Observed Global Precipitation Variability during the 20th Century

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Global precipitation analyses that include land and ocean derived from a combination of rain gauge observations and satellite-derived estimates have been available for some time. Our group at the Cooperative Institute for Climate and Satellites (CICS/ESSIC/UMCP) has created a statistical reconstruction of 20th Century near-global land and ocean precipitation based on the modern precipitation analyses together with historical rain gauge observations and historical analyses of both sea surface temperature and sea level pressure. The resulting analyses contain monthly anomalies relative to the climatology of the 1979 – 2008 base period between 75°N – 75°S on a 5° grid beginning 1900. Averages over ocean areas and all areas indicate increasing precipitation through the 20th Century as global temperatures warm, consistent with theoretical and model estimates. The largest increases are over the tropical oceans. Preliminary evaluations indicate that the reconstruction gives a reasonable estimate of oceanic historical variations in the period before satellites were available. However, more evaluations are needed to better understand the historical variations and improve the reconstruction. We hope that this historical reconstruction may be used with dynamic model precipitation estimates of 20th century precipitation variations to give an improved understanding of changes in the global hydrological cycle over this period. Additional precipitation observations and other observations are also needed to improve the dataset. The reconstruction data and additional documentation are available at: http://cics.umd.edu/~tsmith/recpr/.