Cloud-Rain Characterization in AWS, TRMM and METEOSAT Measurements during Indian Summer Monsoon Season

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An attempt has been made here to estimate quantitatively the rainfall associated with deep cloud systems of monsoon over the Indian land region during 2008-2009 using ground based rainfall measurements from meso-network of Automated Weather Systems (AWS) established under PRWONAM programme in comparison with TRMM 3B42 precipitation measurements. Sky conditions have been segregated in to clear sky (BRT >290 K) and deep cloud systems (BRT < 270) based on METEOSAT IR brightness temperatures.

First of all, a set of stations have been identified falling within respective TRMM grid for different parts of India, namely, Karnataka, Kerala and Andhra Pradesh regions to infer one-to-one correspondence in rain measurements between AWS and TRMM. Number of stations identified are six around Bangalore in Karnataka, seven around Cochin in Kerala and 3 around Sriharikota (SHAR) in Andhra Pradesh. Analysis of 3 hourly rainfall measurements for these three locations, Bangalore, Cochin and SHAR reveal that one-to-one correspondence existed for 72%, 73% and 68% of the time respectively between AWS and TRMM with no data points being minimal at 0.03 %, 0.08 % and 0.05 %. Correlation coefficients in rainfall between AWS and TRMM on daily and monthly time scales are found to be 0.6 (0.6) and 0.71 (0.87) for Bangalore (Cochin).

Further, it is inferred that percentage of Rainy hours alone based on AWS measurements are 7.85% (232 Hours) and 1.35 % (40 hours) respectively for Bangalore and SHAR out of 81 % (2397 hours out of 2952 Hours) and 76 % (2259 hours out of 2952 Hours) of available good data; whereas, Cloudy hours characterized by deep clouds alone and Clear sky hours turn out to be respectively 54.22 % and 8.48 % at Bangalore and 46. 53 % and 18.49% at SHAR. Note that sky conditions for BRT in range 270-290 are not considered, wherein, cirrus or low clouds would prevail. It is interesting to note that only 6.36% (1.08 %) of deep clouds rained at Bangalore (SHAR) although 41.86 % (32.2 %) of the time deep clouds prevailed. It is remarkable to note that much of rain has fallen from deep cloud systems at both Bangalore and SHAR. The fact that 35.5 % and 31.13 % of deep clouds did not rain at Bangalore and SHAR is indicative that a large fraction of

monsoon deep cloud systems are non precipitating. This analysis is being extended to other parts of Indian region.