An OI-based Analysis of Global Daily Precipitation: Preliminary Results

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A new algorithm is developed to construct analyses of global daily precipitation by merging gauge observations and estimates derived from satellite observations of IR, TOVS, SSM/I and AMSU-B. A 3-step approach is applied to reduce the bias and random error inherent in the individual input data sources. First, bias correction is conducted for each set of satellite estimates. This is done by defining an OI-based analysis of the bias field for each of the satellite estimates by comparing them with a ›reference‹ field over an accumulated period. The ›reference‹ field is the GPCP analysis of pentad precipitation over global oceanic areas, while over global land areas it is the gauge observations of daily precipitation collected from GTS and GDCN. The second step of the algorithm combines the bias-corrected individual satellite estimates to reduce the random error through the OI, in which the weighting coefficients are defined based on the covariance structure of the individual satellite estimates. The combined satellite estimates (output of the second step) are finally merged with the gauge observations over regions where the ending time of the daily gauge observations matches that of the satellite estimates. In this step, the influence distance of the gauge observations is set as a varying function of their spatial representativeness. Further work is underway to test and improve the prototype algorithm and to produce a test product of daily precipitation. Our preliminary results showed that the OI-algorithm presents superior performance in generating precipitation estimates with stable quality over oceans, while over land spatial distribution of precipitation over mountainous areas is better represented by including gauge observations from dense networks. Detailed results and examples of the daily analyses will be presented at the workshop.