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Performance of high-resolution quantitative precipitation estimates over the mid-latitudes

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Estimation of rainfall is a major focus for research and operational activities at both regional and global scales. Precipitation (rainfall and snowfall) retrievals from Earth Observation missions utilise a range of sensors spanning the visible, infrared and microwave regions of the spectrum. Combinations of these observations allow estimates to be made with increasing spatial and temporal resolution. Analysis of precipitation at high resolutions provides the potential to improve our understanding, not only of the retrieval schemes, but also of the precipitation processes within the atmosphere, and of the occurrence, distribution and accumulation of precipitation across the globe.

Although the retrieval of precipitation from satellite observations over the tropical regions has undergone significant development, retrievals of precipitation at mid and high latitudes are more problematic. The multi-sensor capability of the Tropical Rainfall Measuring Mission provides much data to enable improved retrievals: this capability will be extended to the higher latitudes with the Global Precipitation Measurement mission, due for launch in 2013. The assessment of current techniques and their subsequent advances is therefore a matter of urgency if the mission is to be fully exploited. In particular, the sensitivity of retrieval schemes to low-level and light precipitation remains a major problem: low intensity precipitation contributes an increasingly large amount at these latitudes with significant underestimation by both passive and active microwave retrievals.

This paper describes the validation of satellite precipitation products over northwest Europe at 3-hourly 0.25x0.25 degree resolution. This work, as part of the Program for the Evaluation of High-Resolution Precipitation Products, suggests that many techniques still have significant problems when dealing with precipitation retrievals over the middle and high latitude regions. Problems include seasonal variations in performance, biases in precipitation totals and land/sea/coast boundary issues. Some of the deficiencies can be attributed to the inability of techniques to adequately identify the precipitation, particularly light precipitation, while the use of different land/sea techniques can lead to biases in the overall regional precipitation estimates.