## Supplement of

# Measurement report: Analysis of aerosol optical depth variation at Zhongshan Station in Antarctica

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### **Supplementary Information**

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**Figure S1.** Number of observation data obtained from CE318-T at Zhongshan Station in (a) 2020, (b) 2021, (c) 2022, and (d) 2023, respectively.

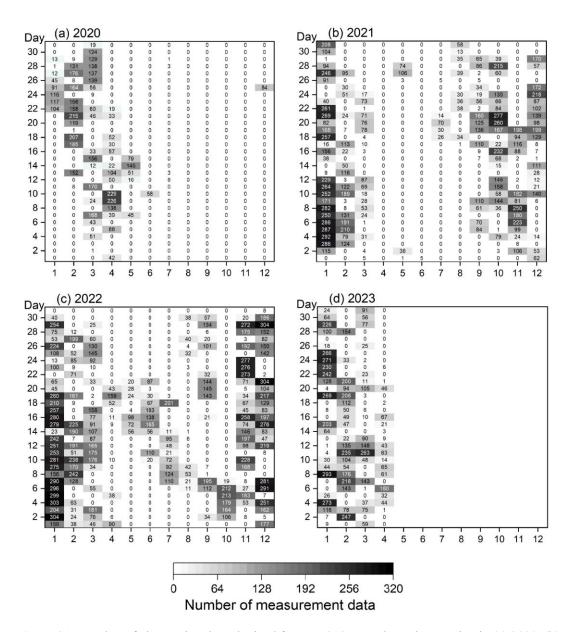
**Figure S2.** (a)-(h) the frequency histograms of aerosol optical depth at  $500_{nm}$  (AOD<sub>500 nm</sub>) and Angstrom exponent at  $440-870_{nm}$  (AE<sub>440-870 nm</sub>) in spring, summer, autumn, and winter, respectively. The red dashed lines represent the lognormal fit curves in (a)-(d), and the normal fit curves in (e)-(h), respectively.

**Figure S3.** Time series of diurnal variations of  $AOD_{500 \text{ nm}}$  and  $AE_{440-870 \text{ nm}}$  on (a) high AOD days, and (b) low AOD days, respectively. The solid blue lines represent  $AOD_{500 \text{ nm}}$  and the solid red lines represent  $AE_{440-870 \text{ nm}}$ .

Figure S4. HYSPLIT backward trajectory of (a) low AOD days and (b) high AOD days.

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**Table S1.** Dates are classified as low AOD days and high AOD days, respectively. Note: The fifth percentile value of the AOD daily mean is 0.02446, and days with an AOD daily mean below this value are classified as low AOD days; The 95th percentile value of the AOD daily mean is 0.14739, and days with an AOD daily mean above this value are classified as high AOD days.



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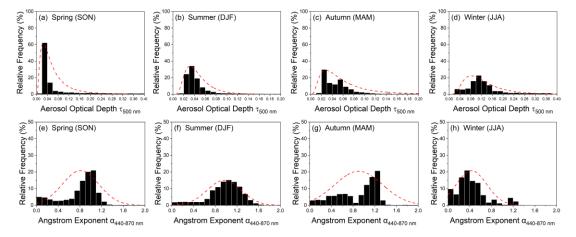
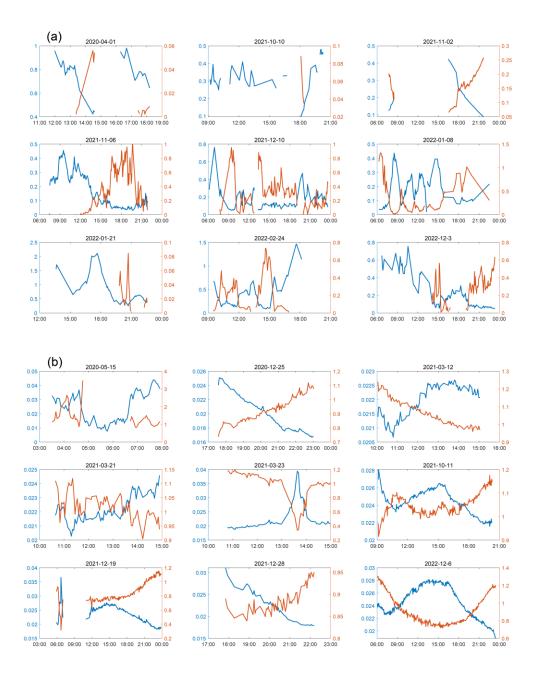


Figure S2. (a)-(h) the frequency histograms of aerosol optical depth at 500 nm (AOD<sub>500 nm</sub>) and

Angstrom exponent at 440-870 nm ( $AE_{440-870 \text{ nm}}$ ) in spring, summer, autumn, and winter, respectively. The red dashed lines represent the lognormal fit curves in (a)-(d), and the normal fit curves in (e)-(h), respectively.



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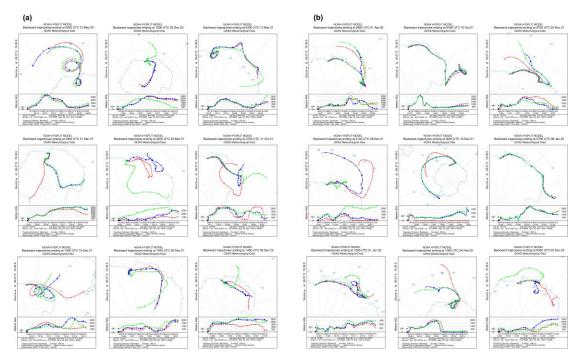


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	Low AOD Date	AOD <sub>500 nm</sub> mean	High AOD Date	AOD <sub>500 nm</sub> mean
-	2020-05-15	0.02435	2020-04-01	0.76389
	2020-12-25	0.02005	2021-10-10	0.32171
	2021-03-12	0.02193	2021-11-02	0.20771
	2021-03-21	0.0222	2021-11-06	0.16909
	2021-03-23	0.02247	2021-12-10	0.14739
	2021-10-11	0.02431	2022-01-08	0.17626
	2021-12-19	0.02329	2022-01-21	0.80477
	2021-12-28	0.02155	2022-02-24	0.34481
	2022-12-6	0.02446	2022-12-3	0.18311
	*The P5 of total AOD	maan: 0 02446	*The POS of total AOD-	maan: 0 1/730

\*The P5 of total AOD<sub>500 nm</sub> mean: 0.02446

\*The P95 of total AOD<sub>500 nm</sub> mean: 0.14739