

Precipitation extremes in TRMM data

Proposal Submitted to NASA

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Summary: We propose a project in which observations from the NASA TRMM satellite will be used to analyze the statistics of the distribution of precipitation and a number of related quantities, conditional on the local value of column water vapor or saturation fraction. Particular focus will be paid to the upper percentiles of the distribution: precipitation extremes. The Precipitation Radar will be used primarily for precipitation observations, the TRMM Microwave Imager for column water vapor. Measures of strong convection (e.g., height of 40 dBz echo) will also be used, as will lower-resolution blended products such as 3B42. The conditional distributions obtained (appropriately downgraded to account for differences in spatial resolution) will provide an observational constraint on climate models used to predict changes in precipitation extremes under future projected climate change. The latest generation of climate models used for the latest IPCC Assessment Report will be analyzed and compared directly to the models. By binning precipitation observations together according to the local value of column water vapor or saturation fraction, the sampling limitations of the TRMM observations will be minimized, so that the TRMM data can be used to best advantage to address the important global change issues around precipitation extremes. By focusing on the local relationship between two quantities known to be related by fundamental atmospheric physics, observations can be used to constrain models in a way that should be relevant for their predictions of the future.