



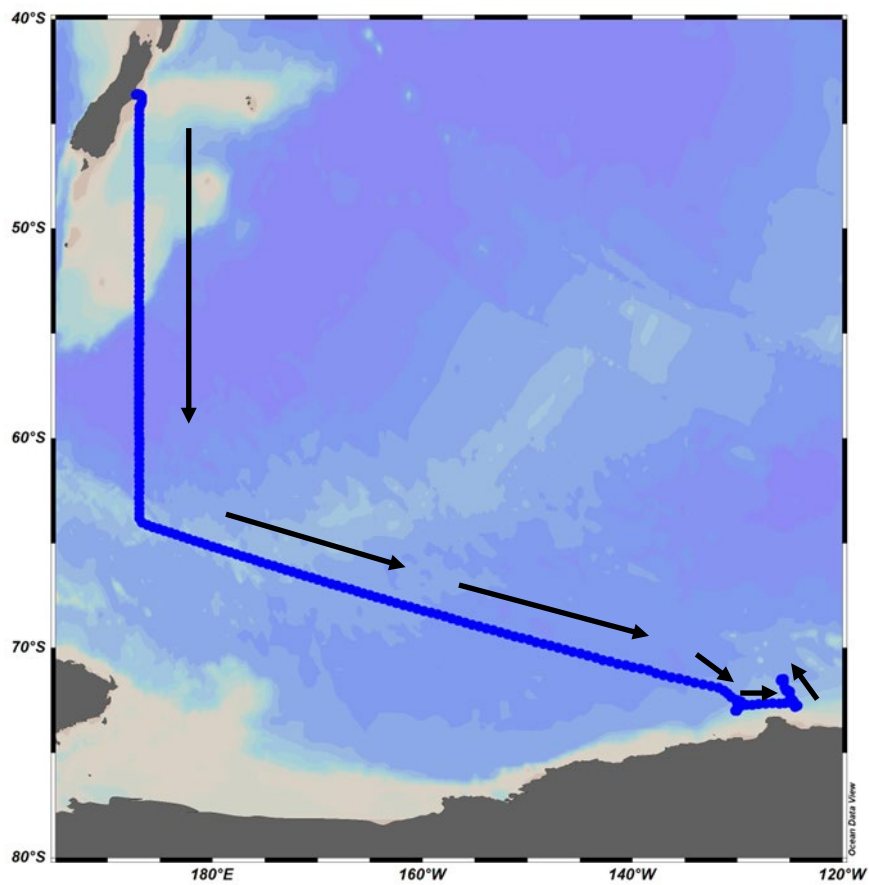
*Supplement of*

## **Cyclones enhance the transport of sea spray aerosols to the high atmosphere in the Southern Ocean**

**Jun Shi et al.**

*Correspondence to:* Jinpei Yan ([jpyan@tio.org.cn](mailto:jpyan@tio.org.cn))

The copyright of individual parts of the supplement might differ from the article licence.



