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Bias-Corrected CMORPH: A 13-Year Analysis of High-Resolution Global Precipitation

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A high-resolution global precipitation data set has been constructed for a 13-year period from 1998 to the present through backward extending the CMORPH satellite estimates and correcting the CMORPH over both land and ocean. While widely used in meteorology, hydrology and many other fields, the CMORPH was available only for a period from December 2002. As a first step of this project, we collected data from satellite observation data from all available passive microwave (PMW) instruments aboard low earth orbits and infrared (IR) sensors on geostationary platforms. Satellite-based precipitation estimates are then produced through propagating the instantaneous PMW estimates along the cloud motion vectors computed from the geostationary IR imagines using the current operational version of the CMORPH. The backward extended CMORPH is generated on an 8kmx8km and 30-min resolution, identical to those in the operational CMORPH for late periods.

Bias correction is then performed for the original CMORPH over the entire data period from 1998 to the present. Special attention has been paid in the development of this products suite to ensure quantitative consistency of this high-resolution but relatively short precipitation analysis with long-term climate record. To this end, the original CMORPH satellite estimates are adjusted against two sets of widely used long-term data sets, the CPC unified gauge analysis over land and the pentad GPCP over ocean, respectively. This is done by matching the PDF of the CMORPH estimates with the daily gauge analysis over land and with the pentad GPCP analysis over ocean. The correction coefficients are applied to remove the bias in the CMORPH at its original resolution of 8Km/30-min to construct a bias-corrected analysis of precipitation on an 8kmx8km grid over the globe from 60oS-60oN and in a 30-min interval over a 13-year period from 1998 to the present.

The 13-year global high-resolution precipitation analysis is applied to examine the diurnal cycle of precipitation and how it is captured by several global models. Detailed results will be reported at the conference.