Towards assimilation of aerosol data from an imager of GOSAT into the aerosol transport model SPRINTARS

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Cloud and Aerosol Imager (CAI) mounted on “IBUKI” (Greenhouse gases Observing SATellite: GOSAT) observes Cloud and Aerosol Image. The GOSAT project in the National Institute for Environmental Studies calculated CAI L2 Aerosol Property products (Fukuda et al. 2010) from CAI L1 data and distributed for researchers. In this study, we investigated the applicability of these CAI L2 Aerosol Property products as the aerosol input data to aerosol transport model Assimilation SPRINTARS (Schutgens et al. 2010).
Assimilation SPRINTARS assimilates Aerosol Optical Thickness (AOT) using ensemble Kalman filter. For example, Assimilation SPRINTARS can assimilate MODIS aerosol data provided by Naval Research Laboratory (NRL). In order to assimilate CAI L2 AOT using this assimilation system, we created 6 hourly 1 degree gridded data (same format as MODIS NRL) from CAI L2 AOT and compared with MODIS NRL.
The data used in this study are 550nm AOT of GOSAT CAI L2 Aerosol Property product V02.00 (CAI L2 AOT) based on GOSAT CAI L1A V130.131 data, and AERONET (AErosol RObotic NETwork) Lev2.0 data as observation data.
Using the method of making MODIS NRL (Zhang and Reid 2006, Shi et al. 2010, Hyer et al. 2010), we created the plan to prepare input data for Assimilation SPRINTARS by the following procedure. (1) Create a matchup for AERONET and CAI L2 AOT for one year. (2) Examine the screening method of CAI L2 AOT using the result of (1). (3) The screening method determined in (2) is applied to CAI L2 AOT and the average value of 1 degree grid of CAI L2 AOT after the screening is adopted as a representative value. In this report, the results of (1) and (2) are shown.
As for the matchup result of AERONET and CAI L2 AOT, there was a tendency that CAI L2 AOT data are larger than AERONET data. As a whole the correlation between these data was low.
We tried the following two types of criteria as screening. (a) CAI L2 AOT is calculated in more than one-third of the circle with a radius of 10 km centered on the AERONET observation point. Also, the standard deviation of derived CAI L2 AOT is 0.08 or less. (b) There are 3 or more AERONET observations within 30 minutes before and after GOSAT CAI observation time. Also, the standard deviation of these AERONET data is 0.08 or less. Creating the scatter diagram, we found that the data after passing these two screening were distributed densely around the line of y=x and around the area where AERONET AOT equaled 0.1. For the latter, there was a possibility that cirrus clouds were treated as aerosol. This feature was clearly seen in the sea data.
Using the screening results, we compared the correlations between AERONET and CAI L2 AOT among AERONET observation points. After screening, the slopes and correlation coefficients of the regression lines were generally improved, but the R square value was less than 0.6 even for the best observation point. By screening, in some AERONET observation points data with larger CAI L2 AOT than AERONET drastically decreased, and the distributions of the data were concentrated more prominently around the line of y = x.
To proceed to (3), we need to investigate the method to exclude CAI L2 AOT with low correlation with AERONET.

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