A Thirteen-Year (1998-2010) TRMM Composite Climatology (TCC), Validation of Means and Estimated "Errors" and New Monthly Composite Products

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1. TRMM Composite Climatology (TCC)

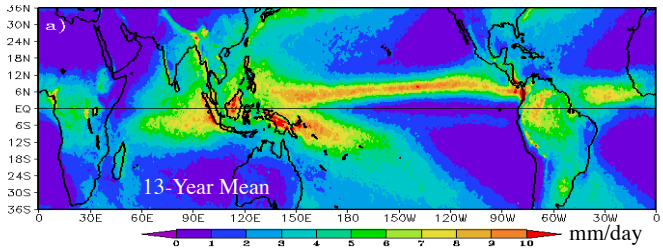
The TCC is meant to provide a "TRMM-best" estimate of monthly climatological surface rainfall. The TCC consists of the mean of quality-controlled, selected TRMM rainfall V6 products from 36°N to 36°S at 0.5° resolution. [see panel a) below for 13-year mean during 1998-2010]

Input Rain Products for TCC:

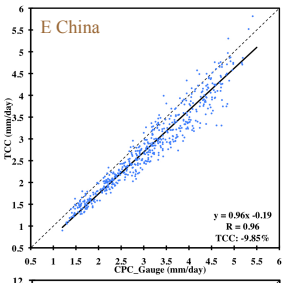
Ocean:
1) TMI (2A12)
2) Radar (2A25 Near Surface) [Adjusted +5.4% for boost]
3) Combined (2B31)

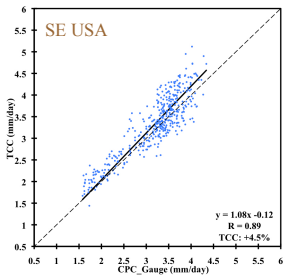
Land:
1) Multi-satellite with gauges (3B43)
2) Radar (2A25 Near Surface) [Adjusted +5.4% for boost]
3) Combined (2B31)

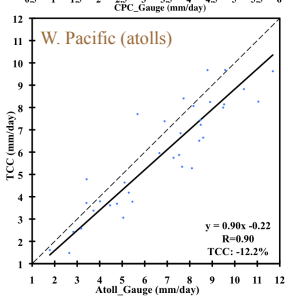
The standard deviation (σ) among the three TRMM estimates serves as a measure of confidence or estimate of bias error [see panel b) below].



2. Comparison with Surface Observations (Raingauges)

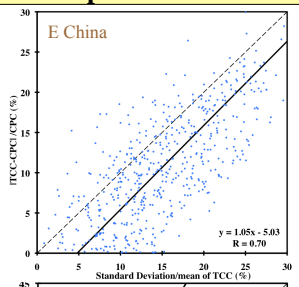


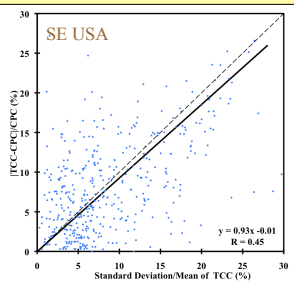


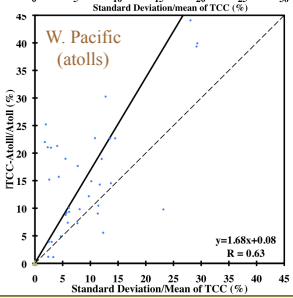


- Annual TCC climatology compared to quasi-independent gauge analyses at 0.5 degree resolution (TCC over land has one input product [3B43] that contains gauges)
- Over land TCC is ~-10% relative to gauges in eastern China and ~+4% relative to gauges in southeast U.S.
- Over western Pacific TCC is ~-12% relative to atoll gauges
- Comparison with gauges indicate that TCC within margin of observational error

3. Comparison of σ Among Products with Actual Errors





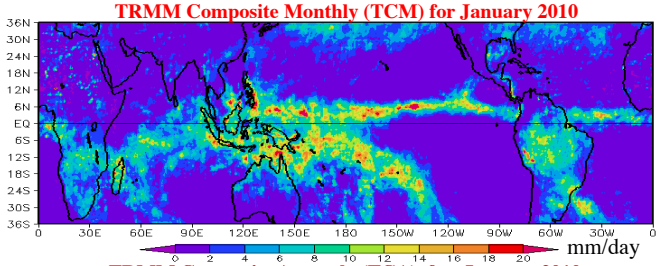


- Standard deviation among input products (σ) is compared to difference between TCC means and gauge means ("error")
- Comparisons have large scatter, but in general larger σ is correlated to larger "error" (difference from gauge)
- Over China and U.S. slope of relation is ~1; over W. Pac. atolls slope is ~1.7
- These initial comparisons indicate that the σ among TRMM estimates has value as estimate of error, at least in a relative sense and perhaps in terms of absolute value

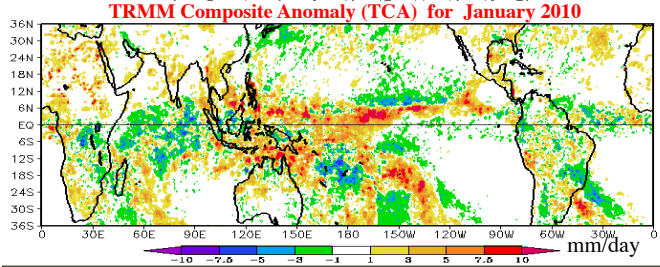
4. TRMM Composite Monthly (TCM) & Anomaly (TCA)

New TCC-type products for individual months: Composites of three TRMM products are produced for 3-month running means at 2.5° lat.-long. to obtain sufficient sampling and avoid aliasing. Results are then disaggregated in time (down to a month) and space (0.5°) using TMPA (3B43) to produce TCM. TCA is TCM minus TCC for month.

TRMM Composite Monthly (TCM) for January 2010



TRMM Composite Anomaly (TCA) for January 2010



5. Summary and Future Work

TCC, TCM and TCA are useful to TRMM investigators as "first look" and outside community as convenient, high quality TRMM estimate for global model validation, water budget studies and variations during TRMM era. Future: 1) New TCC version with V7 data after examination of TRMM products (especially land results), 2) Further analysis of standard deviation among products as error estimate, and 3) Analysis of variations and extremes of tropical precipitation in relation to temperature and moisture variations during the TRMM era.

The TCC data is available at: http://pps.gsfc.nasa.gov/tsdis/tcc/TCC.html and soon through Goddard DISC

Adler, R. F., J.-J. Wang, G. Gu, and G. J. Huffman, 2009: A ten-year rainfall climatology based on a composite of TRMM products. *J. Meteorol. Soc. Japan*, 87A, 281-293.

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