On the possibility to develop a rainfall data set over Belgium and Western Europe for climate monitoring from SEVIRI data : validation and application of Cloud properties algorithm developed at KNMI

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Clouds and rainfalls formation remains one of the most important source of uncertainties for climate changes. The assessment of the variation of rainfall intensities and patterns in relationship with global change is crucial and calls for accurate measurements of clouds properties and precipitations. The spatial and temporal sampling of instrument on geostationary satellites is of great interest for that purpose.

Last years, an algorithm has been developed at KNMI allowing retrievals of cloud properties (Roebeling et al., 2006) and rainfalls (Roebeling and Holleman, 2009) from Meteosat Second Generation. The algorithm is based on the possibility to retrieve clouds optical thickness and effective radii from visible and near infra-red channels and liquid water path afterwards. These cloud properties have influences on both short and long wave radiations and therefore, obtained data are useful to improve the understanding of Earth Radiation Budget.

In this work we evaluate the accuracy and the reliability of this method and its suitability for constructing a climate data set of rainfalls. A complete data set from 2004 to 2011 has been constructed using the algorithm developed at KNMI. Cloud microphysical properties retrievals have been compared with similar MODIS products. Radar data from the Belgian network have been re-projected and parallax effect on satellite data have been corrected. Statistics such as contingency matrix, detections and rejections statistics have been computed using radar and satellite precipitation retrievals. Case studies on different kind of precipitation have also been done to highlight differences of reliability. The sensitivity of the method to high solar zenithal angle has also been tested. Results show that the method is less reliable during winter month due to difference of type of precipitation where the effect of high zenithal angles becomes significant only above 75°.

References :
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