

# 1 Supplementary Material

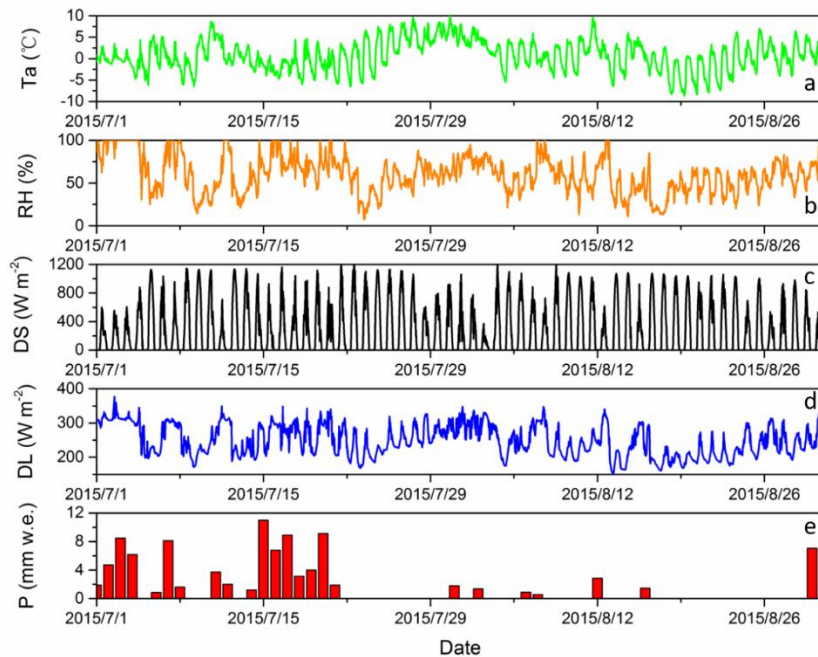
2 **Table S1.** Concentrations of TC, IC, OC, BC and Total Fe in the LHG cryoconite.

Site	TC (mg g <sup>-1</sup> )	IC (mg g <sup>-1</sup> )	OC (mg g <sup>-1</sup> )	BC (mg g <sup>-1</sup> )	Total Fe (mg g <sup>-1</sup> )
J1	17.45	5.20	10.96	1.34 (±0.06) <sup>a</sup>	47.12 (±0.21)
J2	16.52	8.54	6.75	1.20 (±0.05)	43.43 (±0.86)
J3	16.39	6.34	8.52	1.44 (±0.11)	42.03 (±0.14)
J4	17.40	6.87	8.83	1.64 (±0.07)	43.49 (±0.42)
J5	28.28	13.42	13.30	1.53 (±0.03)	37.66 (±2.11)
J6	24.44	6.80	16.26	1.47 (±0.15)	41.77 (±1.05)
J7	20.06	5.35	13.27	1.54 (±0.14)	41.50 (±0.09)
J8	22.44	5.35	15.83	1.33 (±0.10)	40.37 (±0.26)
J9	21.09	8.32	11.71	1.13 (±0.09)	39.80 (±0.53)
A1	12.36	7.47	3.96	0.96 (±0.03)	51.92 (±0.37)
A2	18.93	7.02	10.93	1.03 (±0.09)	43.92 (±0.17)
A3	15.65	6.94	7.63	1.11 (±0.04)	15.46 (±0.38)
A4	21.55	7.05	13.34	1.14 (±0.05)	38.04 (±0.45)
A5	20.37	9.87	8.95	1.65 (±0.14)	37.15 (±0.67)
A6	23.23	8.66	13.57	1.07 (±0.11)	41.03 (±0.57)
A7	22.58	8.57	12.77	1.24 (±0.00)	40.70 (±0.02)
A8	22.52	6.22	15.07	1.31 (±0.10)	42.42 (±0.91)
A9	32.49	8.21	23.06	1.34 (±0.17)	39.63 (±0.73)
A10	13.53	6.18	6.74	0.60 (±0.02)	38.29 (±1.16)
A11	20.98	6.43	13.34	1.29 (±0.11)	43.11 (±0.78)
A12	18.38	6.86	9.97	1.64 (±0.13)	42.18 (±0.04)
A13	19.20	11.71	6.15	1.31 (±0.03)	27.51 (±1.29)
A14	16.33	8.98	6.26	1.08 (±0.01)	39.98 (±0.35)

3 <sup>a</sup> Values in brackets represent the standard deviations.

