Retrospective Processing for the Second Generation CMORPH: Experiments for the Pilot Period

Pingping Xie, Shaorong Wu, Bert Katz, and Robert Joyce
NOAA Climate Prediction Center

Abstract

Retrospective processing for the second generation CMORPH (CMORPH2) is under way. CMORPH2 is defined through integrating rainfall and snowfall rate retrievals from passive microwave (PMW) measurements aboard all available low earth orbit (LEO) satellites, precipitation estimates derived from infrared (IR) observations of geostationary (GEO) and LEO platforms, and model precipitation forecast from the NCEP operational global forecast system (GFS). CMORPH2 precipitation estimates are constructed in a 30-minute interval and on a 0.05^{o}lat/lon grid over the entire globe from pole to pole. Bias in this purely satellite based precipitation estimates (raw CMORPH) is then removed through calibration against CPC daily gauge analysis over land and against the GPCP merged analysis (of reasonable long-term homogeneity but of much coarser time/space resolution) over ocean.

Our goal for the CMORPH2 retrospective processing is to generate a climate data record (CDR) of satellite-based global precipitation estimates for a 30-year period from 1991 to the present. As a first step, retrospective processing is performed for a pilot period from April 2017 to the present to discover and solve any issues in the retrospective processing and to examine the quantitative accuracy of the new product. Preliminary comparison results against several independent ground observation data sets showed great improvements of the CMORPH2 in representing precipitation and its variations over various global regions. Overall, correlation between CMORPH2 and ground observations of high quality (e.g. the MRMS radar data over CONUS) may reach to higher than 0.8 for daily precipitation averaged over a 0.25^{o}lat/lon grid box. In particular, representation of cold season precipitation, including the snowfall, is substantially enhanced compared to the first generation CMORPH. Extreme precipitation events are well detected however with a tendency of under-estimating peak rainfall intensity. Performance of CMORPH2 in quantifying orographic rainfall, however, needs to be improved. At the IPWG workshop, detailed evaluation results and up-to-date progress will be reported.