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Exploitation of cloud top characterization from three-channel IR measurements in a physical PMW rain retrieval algorithm

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Abstract. Rainfall intensity estimates by passive microwave (PMW) measurements from space perform generally better over the sea surface with respect to land, due to the problems in separating true rain signatures from those produced by surfaces having similar spectral behaviour (e.g. snow, ice, desert and semiarid grounds). The screening procedure aimed at recognizing the various surface types and delimit precipitation is based on tests that rely on PMW measurements only and global thresholds. The shortcoming is that the approach tries to discard spurious precipitating features (often detected over the land-sea border) thus leading to no-rain conservative tests and thresholds. The TRMM mission, with its long record of simultaneous data from the Visible and Infrared Radiometer System (VIRS), the TRMM Microwave Imager (TMI) and rain profiles from the Precipitation Radar (PR) allows for unambiguous testing of the usefulness of cloud top characterization in rain detection.

An intense precipitation event over the North Africa is analysed exploiting a night microphysical RGB scheme applied to VIRS measurements to classify and characterize the components of the observed scenario and to discriminate the various types of clouds. This classification is compared to the rain intensity maps derived from TMI by means of the Goddard profiling algorithm and to the near-surface rain intensities derived from PR. The comparison allows to quantify the difference between the two rain retrievals and to assess the usefulness of RGB analysis in identifying areas of precipitation.

Full Article in PDF (PDF, 1445 KB)

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