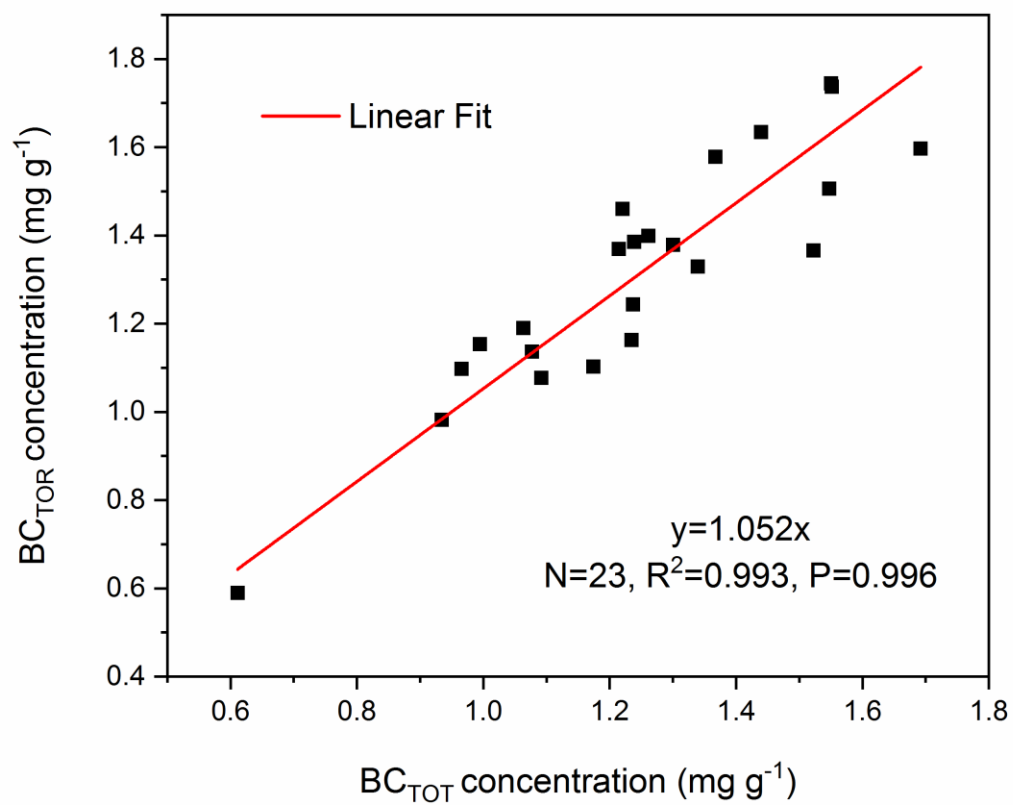
#### 4 Meteorological Measurements

5 Meteorological data were collected from an automatic weather station set up at a 1.5 m height in the  
6 LHG ablation zone (39.478 ° N, 96.535 ° E; 4550 m; Figure 1b). Air temperature, humidity, and  
7 incoming shortwave/longwave radiation data were recorded every 10 s and stored as 30-min means in  
8 a data logger (CR1000, Campbell Scientific Inc, USA) with a low temperature resistance (-55 °C). The  
9 precipitation data were obtained by a GeonorT-200B. Beijing time (BJT, or UTC +8:00) was used  
10 throughout this study, and the LHG local time was approximately 1 h 34 min later than BJT.  
11 Meteorological data for the study period (1 July to 31 August 2015) are presented in Figure S1.



