

C20C Project on Precipitation of the 20th Century

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1. Background

The discussion addressed three aspects associated with the simulation of observed precipitation during the 20th Century:

- 1) Validation of precipitation simulation in the C20C models;
- 2) Improvement of observational datasets; and
- 3) Enhanced understanding of climate variability and change during the 20th Century.

Since existing models and observations are relatively limited in skill and accuracy, it was agreed that the planned effort should focus on large spatial scales and long time scales. Datasets to be used include the modern global precipitation analyses that begin in 1979, GPCP (Global Precipitation Climatology Project; see Adler et al., 2003) and CMAP (Climate Prediction Center Merged Analysis of Precipitation; see Xie and Arkin, 1997) and the 20th Century reconstruction of precipitation produced by Smith et al. (2010). The spatial resolutions of the datasets are 2.5° latitude/longitude (GPCP and CMAP) and 5° (reconstruction); all offer monthly temporal resolution. Existing C20C model runs are adequate for initial comparisons. A critical challenge will be the development of a standard set of metrics and protocols that will ensure concrete and meaningful evaluations.

2. Proposed analyses

This project aims at comparing model simulations of large-scale properties of precipitation against observations. Aspects to be evaluated include:

- 1) the simulated global mean and the long-term mean annual cycle over large domains (global, hemispheric, land/ocean, continental) and changes over the Century;
- 2) the simulation of precipitation features associated with large-scale coherent modes of climate variability, include the El Niño/Southern Oscillation (ENSO), the North Atlantic/Arctic Oscillation, the Pacific Decadal Oscillation, the Atlantic Multi-Decadal Oscillation, and others; and
- 3) the relationship of the features to be evaluated to observed atmospheric and sea surface temperature variations.

Approximately 15 models simulations are available for these analyses. The precipitation anomaly simulations from these runs will be compared against the 20th Century reconstructed precipitation anomalies over the full period from 1900-2000 or later. GPCP and CMAP will be used for more detailed examination of the mean annual cycle on a regional basis and where greater spatial detail is required. Three periods are particularly relevant, mainly due to the various atmospheric reanalyses available, beginning in 1979, 1950 and 1900.

3. Timetable

The initial set of analyses is expected to be completed during mid-2011, leading to at least one manuscript describing results that would be submitted for publication by the end of the year. The most crucial objective of the initial analyses would be establishing the accuracy of the various models with respect to large-scale precipitation variations so as to provide means for assessing the likely validity of projections of precipitation variations during the 21st Century. Further analyses will be required to address the CMIP5 results and to examine specific details.

4. References

- Adler, R. F., and Coauthors, 2003: The version-2 Global Precipitation Climatology Project (GPCP) monthly precipitation analysis (1979–present). *J. Hydrometeor.*, **4**, 1147–1167.
- Smith, T.M., Arkin, P.A., Sapiano, M.R.P., and C.-Y. Chang, 2010: Merged statistical analyses of historical monthly precipitation anomalies beginning 1900. *J. Climate*, **23**, 5755-5770.
- Xie, P., and P. A. Arkin, 1997: Global precipitation: A 17-year monthly analysis based on gauge observations, satellite estimates, and numerical model outputs. *Bull. Amer. Meteor. Soc.*, **78**, 2539–2558.