Cb-TRAM: Tracking and monitoring severe convection from onset over rapid development to mature phase using multi-channel Meteosat-8 SEVIRI data

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Cb-TRAM is a new fully automated tracking and nowcasting algorithm. Intense convective cells are detected, tracked and discriminated with respect to onset, rapid development, and mature phase. Finally, short range forecasts are provided. The detection is based on Meteosat-8 SEVIRI (Spinning Enhanced Visible and Infra-Red Imager) data from the broad band high resolution visible, infra-red 6.2 micrometer (water vapour), and the infra-red 10.8 micrometer channels. Areas of convection initiation, of rapid vertical development, and mature thunderstorm cells (cumulonimbus Cb) are identified. For the latter, tropopause temperature data from ECMWF operational model analyses is utilised as an adaptive detection criterion. The tracking is based on geographical overlap between current detections and first guess patterns of cells detected in preceeding time steps. The first guess patterns as well as the short range forecasts are obtained with the aid of a new image matching algorithm providing complete fields of approximate differential cloud motion. Based on the so called pyramid matcher an interpolation and extrapolation technique is presented which can also be used to generate synthetic intermediate data fields between two known fields as well as nowcasts of motion and development of detected areas. Examples of application are presented including a verification with precipitation radar and lightning data as independent data sources.

Reference: Zinner, T., H. Mannstein, A. Tafferner, 2006: Cb-TRAM: Tracking and monitoring severe convection from onset over rapid development to mature phase using multi-channel Meteosat-8 SEVIRI data. Subm. to. Meteor. Atmos. Phys.