Discussion Period 4: Tropical-Extratropical Interaction

Speakers:
- William Lau: The 2010 Pakistan flood and Russia heat wave/wildfires
- Prashant Sardeshmukh: Predictability at the intersection of weather and climate
- David Reynolds: Pacific atmospheric rivers: Impacts on extreme rainfall, flooding, and water supplies

Posters:
- Kang: Decadal variations of tropical cyclone activity over western North Pacific in a warming environment
- Ashrit: Impact of DWR data assimilation on the high-res. prediction of an intense rainfall event over Delhi
- Hu: Mechanisms of poleward expansion of the Hadley circulation: Observations and Simulations
- Hong: Role of European blocking and tropical-extratropical interaction on the Pakistan flood in 2010
- Sun: Heat content variation in East China sea and its effect on humidity and heat transports into China
- Ryoo: A lagrangian trajectory model of atmospheric rivers over Pacific-North America during YOTC
- Chang: Anatomizing the ocean’s role in the Pacific Decadal Oscillation.
- Dong: The tropospheric biennial oscillation over east Asia and its effect on precipitation and circulation
- Guan: Does the MJO influence wintertime atmospheric rivers and precipitation in California?
- Liu: Relationship between the Mei-Yu over the Yangtze basin and tropical cyclogenesis over west Pacific
- Jiang: An A-train view of the atmospheric response to El Ninio
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**Posters**

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Some issues to consider

1. Limited Predictability (of heat waves, floods, Atmospheric rivers)

2. Will ultra-high model resolution heal everything?

3. Importance of coupling?
Observed trends

Simulated in **COUPLED** IPCC/AR4 models with prescribed observed radiative forcings

Simulated in **UNCOUPL ED** atmospheric GCMs with prescribed GLOBAL SSTs, but no explicitly specified radiative forcings (GOGA runs)

Simulated in **UNCOUPL ED** atmospheric GCMs with prescribed TROPICAL SSTs, but no explicitly specified radiative forcings (TOGA runs)
**Trends of annual-mean Tropical SSTs over 1951-1999**

**OBSERVED TREND**
(average of 3 datasets)

**SIMULATED TREND**
(average of 76 coupled IPCC/AR4 simulations)

**Fidelity of all 76 simulated SST trend fields**

- p.d.f. of area-mean trends
- Including area-mean trends
- Excluding area-mean trends

Multi-model Ensemble Mean
\[ L_{23} = \text{Effect of Region 3 on Region 2} \]

The 8 x 8 Tropical SST Feedback Matrix \( L \)

Model Mean □ OBS
1. Coupled climate models have difficulty in capturing regional climate trends around the globe because of their difficulty in capturing the *spatial variation* of tropical SST trends.

2. The spatial pattern of the recent observed 50-yr tropical SST trend is not consistent with the radiatively forced multi-model mean trend in the IPCC/AR4 simulations.

3. The discrepancy is not just due to natural variability or climate noise but is also, very substantially, due to tropical modeling errors.

Two relevant papers:
Shin and Sardeshmukh *Climate Dynamics* 2010
Shin, Sardeshmukh, and Pegion *JGR-Atmospheres* 2010
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Prashant Sardeshmukh
Climate Diagnostics Center, CIRES, University of Colorado
And Physical Sciences Division / ESRL / NOAA
Boulder, Colorado