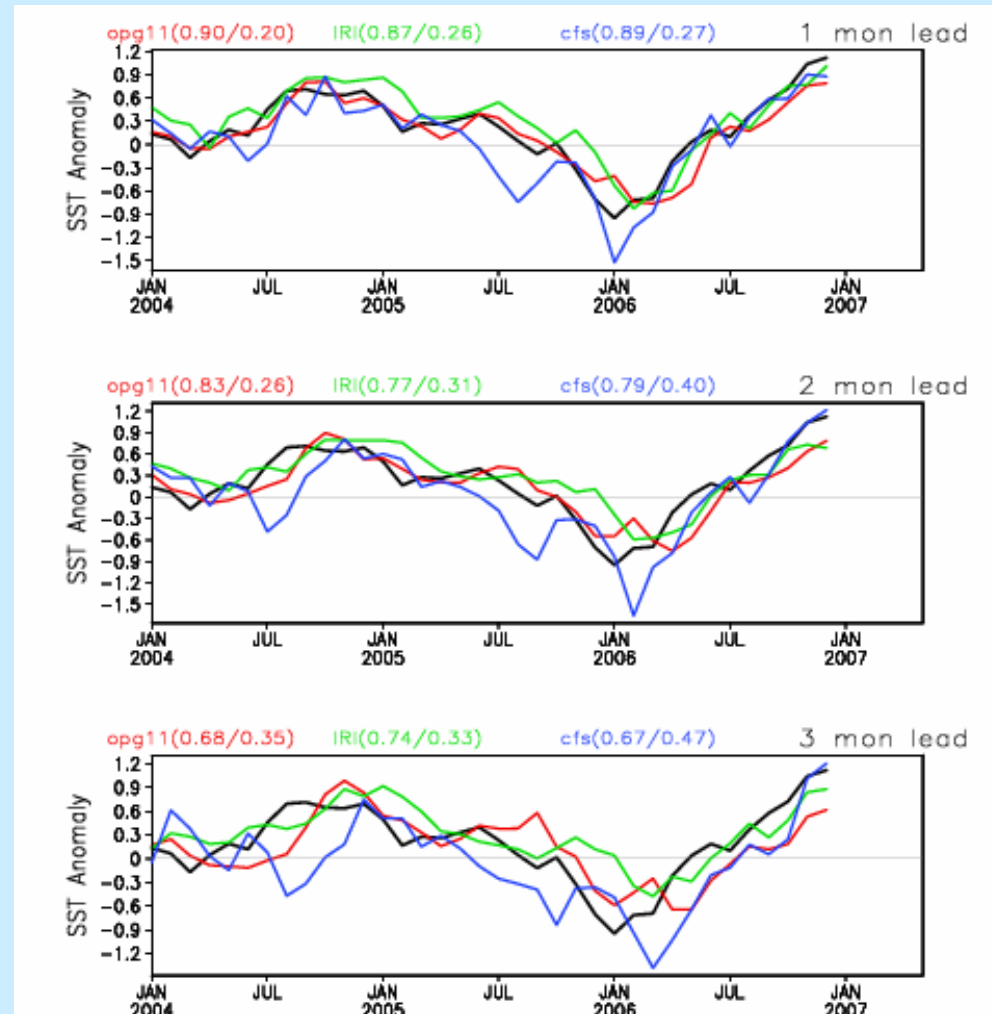
OPGSST vs. CFS_SST



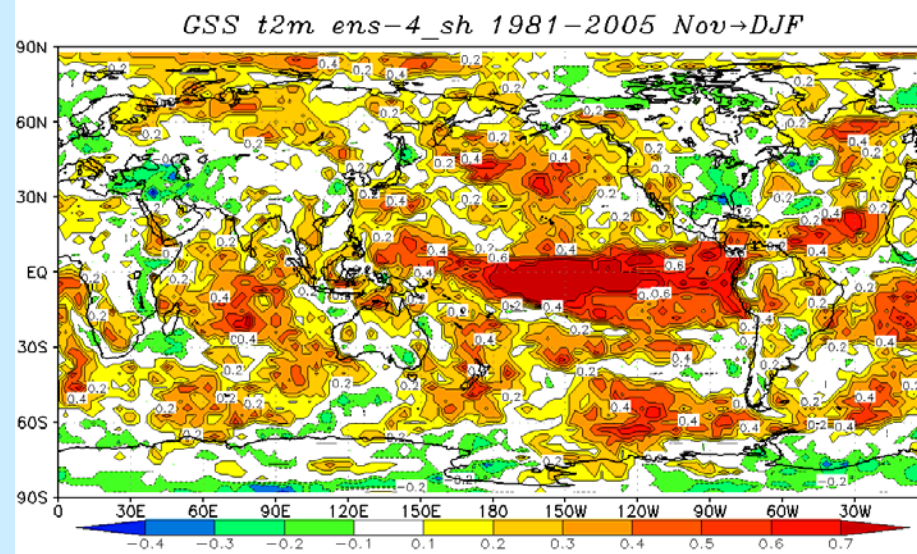
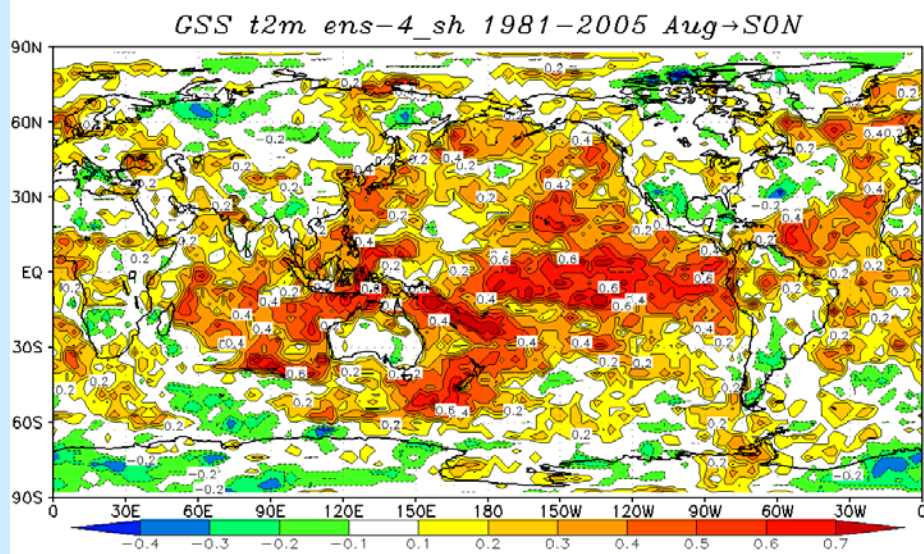
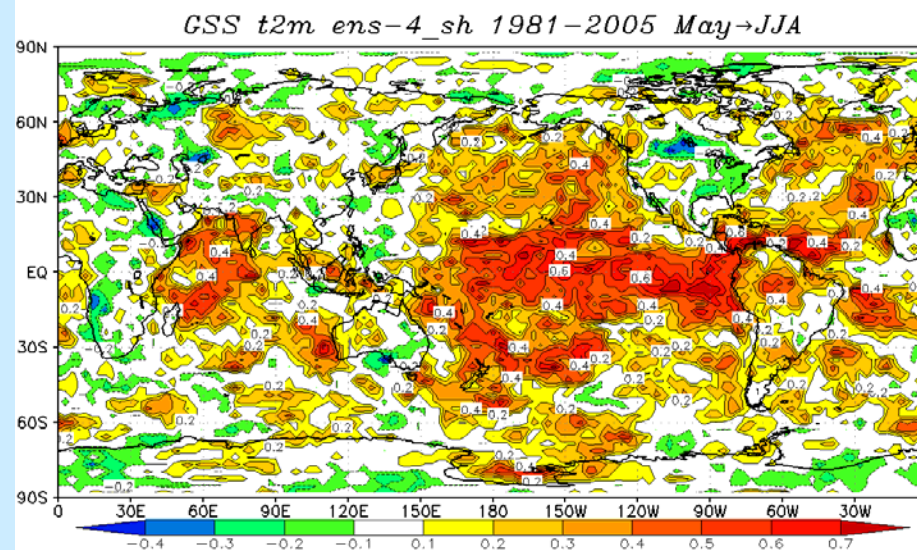
