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Utilization of the depolarization ratio provided in the AERONET version 3 inversion product: AOD Separation according to Aerosol Type

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The method to separate aerosol optical depth (τ) of mixed aerosol plume as τ of dust (τ_D), coarse-(τ_{PC}) and fine-mode pollution (τ_{PF}) was developed using the linear particle depolarization ratio(δ_p) and coarse-mode fraction of volume concentration (CMF_{vc}) of AERONET sun/sky radiometer data. To separate τ according to aerosol types, we retrieved the dust ratio (R_D) using the . Then, the ratio of coarse-mode pollution particle (CMP), which is denoting the ratio of only coarse-mode pollution particles not inc0luding dust particles, was calculated by subtracting R_D from CMF_{vc}. This method was applied to the AERONET data, observed from 2001 to 2016 on China (Beijing (39.58° N, 116.22° E), XiangHe (39.75° N, 116.96°E)), Korea (Seoul (37.45°N, 126.95°E), Yonsei (37.56°N, 126.93°E), Anmyon (36.53°N, 126.33°E), Gwangju (35.22°N, 126.84°E)), Japan (Osaka (34.65°N, 135.59°E), Shirahama (33.69°N, 135.35°E)) and Taiwan (Taipei (25.01°N, 121.53°E)). The total number of observation days was 1219, 1310, 232, 409, 327, 351, 278, 359 and 312 at Beijing, Xianghe, Seoul, Yonsei, Anmyeon, Gwangju, Osaka, Shirahama, and Taipei, respectively. The total average τ_D was 0.12 ± 0.20, 0.12 ± 0.19, 0.05 ± 0.08, 0.06 ± 0.09, 0.07 ± 0.10, 0.07 ± 0.09, 0.05 ± 0.07, 0.06 ± 0.12 and 0.02 ± 0.03 in Beijing, Xianghe, Seoul, Yonsei, Anmyeon, Gwangju, Osaka, Shirahama, and Taipei, respectively. The τ_{PC} at 440 nm in China sites (0.17 ± 0.14 in Beijing and 0.15 ± 0.12 in Xianghe) was more than twice as high as in Korea sites (Seoul, Yonsei, Anmyeon and Gwagnju) of 0.08 ± 0.05, 0.08 ± 0.06, 0.07 ± 0.06, and 0.07 ± 0.04, respectively. Japan sites showed lowest value of as 0.06 ± 0.04 and 0.05 ± 0.03 in Osaka and Shirahama, respectively. Taiwan site was similar with Korea sites as 0.07 ± 0.04 in Taipei. The τ_{PF} at 440 nm also showed same regional trend with The τ_{PC} at 440 nm of four countries. The separated τ according to aerosol types can be possible to determine the main type of aerosol and its ratio in terms of month, season and year. We know that the seasonal variation and Wavelength dependence of the τ were induced from the high hygroscopicity and mass extinction efficiency of fine-mode pollution particles. The annual variation of τ_D and τ_{PC} from 2001 to 2016 showed a tendency to decrease, but τ_{PF} showed an increase or stagnation rate. And, the particle size of finemode pollution particles tends to decrease even though the τ_{PF} increases. This method of aerosol type separation will be used as an important data for mass concentration retrieval using remote sensing techniques.

- **When : 2019.06.13. (Thu) 16:00**
- **Where: Bldg.110 (EB4), Room.1007**
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