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Evaluation of the global 3-D cloud cover distribution obtained from multi-Geostationnary data with CALIPSO lidar observations in the tropical belt.

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Cloud vertical distribution is conditionning radiative heating and latent heat release profiles which are essential to the energy redistribution in the atmosphere. A good knowledge of its variations at global and regional scale is important, more particularly taking into account the diurnal cycle. These last years, the CALIPO lidar and CloudSat radar active measurements and the AIRS and IASI sounders mesurements with improved spatial resolution have brought new observations of the cloud cover distribution. However, these LEO mesurements can not observe the full diurnal cycle of the cloud cover. The geostationary satellite data remain the only data set allowing such observation at middle and low latitude, but the quality of the vertical distribution of the retrieved cloud cover depends on the multispectral capability of the instruments and the spatial resolution of the observation. as well as its temporal sampling. A good understanding of the characteristics of these geostationnary data sets is important. It is moreover necessary to use the same analysis method. Comparison of the cloud cover parameters obtained with simultaneous active CALIOP lidar and/or CloudSat radar measurements is an important step as it provides independent observations which can be used in reference. This can allow to analyse potential limitations of the VIS-IR geostationnary data set and further lead to improvements in the analyses performed with these data sets, as done in the frame of ISCCP.

Here we show first results from such an approach using the retrieval method developed by the SAFNWC (Legleau and Derrien, 2005; Derrien and Legleau, 2009) for the multi-spectral SEVIRI radiometer on board METEOSAT second generation, and also apply it to GOES-E, GOES-W and MTSAT satellite data. This four set of geostationary data allows to retrieve cloud parameters with a one hour time sampling over a large part of the tropical belt (35°S -35°N). For a four month period in summer 2009, cloud mask, cloud type classification and cloud top pressure products from these four satellite data set have been analysed using the cloud layer structure observed with the lidar CALIOP (product layer Version 3). First results of this evaluation study are presented. For each geostationary satellite the mean cloud cover and instantaneous cloud cover is compared to CALIOP cloud cover for a three month period. Day and night, land and ocean are studied separately.