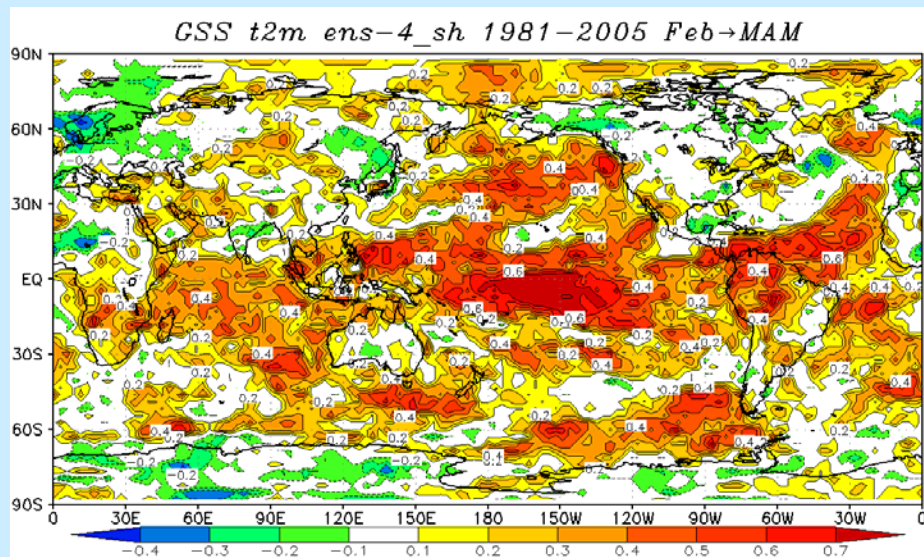


Forecast temporal correlation/RMS

OPGSST vs. IRI vs. CFS_SST
NINO3



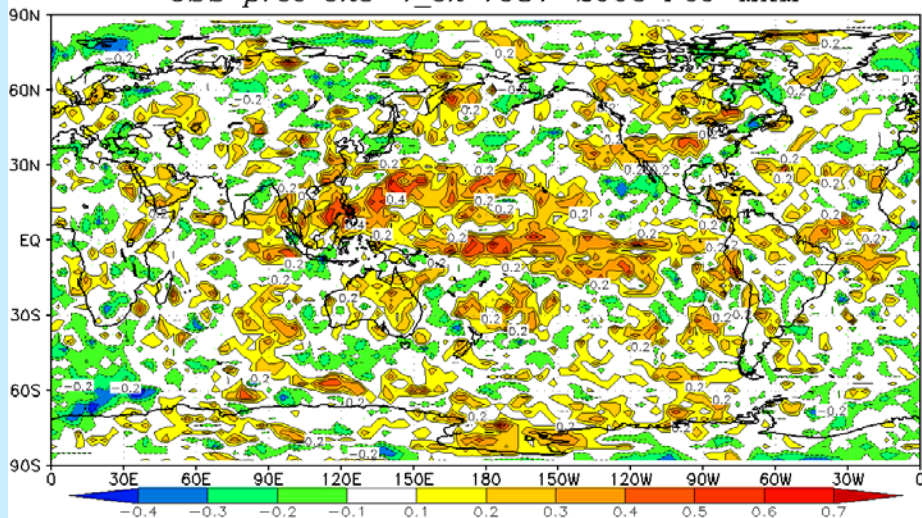
Two-tier Gerrity Skill Score (GSS) (T_{2M})



