IRS2012-95-1
International Radiation Symposium 2012
Dahlem Cube, Berlin, Germany, 06 – 10 August 2012

Evaluation of the Global Cloud Cover distribution obtained from Multi-Geostationnary data with CALIPSO lidar observations

G. Sèze (1), M. Derrien (2), H. Le Gleau (2), J. Pelon (3), and B. Six (4)

(1) LMD/IPSL/ Université Pierre et Marie Curie, France (genevieve.seze@lmd.jussieu.fr), (2) Météo-France, Centre de Météorologie Spatiale, Lannion, (3) LATMOS/IPSL, Paris, France, (4) ICARE, UMS 2877, Université de Lille-1

Cloud vertical distribution is conditioning 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 measurements 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 multi-spectral 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 geostationary 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 geostationary 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 data set from four 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). Results of this evaluation study are presented. For each geostationary satellite the mean cloud cover and instantaneous cloud cover are compared to CALIOP cloud cover. Day and night, land and ocean are studied separately.

Although the multi-spectral capability of the SEVIRI, GOES-E, GOES-W and MTSAT radiometer are not equivalent, it is found that the main behavior of the geostationary satellite cloud cover obtained with the SAFNWC scheme compared to CALIOP cloud cover are similar. There is a large negative bias of the cloud cover occurrence frequency over ocean during night-time which decreases in the daytime data set. Over land, it is still negative but larger during daytime than nighttime. Over Ocean, this bias is due to the no detection of low cloud often broken; over land it is due to the no detection of low but also of broken mid-level cloud. The no detection of high cloud is rare.