Monthly oceanic rainfall based on METH techniques: DMSP SSM/I V6 and SSMIS continuity

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As part of the Global Precipitation Climatology Project (GPCP), our group have been producing oceanic rainfall over 2.5 and 5 degree boxes by applying the Microwave Emission brightness Temperature (Tb) Histogram, or METH technique to the Special Sensor Microwave Imager (SSM/I) data taken on board the Defense Meteorological Satellite Program (DMSP) satellite series. Recently, the rainfall series have been updated using the V6 SSM/I provided by RSS (Chiu and Chokngamwong., 2010). With the demise of the F15 SSM/I sensor, we examine the use of the SSMIS series to continue the DMSP time series. With its long duration, the DMSP satellite sensors constitute a unique data set capable of producing microwave-based products for climate studies. We compared the F13 SSM/I and F17 SSMIS for the period January 2008 – September 2009. The METH technique matches the histogram of Tb (twice 19V minus 22V) to a mixed-distribution of rain rates and estimates the parameters of the rain rate distribution. Mathematical convergence of the matching procedure is reached when a certain Chi-square threshold is reached. The important parameters are the Tb of the non-raining pixels (To) and the freezing level (FL) of the grid box considered. The sample size of the SSMIS is much larger than the SSM/I, hence the convergence criteria is relaxed by changing the Chi-square threshold. Preliminary results show a slight shift of the To ($\sim$0.8K). By adjusting To by a constant, the domain average SSMIS rain rates and FL are computed to within 2% and 1% of the SSM/I rain rates, respectively. Further investigation of the SSMIS METH rain rate will involve the comparison of the 19V and 22V and fine tuning the Chi-square parameter.

References: Chiu and Chokngamwong, 2010, J.Appl. Met. Clim, 49, 115-123;