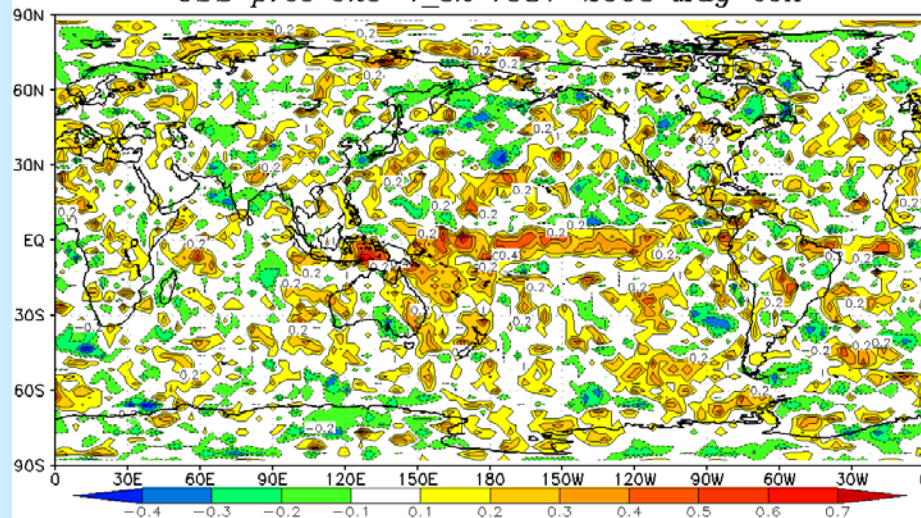


Two-tier GSS (Prec.)

