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Determination of rainfall intensities and patterns from the MSG satellite

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Different cloud indexing retrievals and bi-spectral approaches has been tested with a spatial resolution over Europe of 3 X 6 km and a temporal resolution of 15 min. Best results in comparison to the radar data of the German Weather Service (Deutscher Wetterdienst, DWD) could be obtained with the adoption of the auto-estimator (Vicente et al, 1998) to the MSG-SEVIRI data. As the regression relationship of the auto-estimator between cloud-top-temperature and precipitation was derived from a comparison to radar data, a calibration of the MSG-data to the gauge-adjusted radar data of the DWD was done. These adjustments seemed necessary if one accounts for the findings of Ba & Gruber (2001), which could show variations in the relationship between cloud-top-temperature and rain rate for different regions in the USA. The resulting regression-law for Central Europe is very similar to that of Vicente et al for cloud temperatures less than 230 K. This results from the appliance of the Probability Matching Method (Rosenfeld et al, 1994) to the MSG and radar data. A comparison of temperature class averages to radar rain rates shows for cloud-top-temperatures higher than 225 K that higher rain rates has to be allocated to warmer stratiform clouds (˜ 3 - 5 mm/h). Apart from this it appears that the regression-curve is switching to warmer temperatures during summer with an increasing height of tropopause.

Beside the brightness temperature in a far-infrared channel additional information about the atmospheric instability should be used in future to derive the rainfall intensities. In this connection the Eumetsat product Global Instability Index (GII) should be taken to detect regions with a highly active atmosphere. Convective cells in an

instability air mass rain less than a more stable cell which has more time to grow.

For the delineation of the rainfall pattern microphysical properties of the cloud tops can be made available by the analysis procedure SESAT (Strahlungs- und Energiefluesse aus Satellitendaten - radiation and energy fluxes from satellite data). Time series analysis should break down the correlation of the microphysical parameters at cloud top and precipitation amount at the ground.

The evaluation of the derived rainrates will be done by comparison with a combined precipitation product, the Multisensor Precipitation Estimate MPE, another Eumetsat product.