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Technical note: A new day- and night-time Meteosat Second Generation Cirrus Detection Algorithm MeCiDA

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Abstract. A new cirrus detection algorithm for the Spinning Enhanced Visible and Infra-Red Imager (SEVIRI) aboard the geostationary Meteosat Second Generation (MSG), MeCiDA, is presented. The algorithm uses the seven infrared channels of SEVIRI and thus provides a consistent scheme for cirrus detection at day and night. MeCiDA combines morphological and multi-spectral threshold tests and detects optically thick and thin ice clouds. The thresholds were determined by a comprehensive theoretical study using radiative transfer simulations for various atmospheric situations as well as by manually evaluating actual satellite observations. The cirrus detection has been optimized for mid- and high latitudes but it could be adapted to other regions as well. The retrieved cirrus masks have been validated by comparison with the Moderate Resolution Imaging Spectroradiometer (MODIS) Cirrus Reflection Flag. To study possible seasonal variations in the performance of the algorithm, one scene per month of the year 2004 was randomly selected and compared with the MODIS flag. 81% of the pixels were classified identically by both algorithms. In a comparison of monthly mean values for Europe and the North-Atlantic MeCiDA detected 29.3% cirrus coverage, while the MODIS SWIR cirrus coverage was 38.1%. A lower detection efficiency is to be expected for MeCiDA, as the spatial resolution of MODIS is considerably better and as we used only the thermal infrared channels in contrast to the MODIS algorithm which uses infrared and visible radiances. The advantage of MeCiDA compared to retrievals for polar orbiting instruments or previous geostationary satellites is that it permits the derivation of quantitative data every 15 min, 24 h a day. This high temporal resolution allows the study of diurnal variations and life cycle aspects. MeCiDA is fast enough for near real-time applications.

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