An analysis of CFS SST errors in the tropical Pacific

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- Cold bias in the equatorial Pacific
- Warm Bias in Southeastern Pacific
• Warm bias starts from coastal areas and spreads steadily toward NW;

• After 8 months, warm bias is very similar to its balanced condition in CFS CMIP simulations
CFS 4-mo lead monthly SST error (K)
- Too large amplitude in most of the tropical Pacific
- Too small amplitude in eastern equatorial and southern Pacific
Nino SSTs from CFS hindcast

Bias

Correlation

STDV obs

STDV fcst
Possible causes of SST errors

- Excessive solar radiation
- Surface wind
- SST-radiation feedback
- Vertical mixing
- ......
Impacts of excessive solar radiation

- Warm SST bias over the SEP is reduced by about half
- The equatorial eastern Pacific is cooled by about 0.5 K
Mean surface wind (m/s)

- Wind direction near the coast is less parallel to the coast

- Wind speed too strong around the equator
- Too strong negative feedback or too weak positive feedback in SEP in GFS and CFS
- Too weak positive feedback in SEP in CFS
Subsurface temperature bias

- (20S, 85W): warm bias in the upper Ocean
- (0S, 110W): cold (warm) bias above (below) 55 m

Different processes are involved in the formation of temperature errors at the two locations.
Summary

- SST mean bias are related to errors in both surface radiation flux and winds.

- The too weak SST variability in the SEP may be due to local weak SST-radiation feedback.

- Vertical distribution of subsurface temperature errors indicates that different processes are involved in the formation of temperature errors in the equatorial Pacific and SEP.