remote sensing

Supplement of

Potential of AOD Retrieval Using Atmospheric Emitted Radiance Interferometer (AERI)

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Refractive indices of aerosols

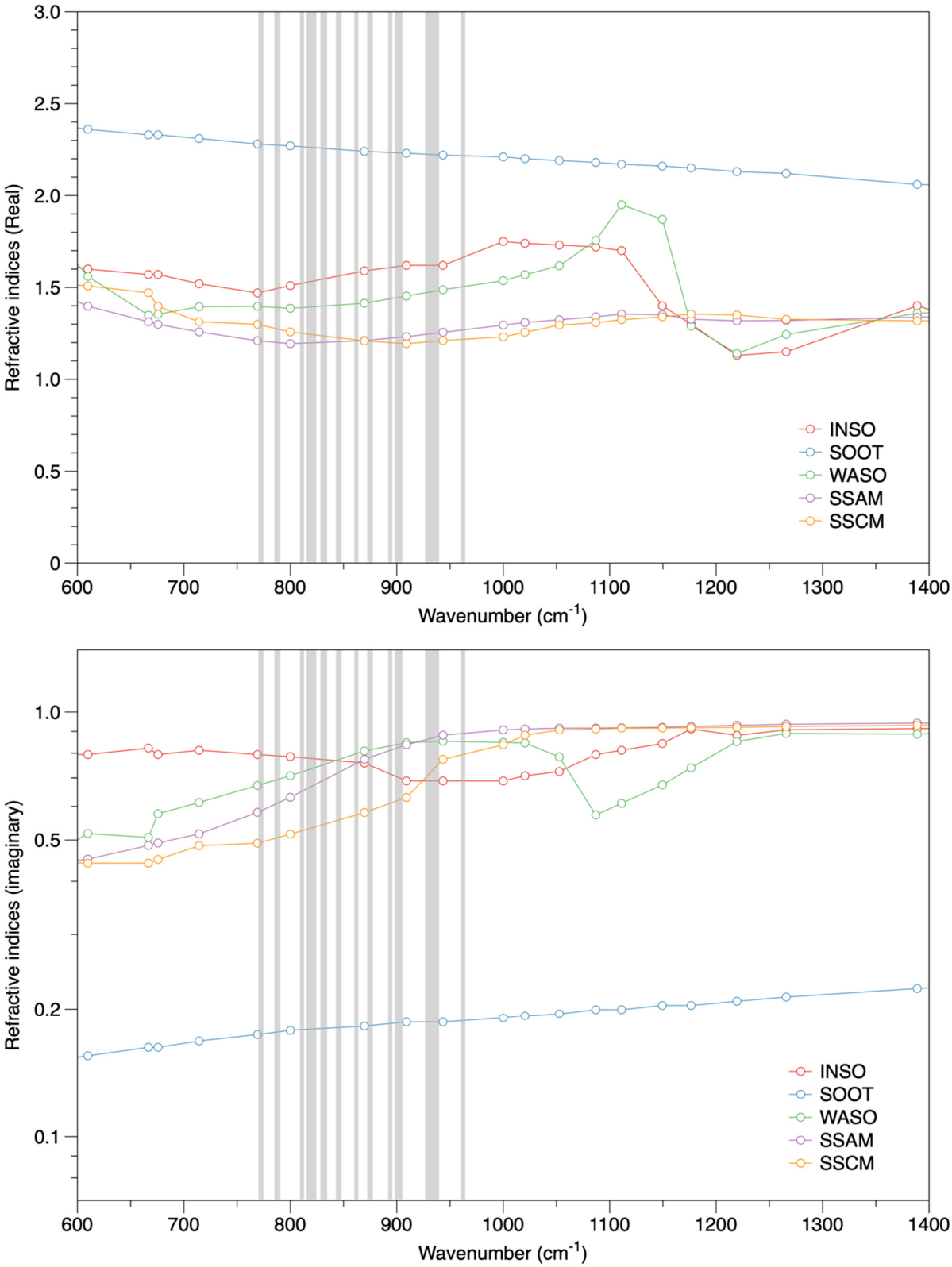

Figure S1. Refractive indices (parts of real and imaginary) of each aerosol type, insoluble (INSO), soot (SOOT), water soluble (WASO), sea salt accumulated mode (SSAM), sea salt coarse mode (SSCM), respectively. The values for WASO represent 50% of relative humidity. The gray shaded regions are the fitting window for AOD retrieval in ARAOE (Table 2 in main text).