**Fig. S1 The cruise tracks of the observation.**  
**(The black arrow shows the direction of the research ship)**

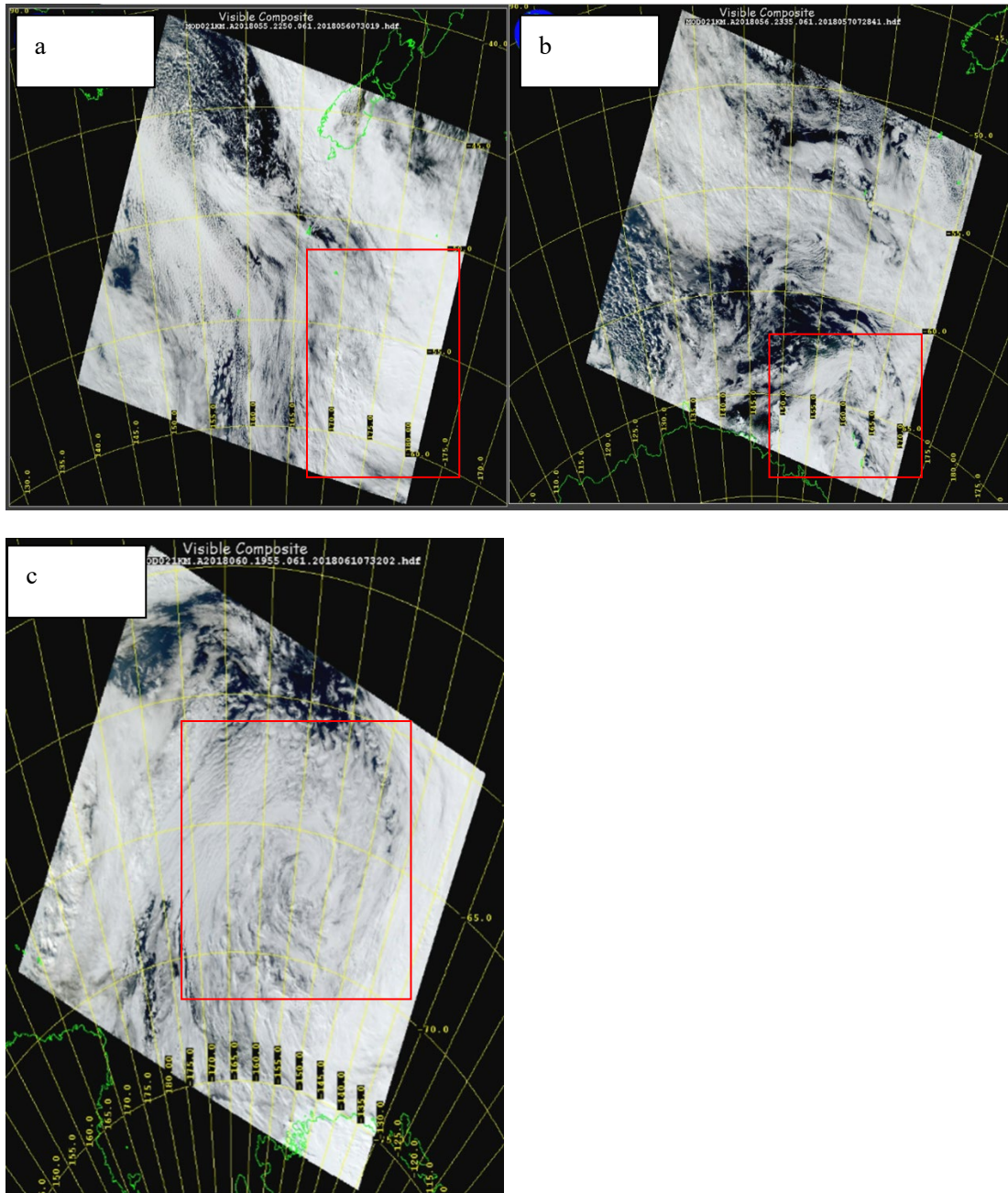
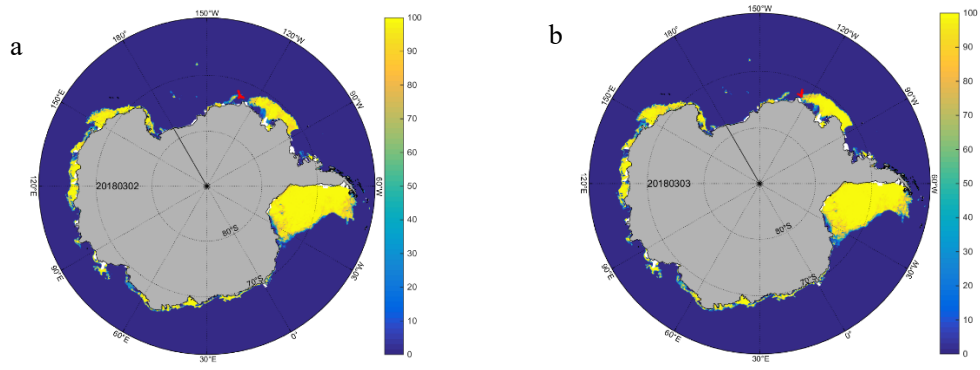
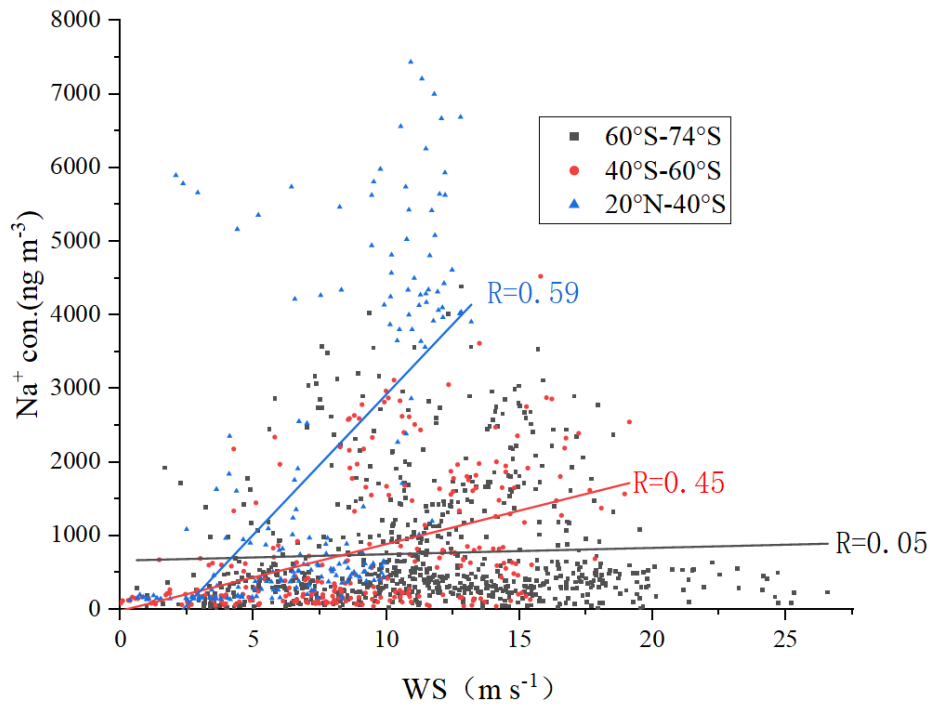


