Cyclones enhance the transport of sea salt aerosols to the high atmosphere in the Southern Ocean

Jun Shi[1,2], Jinpei Yan*[1,2], Shanshan Wang[1,2], Shuhui Zhao[3], Miming Zhang[1,2], Suqing Xu[1,2], Qi Lin[1,2], Hang Yang[1,2], Siying Dai[1,2]

[1]Key Laboratory of Global Change and Marine Atmospheric Chemistry, Ministry of Natural Resources, Xiamen 361005, China;

[2]Third Institute of Oceanography, Ministry of Natural Resources, Xiamen 361005, China.

[3]School of Tourism, Taishan University, Tai'an City, Shandong Province, China, 271000.

***Corresponding author**:

Jinpei Yan, Phone: 86-592-2099290, E-mail: jpyan@tio.org.cn

Address:No. 178Daxue Road, Siming District, Xiamen City, Fujian Province, China
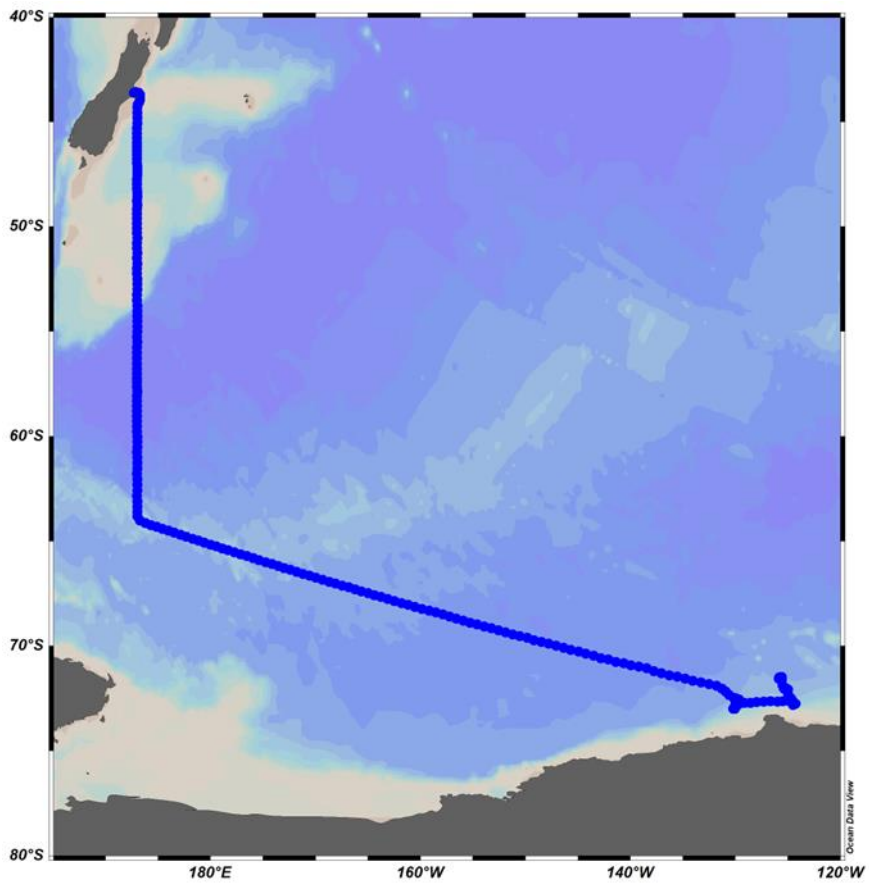
Fig. S1 The cruise tracks of the observation
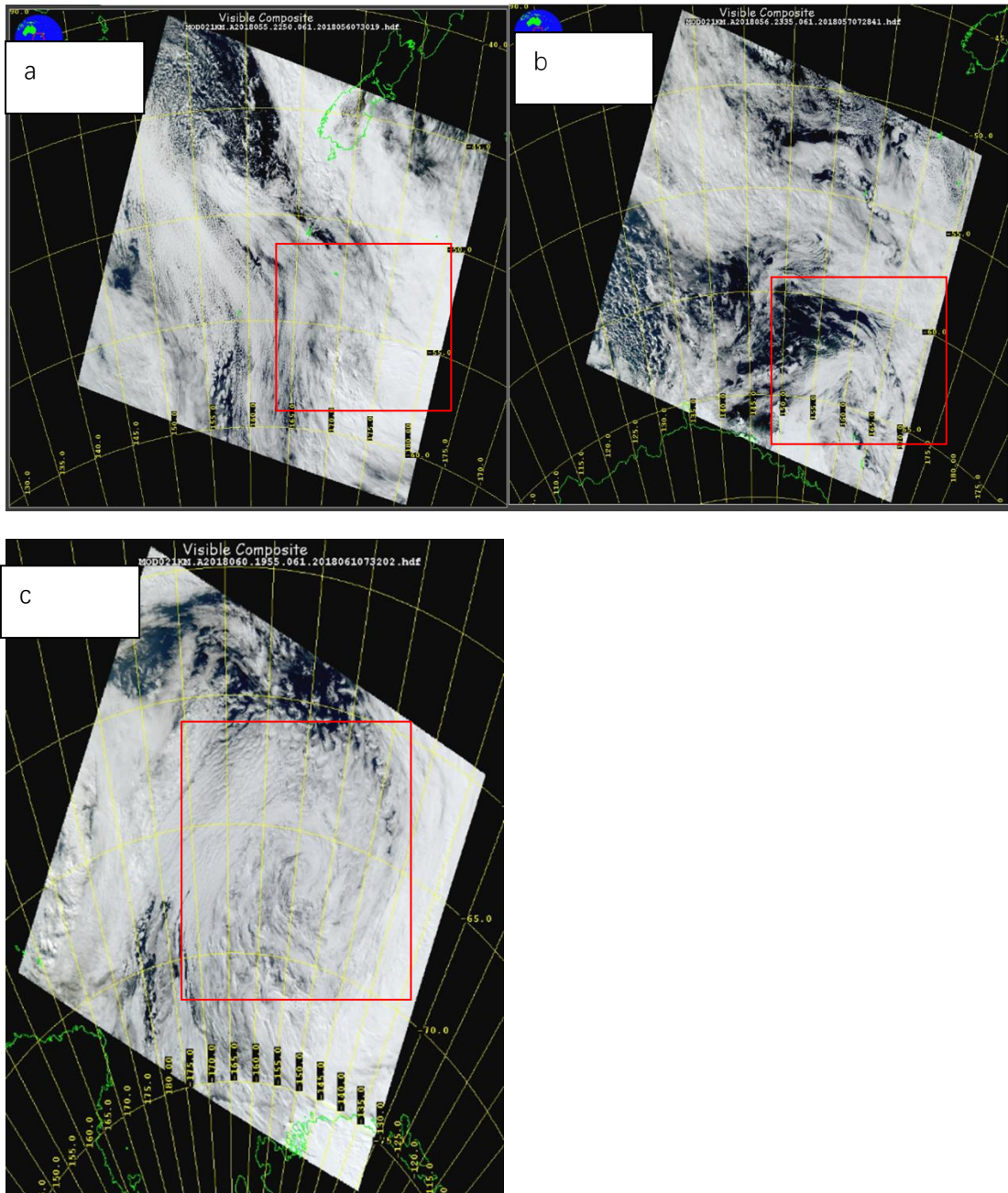
