

## Cloud and aerosol discrimination algorithm for EarthCARE/ATLID lidar

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The EarthCARE satellite with the high spectral resolution lidar (HSRL) at 355 nm will be launched in 2022. The cloud mask algorithm at 532 nm had been developed for the CALIPSO satellite retrieval (Hagihara et al., 2010). We have been working on development of the cloud mask algorithm for the EarthCARE lidar retrieval at 355 nm. In this study, we perform data analysis of the observation data of the NASA airborne HSRL (Burton et al., 2015; 2018) and AD-Net Raman lidar (Nishizawa et al., 2017) to determine the threshold values of attenuated and particle backscatter coefficients ( $\beta'_{th}$  and  $\beta_{th}$ ) at 355 nm for the discrimination of clouds and aerosols. The color ratio (ratio of the backscatter coefficients between 2 wavelengths) at 355 and 532 nm, which is measured by the HSRL observations, is used to discriminate aerosols and clouds, because the wavelength dependence of backscatter coefficient for aerosols is larger than that for clouds. In the analysis of HSRL airborne observations, we defined the particles, which have attenuated and particle color ratios smaller than 1 below 6.5 km altitude, as aerosols. From these results, the threshold values of  $\beta$  at 355 nm for discrimination of clouds and aerosols are estimated as  $\beta'_{th,355} = 4.5-5.7 \times 10^{-6} [m^{-1}sr^{-1}]$  and  $\beta_{th,355} = 2.2-5.7 \times 10^{-6} [m^{-1}sr^{-1}]$ . In addition, we perform the test of EarthCARE lidar retrieval using these new threshold values and the simulated data of the global atmospheric model NICAM (Sato et al., 2014) and J-sim (Hashino et al., 2013).

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