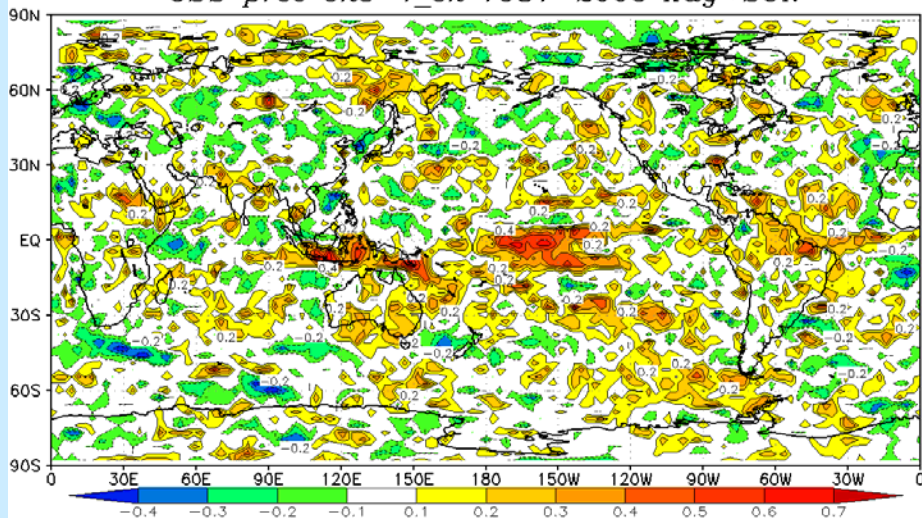
GSS prec ens-4_sh 1981-2005 Feb→MAM



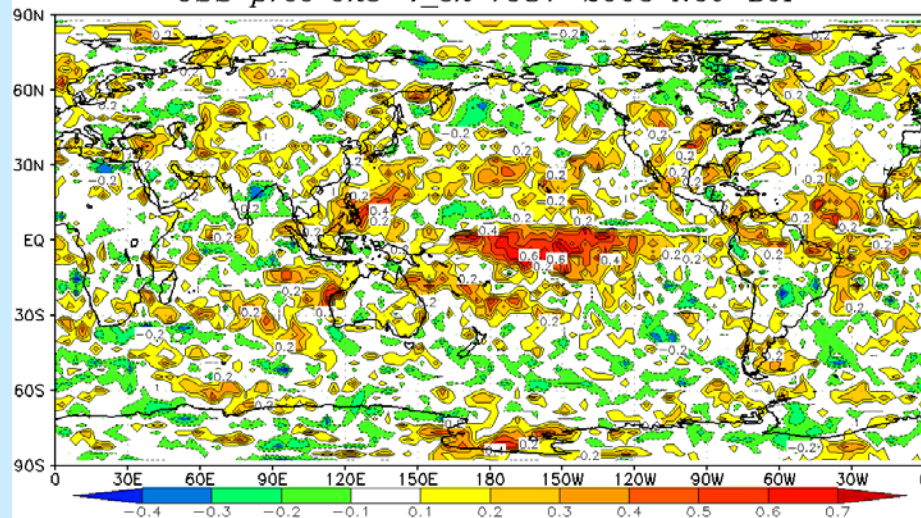
GSS prec ens-4_sh 1981-2005 May→JJA



GSS prec ens-4_sh 1981-2005 Aug→SON



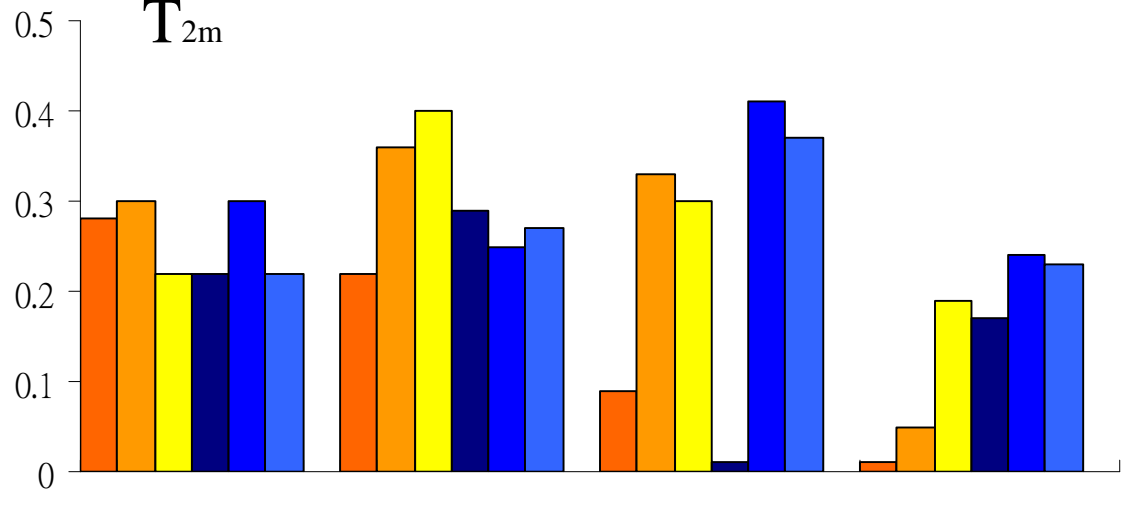
GSS prec ens-4_sh 1981-2005 Nov→DJF





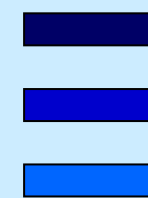
Taiwan 9 stations forecast skill (1981-2005)

T_{2m}



GFS

ECHAM



AGCM interpolation
 Stati. Downscaling 1
 Stati. Downscaling 2

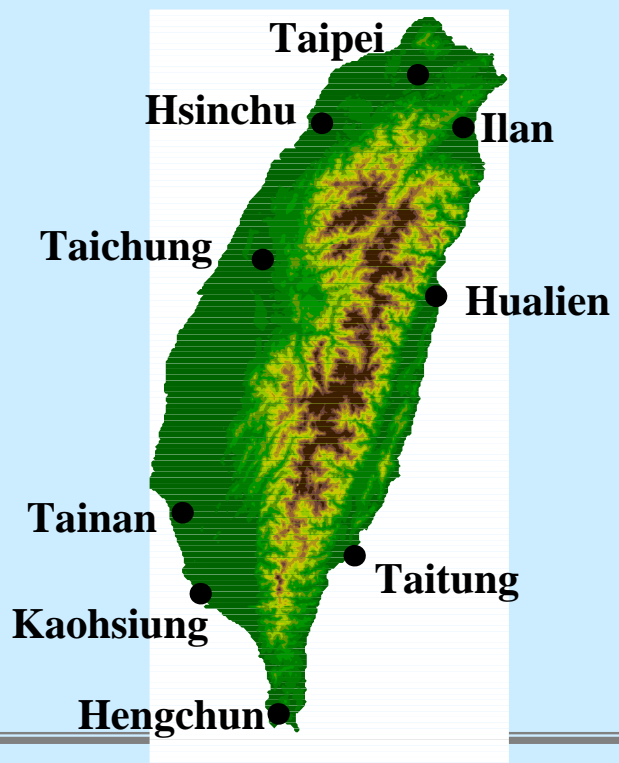
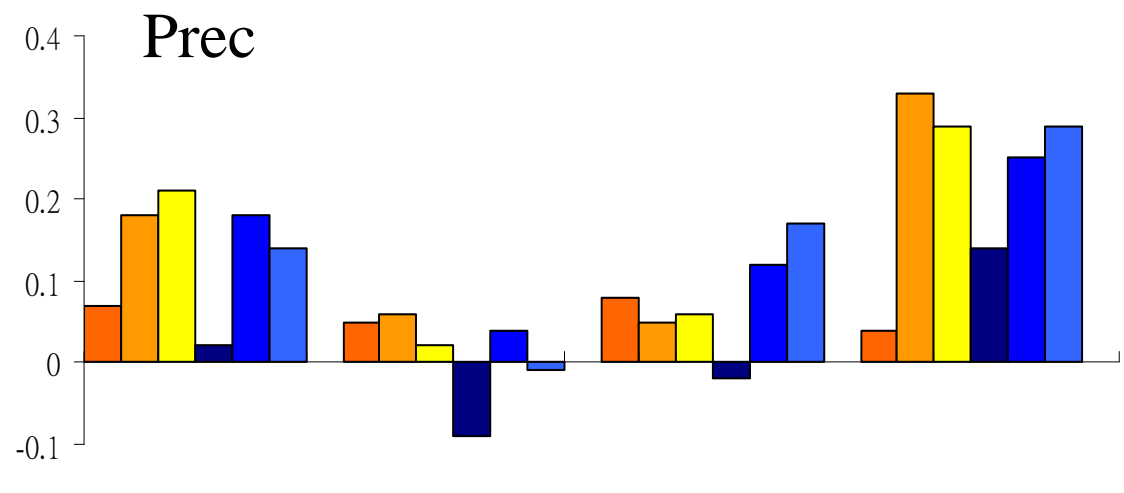
FMA