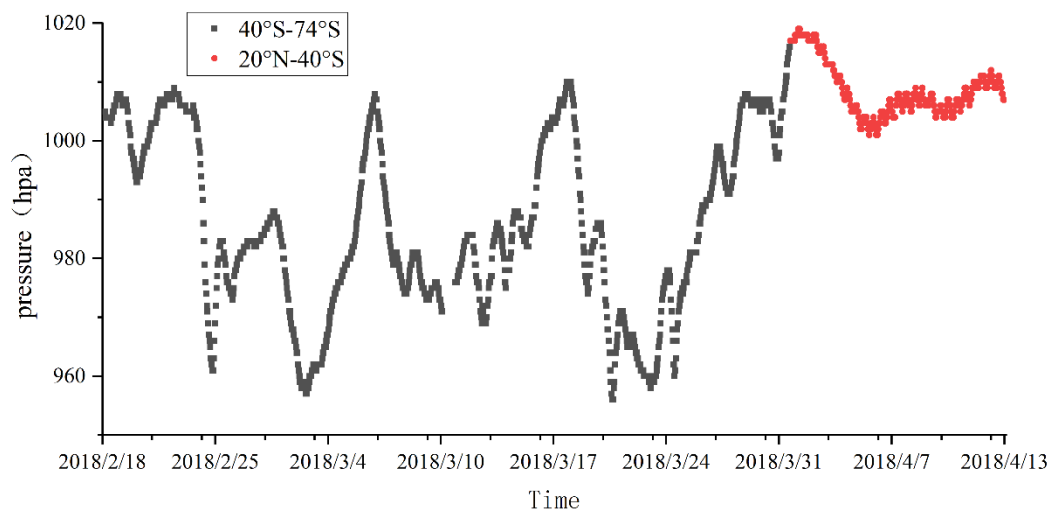
Fig. S2 The satellite cloud map of three events (a) event 1 (b) event 2 (c) event 3. (LAADS DAAC data product MOD021KM. <https://ladsweb.modaps.eosdis.nasa.gov/>)



