Terra/MODIS Cloud Detection Algorithms and their Regional Changes

JK Rajapaksha

Oceanography Division

National Aquatic Resources Research and Development Agency (NARA)

Colombo -15, Sri Lanka

Abstract

MODIS (MODerate Resolution Imaging Spectroradiometer) on Terra (EOS AM-1) satellite has been designed as a primary sensor to monitor atmosphere, land, and the oceans. MODIS is a 36-band spectrometer providing a global data set every 1-2 days with a 16-day repeat cycle. The spatial resolution of MODIS (pixel size at nadir) is 250m for channel 1 and 2 (0.6μm -0.9μm), 500m for channel 3 to 7 (0.4μm - 2.1μm) and 1000m for channel 8 to 36 (0.4μm -14.4μm), respectively. However, one of the major hindrances for the earth observations from the space is clouds. Therefore the cloud masking is an essential part in image processing for remotely sensed data for further analysis. Proper bands and band combinations for cloud detection were observed and algorithms coefficients were tuned depending on the regional climatic conditions.

The process on finding the proper cloud detection method is described and tested over the Indo-China peninsula and Indian Ocean region. Two-band combination of emissive and reflective is better than one band threshold for could detection. The best band combination for cloud masking over the land is Band 4 and Band 31 while Band 6 and Band 31 are best over the oceans.

Sun glint the enhanced Fresnel reflection of the sea surface can appear in daytime. Its occurrence depends on geographical location, season and time of the day. Glint produces high albedos which can be misinterpreted as cloud. If glint-contaminated pixels are mistakenly assigned as cloud, it will introduce erroneous, seasonally dependent biases in cloud climatology. Moreover, this also can lead to unnecessary data loss for Sea Surface Temperature (SST) computation because thermal bands (Band 31 and 32) are unaffected by glint. Therefore the algorithm has been modified to prevent masking out the glint pixels for SST applications.