Spatial Patterns of Global Precipitation Variability and Change during 1901-2010

Guojun Gu and Robert F. Adler

Objectives:

- Quantify and compare precipitation variations/changes on interannual-to-decadal/interdecadal-to-trend scales using observations and model outputs;

- Examine/discriminate the effects of anthropogenic forcings [greenhouse-gases (GHG), aerosols] and internal variations/modes [El Nino-Southern Oscillation (ENSO), Pacific Decadal Oscillation (PDO), Atlantic Multidecadal Oscillation (AMO)];

- Assess the capabilities of climate models (CMIP5/AMIP5 and reanalysis products) in simulating forced responses and reproducing observed precipitation variability and change

Observations and Model Outputs:

- GPCC full data reanalysis of monthly land precipitation (1901-2010);
- NOAA/CICS-Smith reconstructed monthly (land+ocean) precipitation (1900-2008);
- CMIP5 historical simulations (full radiative forcings, GHG-forcing only, natural forcing only)
- AMIP5 simulations (forced by observed SST & sea ice extent, and full historical radiative forcings)
- GPCP monthly (land+ocean) precipitation analysis for the satellite era (1979-present)
For both ENSO and PDO,
  
  ➢ Consistency over land, though with differences in intensity;
  
  ➢ Differences in spatial structures over tropical ocean.
Potential collaborations:

Evaluate models’ capabilities of simulating and predicting global precipitation variations on the longer-than-seasonal time scales using satellite and gauge based precipitation measurements. This will primarily be based on examining and identifying the variations related to internal physical modes, including (various flavors of) ENSO, PDO, AMO, etc, and also on assessing and identifying the likely effects of anthropogenic factors (GHG and aerosols).