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Tracking of convective cells using remote sensing data from radar and satellite

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Heavy precipitation caused by thunderstorms can lead to flash floods in local areas. Early detection and short term forecasting of these events is important for public mitigation measures. In this context Rad-TRAM, a fully automated tracking and nowcasting algorithm based on radar data, has been developed recently. It uses the same tracking algorithm as the cloud tracker CB-TRAM which is based on a pyramidal image matcher taking into account the spatial scale of detected cells (see the corresponding contribution by Zinner et al., this session). Using the European radar composite of the German Weather Service (DWD) cells of high reflectivity representing regions with heavy precipitation and hail are identified using a threshold criterion. In order to achieve a more comprehensive picture of the heavy precipitation cells a visual as well as a statistical analysis is performed where the cloud cells tracked by Cb-TRAM as well as the precipitation cells tracked by Rad-TRAM are investigated in parallel. The statistical analysis of a multitude of thunderstorm tracks relates the detected features of both systems to one another with regard to their spatial extent and existence in time. In addition to this analysis the quality of short range forecasts of heavy precipitation cells up to one hour provided by Rad-TRAM is investigated. It is shown that these forecasts perform on average better than corresponding forecasts based on persistence. A similar test with the TITAN tracker referred to by Wilson (Wilson et al., 1998: Nowcasting Thunderstorms: A status report. Bull. Amer. Meteor. Soc., 79) apparently does not achieve a result as quite as positive. Overall, the results from this study suggest that a combined use of both tracking systems for clouds as well as for precipitation cores provides a more complete figure of the storm at hand and is thus useful for operational nowcasting systems in real time conditions (see also contribution of Forster and Tafferner, session NH1.03).