Geophysical Research Abstracts, Vol. 8, 02891, 2006
SRef-ID: 1607-7962/gra/EGU06-A-02891

Assessment of daily rainfall variability in climate model simulations using estimations of areal rainfall.

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Assessment of the level of daily variability in precipitation series simulated by climate models can be problematic due to the mis-match of spatial scale between coarse-scale areal average values from models and the point scale rain gauge observations. In regions where a dense station network is available, a reliable areal average may be constructed from observed data, but for those areas which are not so well observed, an areal average constructed from only a few stations will not be a realistic baseline for comparison of variability.

A statistical technique for estimating the dry-day frequency and the distribution of wet-day values of areal precipitation is proposed. Using the dry-day probability and parameters of the gamma-distribution from a few stations within a grid box, and a novel approach to measuring the spatial dependence between stations, the parameters of an average series from any larger number of stations can be estimated, providing a realistic observed areal average with which to compare model simulations.

This approach is applied to precipitation simulated by three general circulation models (UKMO HadCM3, CCC CGCM3 and NCAR PCM), over two regions, providing a comparison of model skill in simulating daily precipitation variability.