MJ

JAS

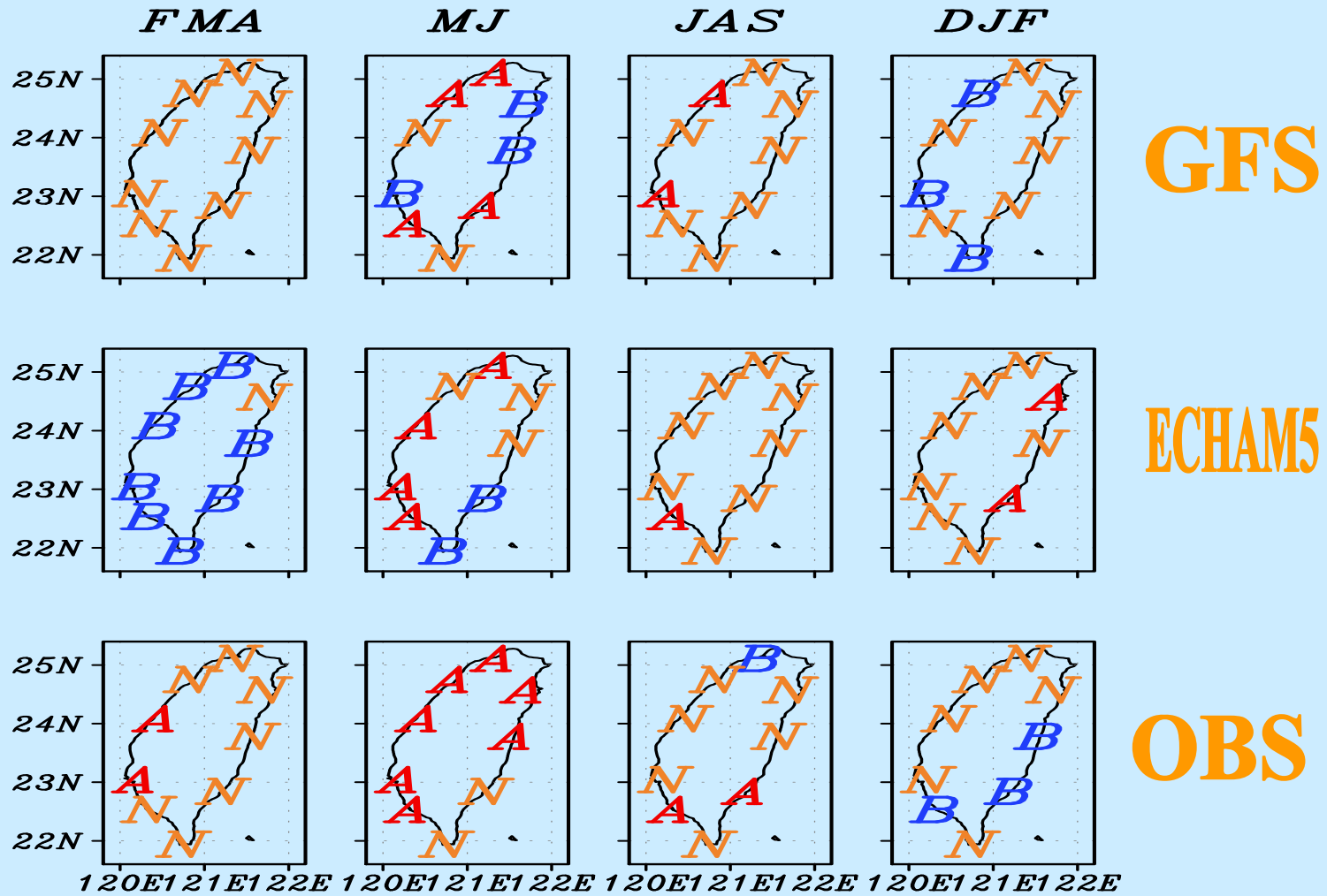
DJF

Prec





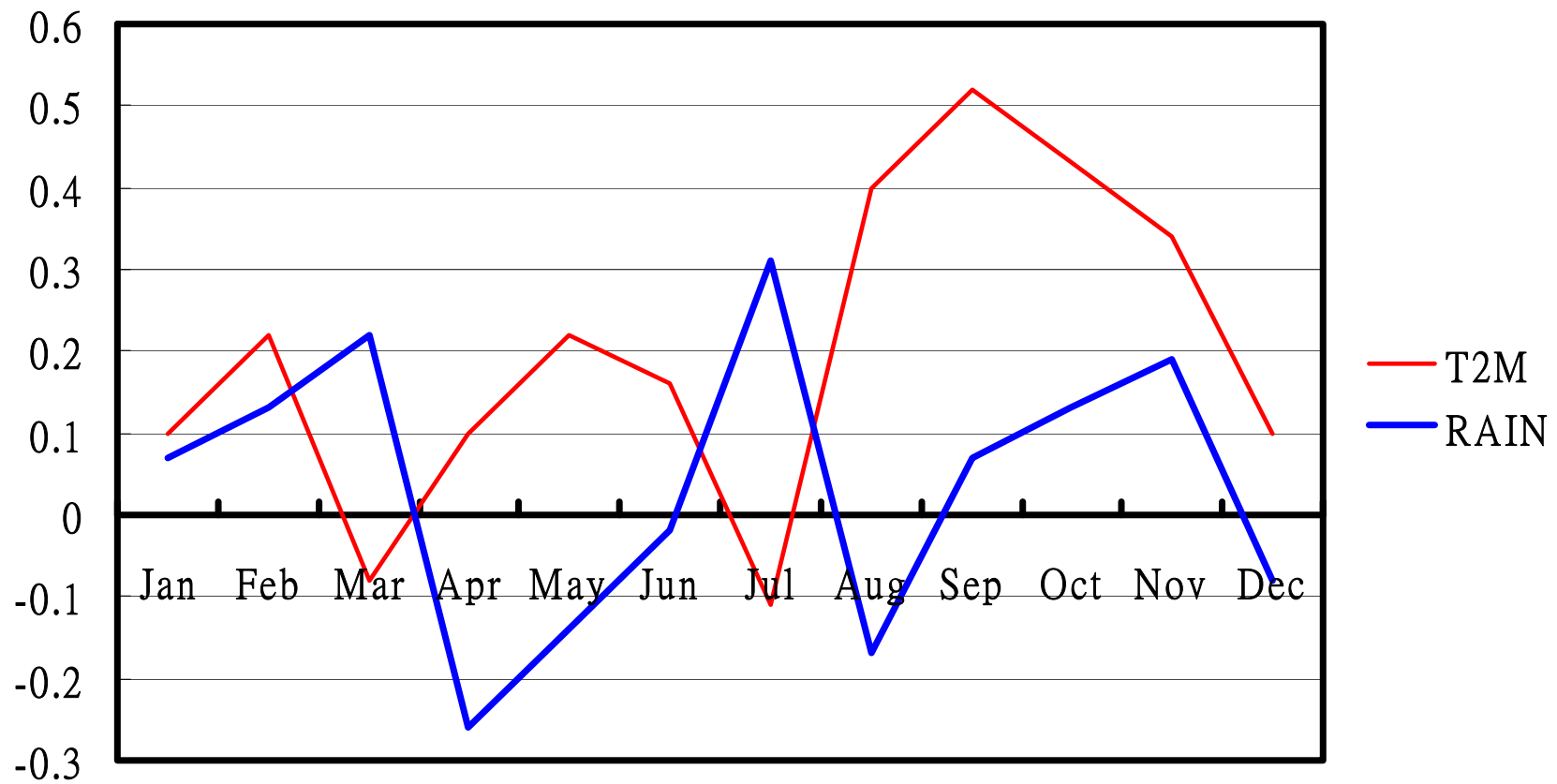
2006 forecast (Prec.)





