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GOSAT/TANSO-CAI のエアロゾルアルゴリズムについて
Aerosol algorithm of GOSAT/TANSO-CAI

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GOSAT (Greenhouse gases Observing SATellite) is an Earth observing satellite, launched in January 2009. The satellite equips two sensors, TANSO-FTS (Thermal And Near-infrared Sensor for carbon Observations ? Fourier Transform Spectrometer) and TANSO-CAI (Thermal And Near-infrared Sensor for carbon Observations ? Cloud and Aerosol Imager). TANSO-FTS is a primary sensor of the satellite devoted to measuring concentrations of greenhouse gasses such as carbon dioxide and methane. On the other had, TANSO-CAI is a secondary sensor and the purpose of this is to detect clouds and aerosols with four bands, 380 nm, 674 nm, 870 nm, and 1600 nm, from near ultraviolet to near infrared. The precision of retrieval of greenhouse gases gets lower, when an area is contaminated with clouds or aerosols but greenhouse gases are retrieved without any consideration for clouds or aerosols. Aerosol retrieval is also important for understanding the direct and indirect influence of aerosols on climate as assessed by the IPCC-AR4.

In this study, we have developed an aerosol remote sensing algorithm to implement for operational process. Over the ocean area, two-channel method (Higurashi and Nakajima; 1999, 2000) is implemented. Both of Aerosol Optical Thickness (AOT) and Angstrom Exponent (AE) are retrieved by use of 674 nm and 870 nm. Over the land area, we uses a modified Kaufman (MK) method, which is a modified version of Kaufman method (Kaufman et al., 1997) and retrieved AOT with use of 380 nm. It is difficult to estimate the ground reflectance with use of minimum reflectance (MR) method because of the observation frequency is not enough for TANSO-CAI case. In MK method, we use NDVI, which is calculated by MR of 674 nm and 870 nm, and the MR of 674 nm to estimate the reflectance of 380 nm. The relationships between NDVI, MR of 674 nm and 380 nm are determined empirically.

It is thought that the values of retrieved AOT are influenced by the assumptions of characteristics of aerosol particle, such as mode radius and standard deviation of particle size distribution function, single scattering albedo (SSA) and aerosol layer height. These parameters are fixed in the current version of operational algorithm. We performed sensitivity tests to study such assumptions do not cause a significant error for retrieval other than the assumption of SSA. Mode radius and standard deviation of particle size distribution function do not produce large errors even if they are fixed in the algorithm. However, SSA is thought to be the reason of large error if they are far from real value. We have calculated correlation coefficient between AOT of CAI and AOT of AERONET(AErosol ROBotic NETwork) in condition that both SSA is fixed and SSA is from averaged value of AERONETS. The result shows that correlation coefficients are improved in some sites, but in some other sites, correlation coefficients are not improved. We need to investigate this result further.

We further discuss a use of the 1600-nm channel as a reference band of Kaufman method to estimate the ground reflectance at 680 nm to retrieve AOT at 680 nm.

キーワード: エアロゾル, リモートセンシング, GOSAT, TANSO-CAI
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