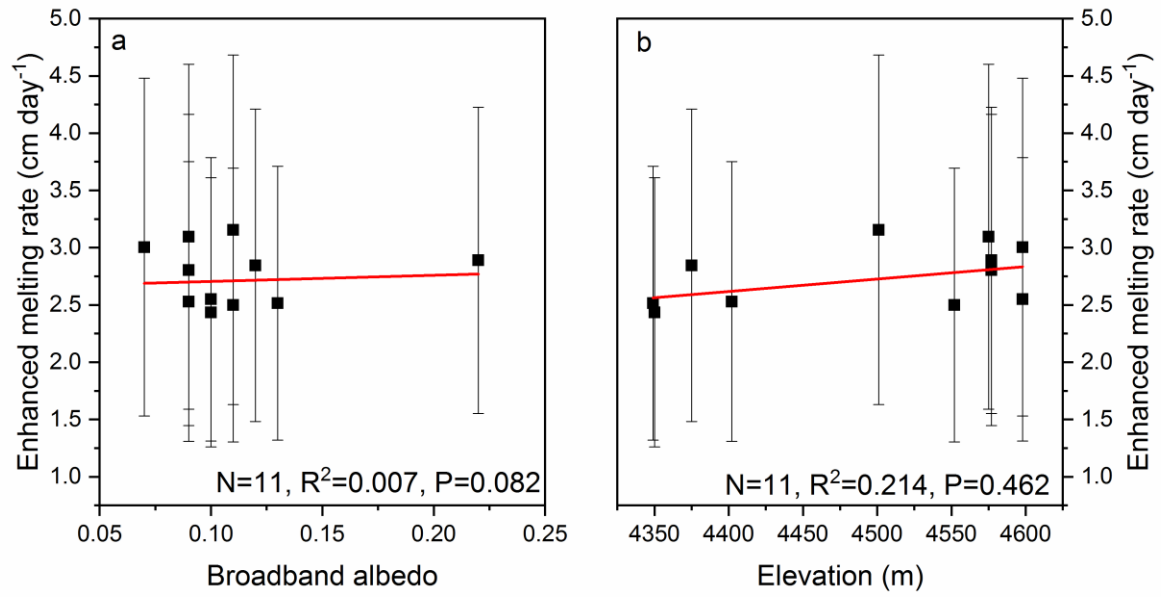
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13 **Fig. S1.** Meteorological characteristics: Half-hour mean values of (a) air temperature, (b) relative humidity, (c)  
14 incoming shortwave radiation, (d) incoming longwave radiation and (e) precipitation in the ablation zone of  
15 LHG from 1 July to 31 August 2015.



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17 **Fig. S2.** Correlation between BC<sub>TOR</sub> concentrations and BC<sub>TOT</sub> concentrations in LHG cryoconite.

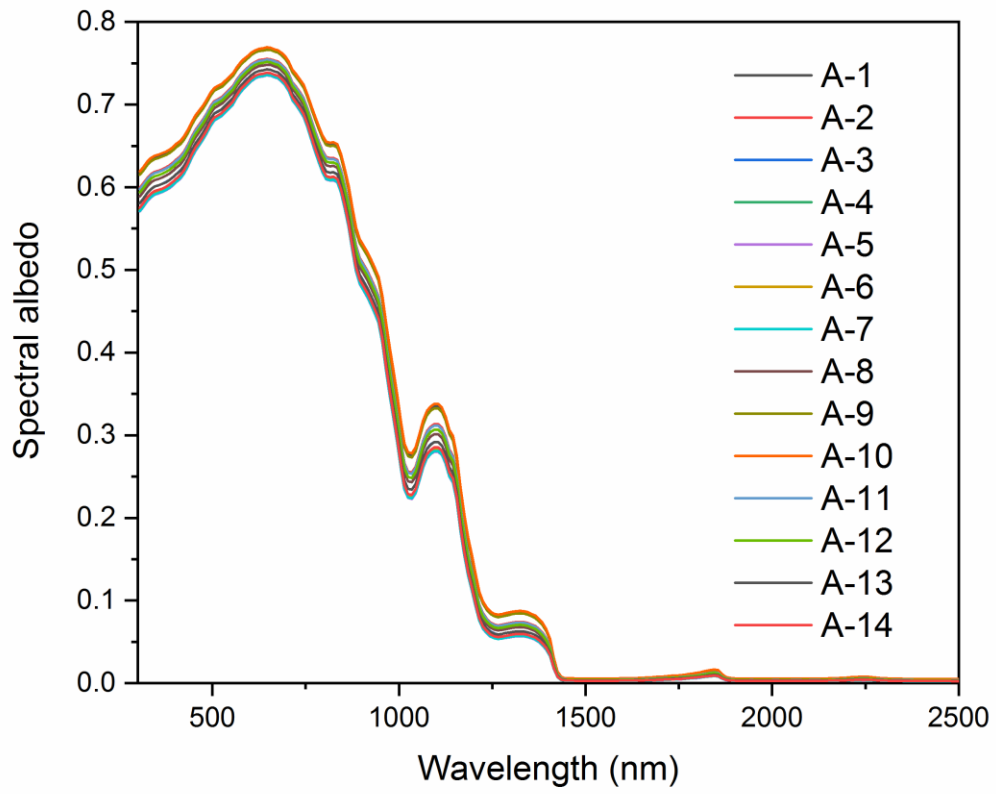


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19 **Fig. S3.** (a) Correlation between the enhanced melting rate and broadband albedos of the control plots. (b)

20 Correlation between the enhanced melting rate and elevation of the control plots in the ablation zone of

21 LHG. Error bars indicate the standard deviation.



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**Fig. S4.** Spectral albedos for the weathering crusts at A1 to A14.