IRS2012-508
International Radiation Symposium 2012
Dahlem Cube, Berlin, Germany, 06 – 10 August 2012

Monitoring spatial and temporal variations of clouds using space-based observations

M. Lockhoff (1), M. Stengel (1), A. Kniffka (1), F. Kaspar (1), K.-G. Karlsson (2), and J.-F. Meirink (3)

(1) Deutscher Wetterdienst (DWD), Offenbach, Germany (maarit.lockhoff@dwd.de), (2) Swedish Meteorological and Hydrological Institute (SMHI), Norrköping, Sweden, (3) Royal Netherlands Meteorological Institute (KNMI), de Bilt, The Netherlands

Clouds play a crucial role in the climate system as they have a major impact on the earth radiation budget by reflecting the incoming short wave irradiance on the one hand and blocking outgoing long wave radiation on the other. Their response to global warming remains still uncertain though. It is therefore important to document and analyse global and regional variations in clouds over the past decades. This will, at the same time, help to improve the current global climate models.

Traditionally, cloud observations have been made by human observers at meteorological surface stations. Despite their subjective character and varying quality these so-called synoptic observations (SYNOP) are of great use for climate monitoring, especially due to their long-term availability. Over ocean and sparsely populated areas, however, space-based observations are largely the only data source available. Besides, satellite-based estimates have the big advantage of providing consistent measurements and processing methodologies across regions. Recently, EUMETSAT's Satellite Application Facility on Climate Monitoring (CM SAF) completed the processing of the first global data set of cloud products based on Advanced Very High Resolution Radiometer (AVHRR) Global Area Coverage (GAC) data. The data set is based on homogenised and inter-calibrated radiances from AVHRR-2 and AVHRR-3 instruments and covers the years 1982 to 2009.

This presentation compares the cloud cover as seen by the CM SAF AVHRR-GAC product to other commonly available global satellite-derived cloud products. The latter include the International Satellite Cloud Climatology Project (ISCCP), the Moderate Resolution Imaging Spectroradiometer (MODIS) and the AVHRR Pathfinder Atmospheres Extended (PATMOS-x) data set. Furthermore, the ECMWF Interim Re-Analysis (ERA interim) product is also considered within the comparison. Both spatial and temporal characteristics of the observed cloud cover are inter-compared between the different data sets and identified areas of agreement and disagreement will be analysed and discussed. Over land, SYNOP observations are used as ground-truth and measures of bias and bias-corrected rms are calculated to further assess the individual strengths and weaknesses of the reanalysis and the satellite-based products.