Sensitivity Test of algorithm

We performed the sensitivity test of aerosol optical depth retrieval algorithm from the atmospheric emitted radiance interferometer using the optimal estimation method (ARAOE) using synthetic data according to the various aerosol types. The synthetic radiance spectrum that covers AERI spectral range consisted of fixed US76 atmospheric data assuming Continental Average (CA) and Maritime Clean (MC) aerosol types for various AOD conditions (0.1, 0.5, 1.0, and 1.5). The retrieved results for assuming CA, urban (UR), and MC types have varied due to the difference of optical properties (e.g., refractive indices) depending on the wavelength for each aerosol type (Figure S2 and Table S1). When the aerosol type used in retrieval algorithm was the same as the type assumed when creating the synthetic data, almost the same AOD value was derived. On the other hand, in case of different types, derived AOD for CA and UR are almost the same, and MC derived relatively low AOD compared to CA or UR. The discrepancy between the actual and derived AOD values according to the type of aerosol increases as the AOD increases. This indicated that the determination of the aerosol type is significant for retrieval of AOD.

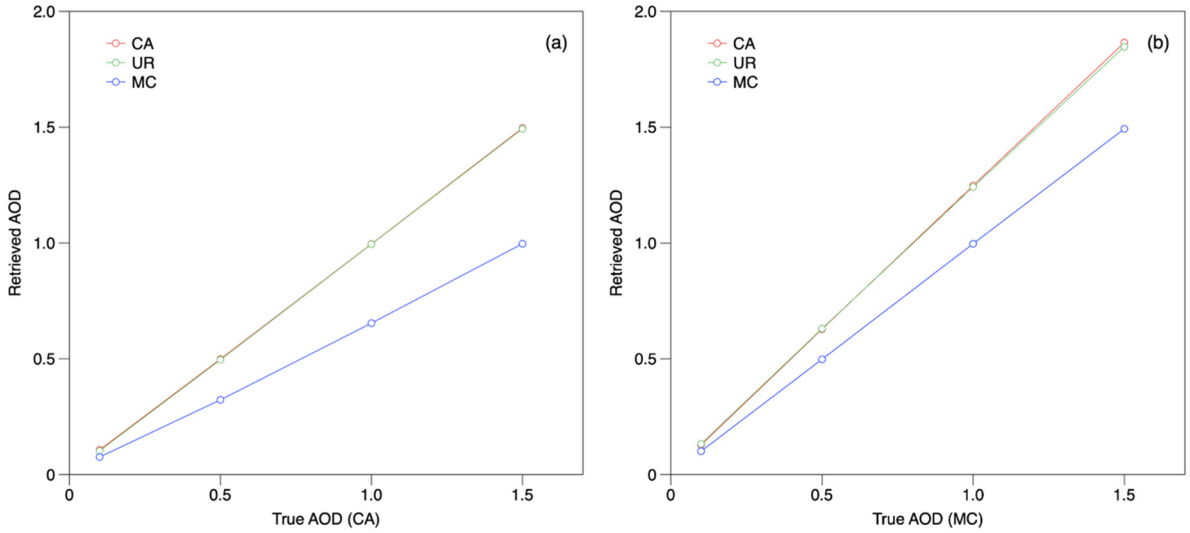

Figure S2. Sensitivity test of ARAOE using synthetic data according to the aerosol types of CA, UR, and MC, respectively. The synthetic radiance spectrum within AERI spectral range consisted of US76 atmospheric data with various AODs of 0.1, 0.5, 1.0, and 1.5 for (**a**) CA and (**b**) MC aerosol types.

Table S1: Results of retrieved AOD for different aerosol type assumption.

Reference Aerosol Type	True AOD	Retrieved AOD for Aerosol Types		
		CA	UR	MC
CA	0.1	0.107	0.103	0.076
	0.5	0.499	0.496	0.323
	1.0	0.996	0.995	0.654
	1.5	1.496	1.493	0.997
MC	0.1	0.128	0.133	0.101
	0.5	0.628	0.630	0.498
	1.0	1.248	1.242	0.997
	1.5	1.865	1.847	1.493