Geophysical Research Abstracts, Vol. 7, 09817, 2005
SRef-ID: 1607-7962/gra/EGU05-A-09817

Seasonal sensitivity of a VIS-NIR-IR probablity of precipitation algorithm

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The performances of satellite rainfall estimates often depend on the observed cloud systems. In particular, at VIS-NIR-IR wavelengths the relationship between cloud top properties and rainfall at the ground is established via a broad variety of statistical schemes. Statistical techniques need a training or calibration phase over a wide spectrum of precipitating events: the performance of the technique on a given cloudy scene reflects how much the training dataset describes the clouds in the current scene. For this reason, the set up of seasonal training sets is expected to improve such kind of techniques.

In this work an artificial neural network probability of precipitation algorithm (ANN-POP) is applied to two MODIS datasets, using the UK-MetOffice radar network for trainig and validation. The data collected by MODIS during morning overpass during winter (Jan-Feb) and summer (Jun-Jul) seasons were remapped and co-located onto the NIMROD 5x5 km grid over British Isles: two datasets of radar/satellite nearly simoultaneous observations of about 750000 cloudy pixel each have been constructed. The datasets are randomly divided in training and validation disjointed sub-sets in order to evaluate the performances of the technique by means of the Equitable Threat Score.

The ANN-POP tecnique showed in prevoius applications high sensitivity to the ratio between cloudy non-precipitating and precipitating pixels in the scene: this parameter has a clear seasonal dependance, related to the relative occurrence of various types of clouds. For the summer dataset the wet to dry ratio was about 7, while for the winter one it was 5: different performances of the technique were discussed evaluating the impact of different channels on the estimates in the two seasons.