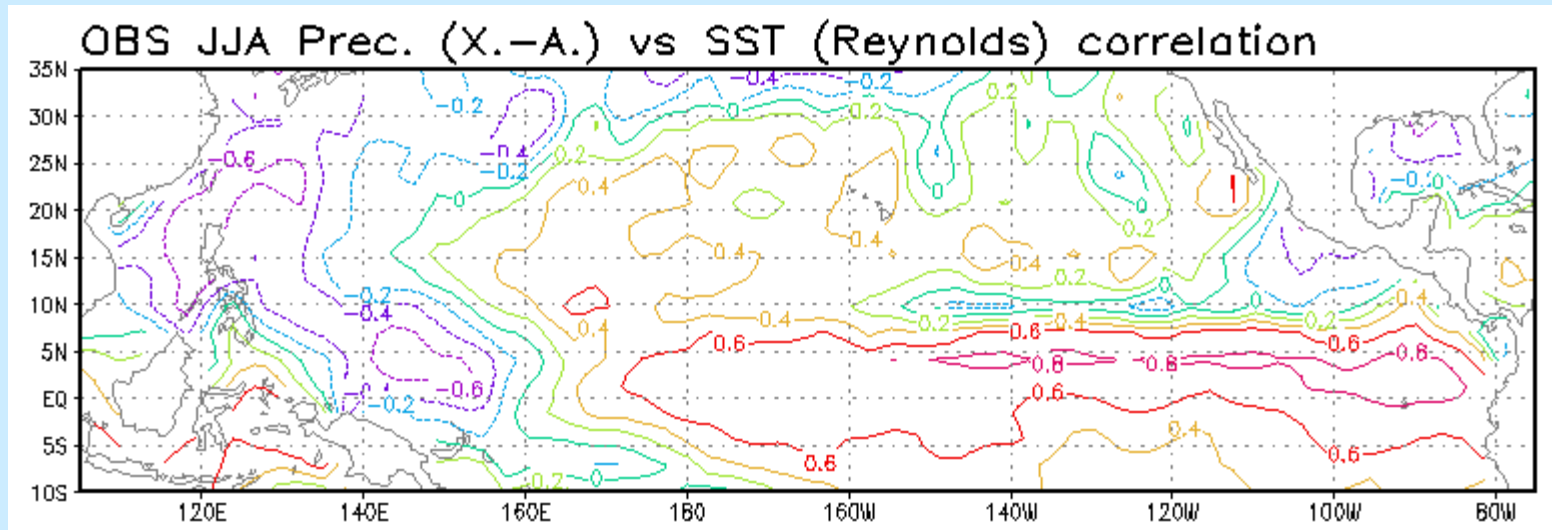
Dynamical Downscaling

Heidke Score by G2NCEPRSM 2006
5 months average (lead)