Fig. S2 The satellite cloud map of three events (a) event 1(b) event 2 (c) event 3.
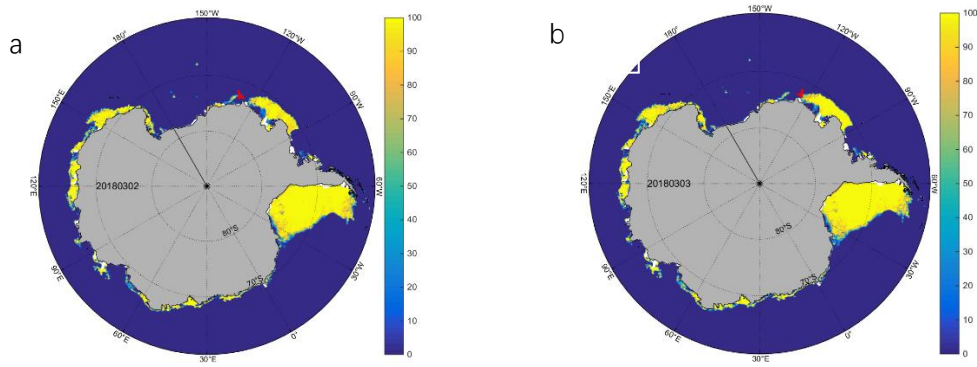
Fig. S3 Average sea ice concentrations in the Southern Ocean, Antarctica during event 3, (a) 2 March (b) 3 March.
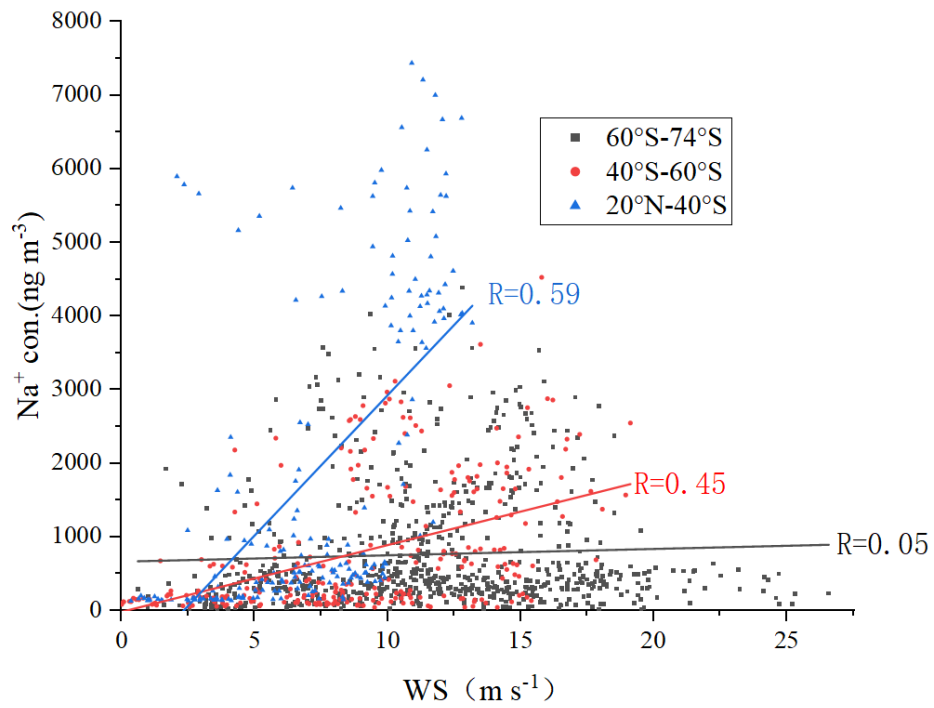
Fig. S4 Correlation between Na⁺ and wind speed in regions of different latitude.
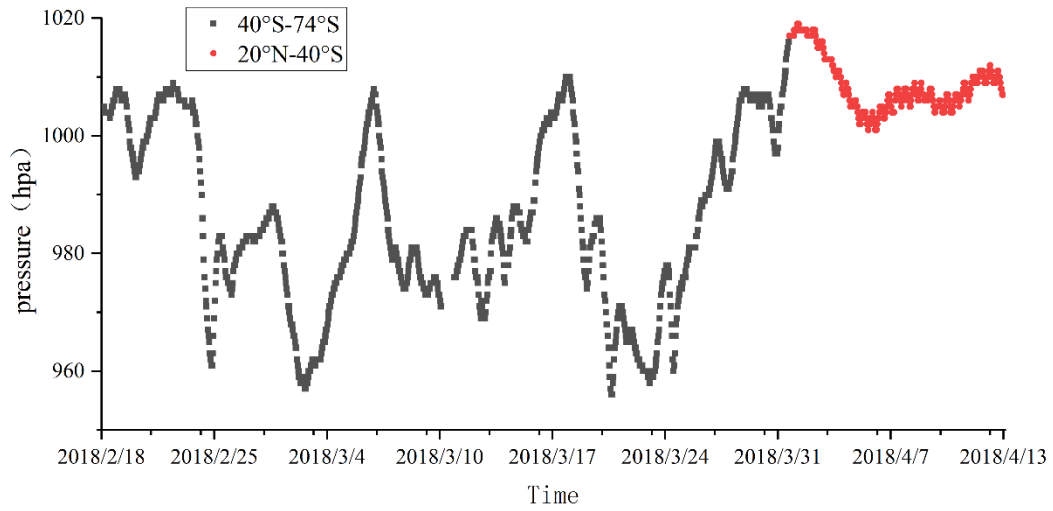
Fig S5. Temporal distributions of pressure during the cruise.