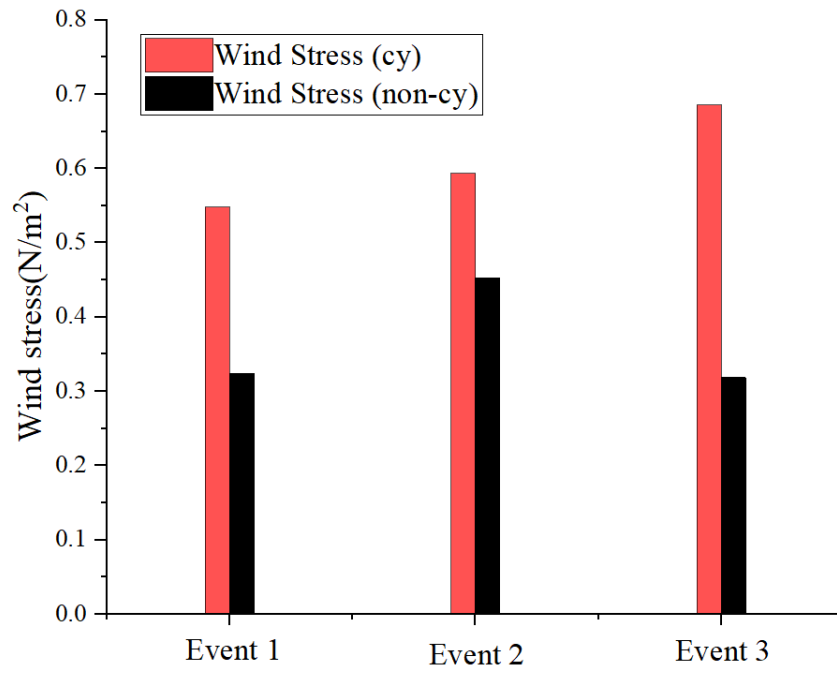
**Fig. S3 Average sea ice concentrations in the Southern Ocean, Antarctica during event 3, (a) 2 March (b) 3 March.**



