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30 days reveal a lot – A cumulonimbus (CB) verification of the convective cloud mask by Berendes et al. (2008) in central Europe.

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30 days, 5 time steps per day and 1679 manually counted CB′s, in order to know if the convective cloud mask (CCM) described by Berendes et al. (2008) is suitable for an automated operational CB-detection, the CCM-detections were verified against precipitation radar and lighting detection data. Therefore a 30 day period from the 10th of May to the 8th of June 2016 was chosen, showing a high variety of different weather patterns. Unstable arctic air masses occurred as well as dense frontal systems and warm sunny days with high impact thunderstorms, giving a tough challenge for the CCM.
The chosen CCM is based on a cloud identification and classification technique using the SDLAC (Standard Deviation Limited Adaptive Clustering) method. This statistical clustering approach identifies different cloud types automatically once it is trained. The German national weather service (DWD) has tested the algorithm trained and described by Berendes et al. using Meteosat Second Generation (MSG) daytime satellite data on a 15 minute time resolution and operates it 24/7 in a test environment. The underlying aim is to develop an operational towering cumulus and cumulonimbus cloud detection algorithm, to be used for fully automated flight weather observations in combination with radar and lightning data.
The presented work shows the performance of the CCM during different daytimes and weather patterns. At each time step (6, 9, 12, 15, 18 UTC) the locations of CB clouds were determined manually, using high resolution radar, lightning and HRV satellite data, and have been compared with the CCM-classifications. Besides the general statistical results, examples of typical situations show the actual classification patterns. Additionally a case study of a CB-lifecycle is presented, revealing the cumulus growth stages identified by the CCM.