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Merging Satellites, Models and Gauges to Obtain New Precipitation Estimates

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The most frequently used merged satellite/gauge global analyses of precipitation are the Global Precipitation Climatology Project (GPCP) analysis and the CPC Merged Analysis of Precipitation (CMAP). The multi-source nature of these datasets allows them to use the best data available to produce the most accurate estimate of precipitation for any given place and time. However, the quality of these datasets is reduced over mid- and high-latitude oceans where satellite estimates are of lower quality. Additionally, discontinuities, artifacts and inhomogeneities can be introduced by the use of time-varying inputs, which can impact the suitability of these datasets for investigation of long-term changes in global precipitation.

The Multi-Source Analysis of Precipitation (MSAP) is a new global analysis of precipitation using Optimum Interpolation (OI) which naturally yields errors associated with the analysis that are needed for many applications. The initial version of the dataset uses the relatively long, consistent precipitation record ($\tilde{2}$0 years) from the Defense Meteorological Satellite Program (DMSP) Special Sensor Microwave/Imager (SSM/I) and forecast precipitation from the ERA-40 reanalysis. However, other inputs can be used to extend the record including the JRA-25 reanalysis, other satellite inputs (such as IR data) and gauge analyses. We will show some examples of MSAP including validation results of the SSM/I+ERA-40 analysis and an inter-comparison of several other "flavors" of MSAP using different combinations of other datasets. We will also discuss prospects for further improvements with the imminent release of the ERA Interim reanalysis product, NASA's Modern Era Retrospective Reanalysis (MERRA) and NOAA's Coupled Forecast System Reanalysis/Reforecast (CFSRR).