OBS Temporal Correlation

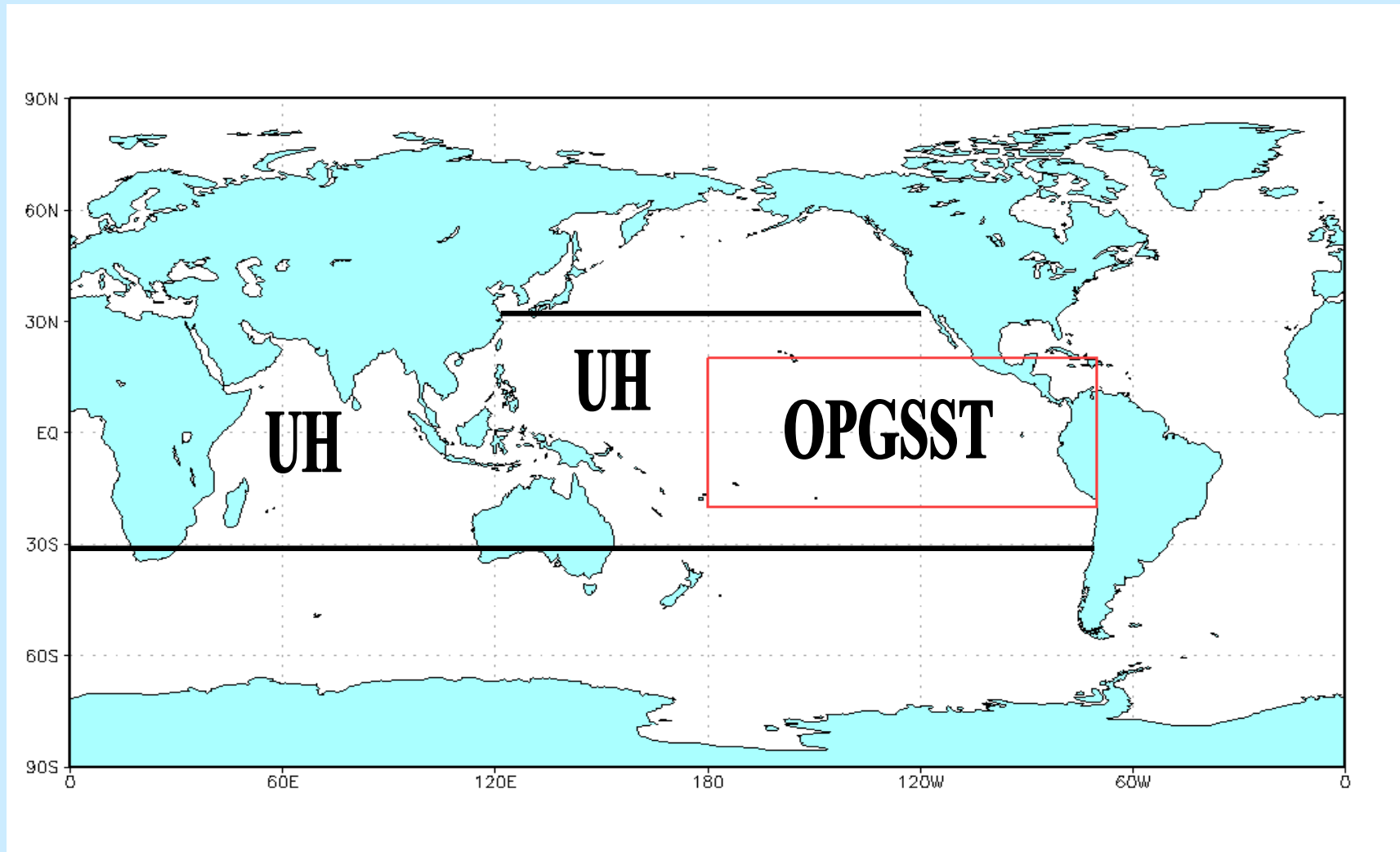


- **Nino 3 region: positive correlation** represents the warm SSTA leads to enhanced rainfall → **Ocean primarily drives atmosphere**
 - **WNP region: negative correlation** represents the enhanced rainfall leads to cold SSTA → **Atmosphere primarily drives ocean**
- **Regional one-tier system is required** in WNP to better represent the two way interaction nature in the region



Regional One-tier System

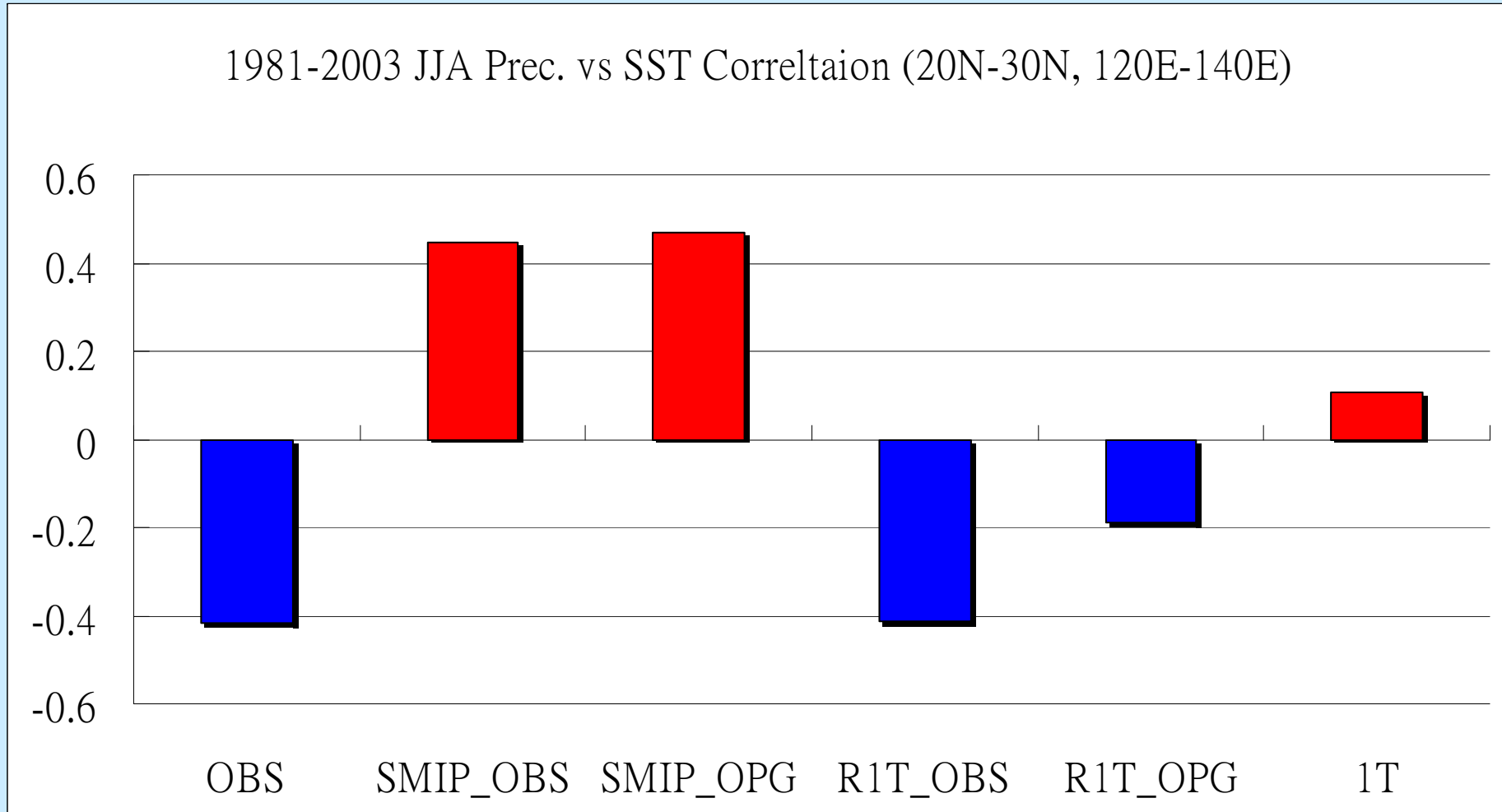
Global AGCM coupled to UH 2.5-layer ocean model