Da(μm)	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%

Table S1 Relative fraction of SSAs size distribution in different case during key events.
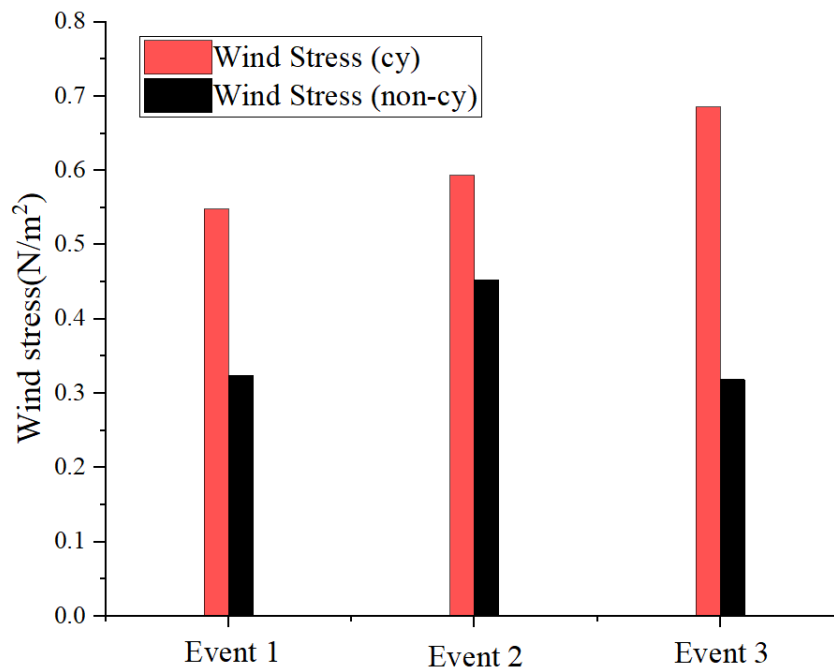
Fig. S6 the difference of wind stress between cyclonic and non-cyclonic periods
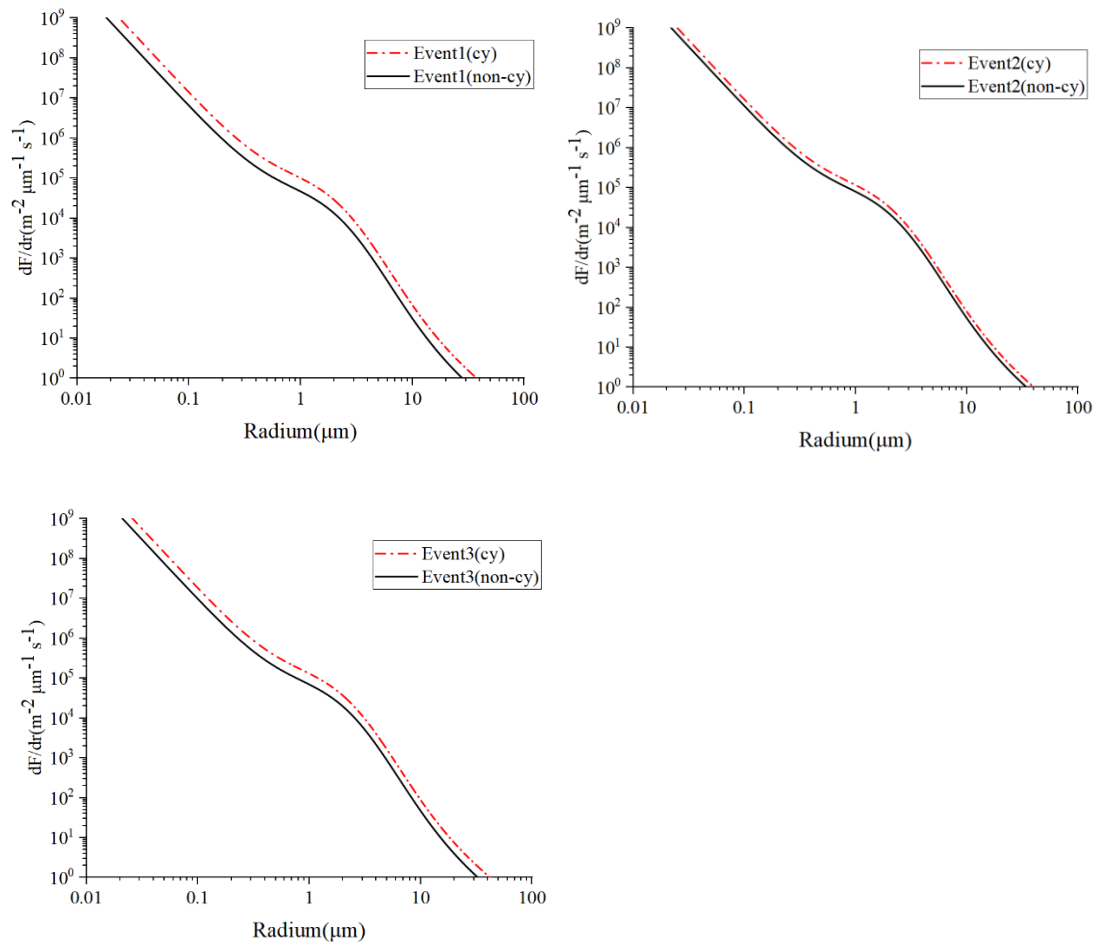
Fig. S7 The difference of wind stress and Sea-salt flux between cyclonic and non-cyclonic periods