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Detection of high Rain Clouds using Water Vapour Emission - Transition from Meteosat First (MVIRI) to Second Generation (SEVIRI)

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Positive brightness temperature differences between the water vapour (WV) and the infrared (IR) channels (dTWVIR) of the Meteosat-7 MVIRI instrument enable the detection and delineation of high rain clouds which is a central element of the Enhanced Convective Stratiform Technique (ECST), a rainfall retrieval technique developed for Meteosat-7 MVIRI. In 2004, Meteosat-7 MVIRI was replaced by Meteosat-8 SEVIRI which is characterized by a higher spectral, spatial and temporal resolution. The aim of the current paper is to test the transferability of the WV-IR difference technique developed for MVIRI to SEVIRI in order to guarantee the continuation of a long-term rainfall retrieval beyond the Meteosat system of the first generation. The presence and strength of positive dTWVIR for different SEVIRI WV-IR channel combinations is analysed by means of radiative tranfer calculations. The results reveal positive dTWVIR for all WV-IR combinations. However, in a comparison study of 80 temporally and spatially corresponding MVIRI- and SEVIR-based ECST results, the difference between the WV(7.3) channel and the IR(12.1) channel has been identified as the most appropriate SEVIRI combination to properly reproduce the MVIRI-based ECST results. The successful application of positive dTWVIR to SEVIRI and the transfer of the adapted ECST from MVIRI to SEVIRI allows the continuation of satellite-derived precipitation time series applicable to e.g. climate change studies.