Temporal Correlation

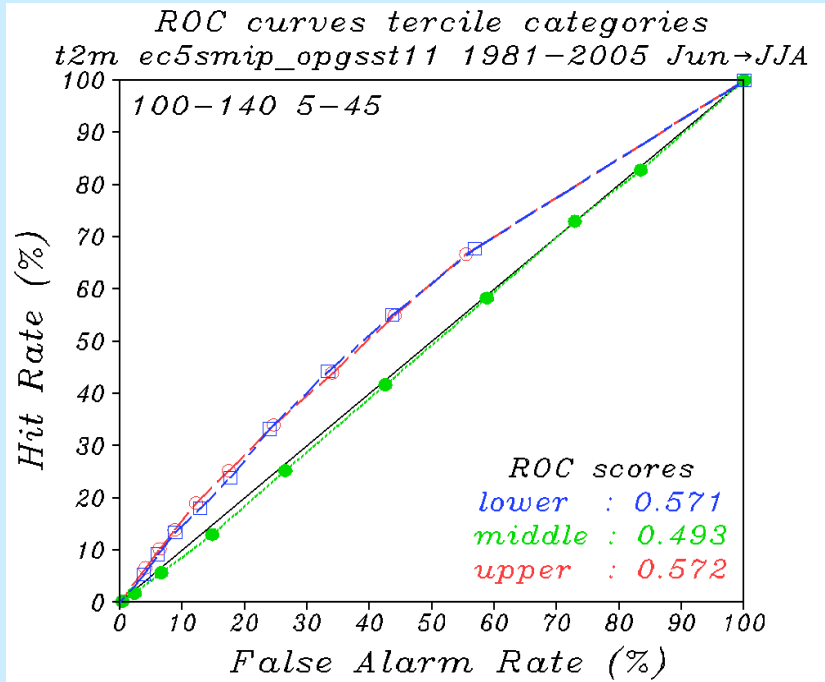
two-tier vs. regional one-tier model



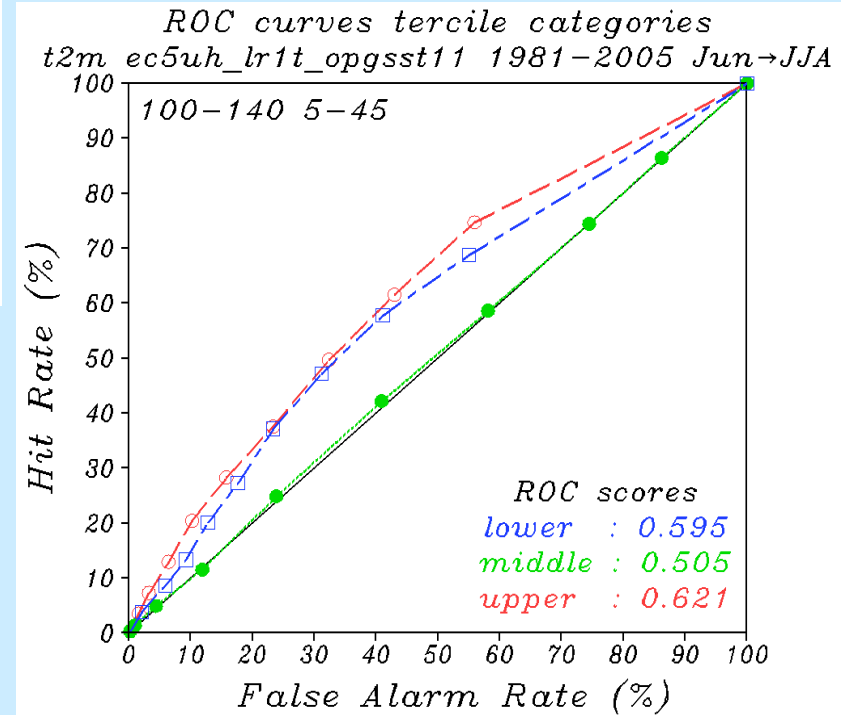


ROC

2-tier



regional 1-tier





Summary

- The first generation CWB seasonal forecast system has been developed and will be operational in 2008.
- There are five major components in the seasonal forecast system: 1) **Optimized Global Sea Surface Temperature (OPGSST) Forecast System**, 2) Pre-processing System, 3) **Two-tier Dynamical Forecast System**, 4) **Statistical Downscaling System**, and 5) **Dynamical Downscaling System**.
- 25-year hindcast forecasts have been completed.
- A preliminary analysis shows a reasonable skill in a 3-month lead.
- A **regional one-tier** forecast system is under investigation. Local precipitation and SST relationship in NWP has been improved.
- CWB will contribute to **APCC probabilistic (MME) forecasts** by delivering our model forecast products.