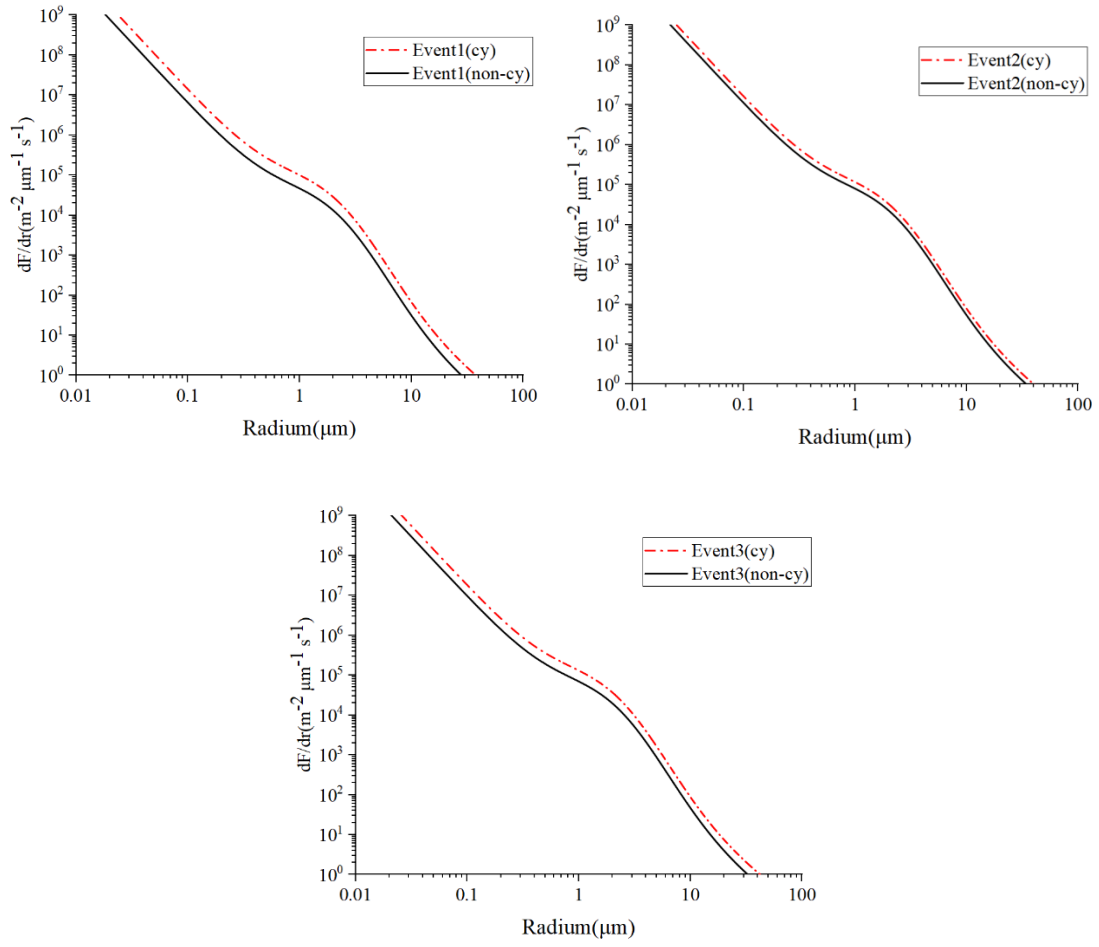
**Fig. S4 Correlation between  $\text{Na}^+$  and wind speed in regions of different latitude.**



**Fig S5. Temporal distributions of pressure during the cruise.**



**Fig. S6** The difference of wind stress between cyclonic and non-cyclonic periods



**Fig. S7** The difference of wind stress and Sea-salt flux between cyclonic and non-cyclonic periods



**Tab. S1 Correlation Coefficients Between element of Sea Spray Aerosol in the Atmospheric Aerosols Recorded in This Study. \*\*Coefficients at 0.01 Significance Level, P < 0.01.**

	Na <sup>+</sup>	Mg <sup>2+</sup>	K <sup>+</sup>	Ca <sup>2+</sup>	SO <sub>4</sub> <sup>2-</sup>
Na <sup>+</sup>	1	.997**	.950**	.597**	.892**
Mg <sup>2+</sup>	.997**	1	.956**	.598**	.891**
K <sup>+</sup>	.950**	.956**	1	.689**	.838**
Ca <sup>2+</sup>	.597**	.598**	.689**	1	.496**
SO <sub>4</sub> <sup>2-</sup>	.892**	.891**	.838**	.496**	1

**Tab. S2 Relative fraction of SSAs size distribution in different case during key events.**

Da( $\mu\text{m}$ )	Normal	Event1		Event2		Event3	
		Non-cyclone	Cyclone	Non-cyclone	Cyclone	Non-cyclone	Cyclone
<1	16.9%	28.9%	16.3%	10.0%	6.2%	24.3%	19.1%
1.1-1.2	26.1%	20.8%	22.2%	15.8%	13.7%	19.8%	19.6%
1.3-1.4	24.8%	21.6%	26.9%	26.4%	25.2%	21.7%	24.1%
1.5-1.6	17.3%	15.2%	20.7%	23.0%	26.9%	16.2%	20.3%
1.7-1.8	9.0%	8.7%	10.6%	14.4%	17.2%	10.4%	11.2%
1.9-2.0	3.9%	3.5%	2.7%	7.1%	7.9%	4.9%	4.2%
> 2	2.1%	1.34%	0.5%	3.3%	3.0%	2.7%	3.1%