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Comparison of SEVIRI-based cloud fractional coverage and cloud top pressure with synoptic measurements and corresponding MODIS products

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The Satellite Application Facility on Climate Monitoring (CM-SAF) is aiming to retrieve satellite-derived geophysical parameters suitable for climate monitoring. CM-SAF started routine operations in early 2007 and provides a climatology of cloud parameters, radiation fluxes, surface albedo, and atmospheric water vapor, temperature and humidity profiles on a regional and partially on a global scale. Here we focus on the validation of cloud products derived from the Spinning Enhanced Visible and Infrared Imager (SEVIRI) on-board the METEOSAT Second Generation (MSG) geostationary spacecraft. Cloud fractional coverage (CFC) products were validated against synoptic measurements, whereas SEVIRI cloud top pressure (CTP) results were compared with corresponding results derived from Moderate Resolution Imaging Spectrometer (MODIS) observations. CFC products from CM-SAF agree well with synoptic data over midlatitudes but SEVIRI overestimates the cloudiness towards the edges of the visible earth disk. Furthermore, we found that CM-SAF satellite measurements tend to overestimate the cloud coverage over sea whereas some underestimation is found over land. CTP validation results show that the cloud top pressure is generally largely underestimated by SEVIRI, i.e. the cloud-top height is higher than that for corresponding MODIS observations. The bias is however remarkably small if only those pixels are analyzed where both cloud masks indicate a fully cloudy pixel. We conclude that a comparison of cloud-top pressure retrievals from different satellite sensors is mainly sensitive to cloud recognition which in turn is a function of spectral sampling, viewing geometry and the ground pixel size.