Geophysical Research Abstracts, Vol. 9, 10722, 2007
SRef-ID: 1607-7962/gra/EGU2007-A-10722

Precipitation occurrence: comparison of model, satellite and surface measurements

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The paper investigates the occurrence of precipitation as identified by model, satellite and surface measurements. Of particular interest is the occurrence of light precipitation across the globe. Satellite measurements have a certain sensitivity below which they cannot distinguish between a surface background with no-rain and that with light rainfall. Conversely, models tend to overestimate the occurrence, or area, of precipitation primarily due to the coarse resolution of the products. Estimates of precipitation occurrence are therefore highly dependent upon the temporal and spatial scales used in the analysis. Instantaneous and point measurements result in a lower instance of precipitation than a spatially averaged, and temporally integrated estimate. However, if a technique is insensitive to light rainfall this will reduce the retrieved occurrence of precipitation for that technique.

Estimates of precipitation occurrence are compared on instantaneous and daily timeframes with spatial resolution from point measurements, through high spatial resolutions ($\sim$5km) to low spatial resolutions ($\sim$30km). One-minute point measurements over a mid-latitude site reveal that precipitation less then 1mm/hr dominates the rainfall intensity spectrum. This result is echoed by surface observation obtained from the Comprehensive Ocean-Atmosphere Data Set (COADS). Furthermore, the distribution of the occurrence of light precipitation over the globe is concentrated in the mid- to high-latitudes. However, this distribution is evenly distributed, and care needs to taken when interpreting differences between rainfall products derived from different sources since each will have different sensitivity thresholds.