Geophysical Research Abstracts,
Vol. 11, EGU2009-8522-1, 2009
EGU General Assembly 2009

Estimation of cloud optical thickness by processing SEVIRI images and implementing a semi analytical cloud property retrieval algorithm

P Pandey (1,2), K De Ridder (1), and N Van Lipzig (2)

(1) VITO - Flemish Institute for Technological Research,Mol, Belgium (praveen.pandey@vito.be), (2) Department of Earth and Environmental Sciences, Catholic University of Leuven, Leuven, Belgium

Clouds play a very important role in the Earth's climate system, as they form an intermediate layer between Sun and the Earth. Satellite remote sensing systems are the only means to provide information about clouds on large scales. The geostationary satellite, Meteosat Second Generation (MSG) has onboard an imaging radiometer, the Spinning Enhanced Visible and Infrared Imager (SEVIRI). SEVIRI is a 12 channel imager, with 11 channels observing the earth's full disk with a temporal resolution of 15 min and spatial resolution of 3 km at nadir, and a high resolution visible (HRV) channel. The visible channels (0.6 μm and 0.81 μm) and near infrared channel (1.6μm) of SEVIRI are being used to retrieve the cloud optical thickness (COT).

The study domain is over Europe covering the region between 35°N - 70°N and 10°W - 30°E. SEVIRI level 1.5 images over this domain are being acquired from the European Organisation for the Exploitation of Meteorological Satellites (EUMETSAT) archive. The processing of this imagery, involves a number of steps before estimating the COT.
The steps involved in pre-processing are as follows. First, the digital count number is acquired from the imagery. Image geo-coding is performed in order to relate the pixel positions to the corresponding longitude and latitude. Solar zenith angle is determined as a function of latitude and time. The radiometric conversion is done using the values of offsets and slopes of each band. The values of radiance obtained are then used to calculate the reflectance for channels in the visible spectrum using the information of solar zenith angle.

An attempt is made to estimate the COT from the observed radiances. A semi analytical algorithm [Kokhanovsky et al., 2003] is implemented for the estimation of cloud optical thickness from the visible spectrum of light intensity reflected from clouds. The asymptotical solution of the radiative transfer equation, for clouds with large optical thickness, is the basis of this algorithm.

The two visible channels of SEVIRI are used to find the COT and the near infra red channel to estimate the effective radius of droplets. Estimation of COT using a semi analytical scheme, which doesn't involve the conventional look-up table approach, is the aim of this work and henceforth, vertically integrated liquid water (w) or ice water content will be retrieved. The COT estimated and w obtained, will be compared with the values obtained from other approaches and will be validated with in situ measurements.

Corresponding author address:
Praveen Pandey, VITO – Flemish Institute for Technological Research, Boeretang 200, B 2400, Mol, Belgium.
E-mail: praveen.pandey@vito.be