

Supplementary Material

Atmospheric inputs of volcanic iron around Heard and McDonald Islands, Southern Ocean.

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Table S1. Aerosol sampling log-sheet during the ‘HEOBI’ campaign including each sample’s ID, midpoint (mid-) latitude and longitude, sampling start and recovery date and time (dd/mm/yyyy hh:mm). Samples are ordered by decreasing estimated distance (km) to the west (W) and increasing distance to the east (E) of Heard Island (HI).

Sample ID	mid-latitude	mid-longitude	Sampling start (UTC)	Sampling recovery (UTC)	Distance to HI km / orientation	
HEOBI-A7	-52.88	71.52	22/01/2016 12:00	24/01/2016 05:49	137	W
HEOBI-A8	-53.02	72.48	24/01/2016 05:55	28/01/2016 01:39	71	W
HEOBI-A10	-53.04	72.66	01/02/2016 13:26	08/02/2016 01:34	58	W
HEOBI-A9	-53.21	73.69	28/01/2016 02:09	01/02/2016 13:17	16	SE
HEOBI-A11	-52.73	74.52	08/02/2016 01:47	13/02/2016 08:01	80	NE
HEOBI-A6	-51.29	73.77	20/01/2016 09:10	22/01/2016 03:22	202	NE
HEOBI-A5	-49.85	78.62	16/01/2016 06:15	19/01/2016 09:35	504	NE
HEOBI-A12	-47.83	87.22	13/02/2016 08:19	19/02/2016 01:16	1131	NE
HEOBI-A4	-43.31	91.03	12/01/2016 14:30	16/01/2016 06:00	1686	NE
HEOBI-A3	-37.57	102.03	10/01/2016 12:45	12/01/2016 14:20	2789	NE
HEOBI-A2	-35.22	107.33	09/01/2016 13:26	10/01/2016 12:29	3304	NE
HEOBI-A13	-40.52	115.95	19/02/2016 01:30	21/02/2016 11:28	3455	NE
HEOBI-A1	-33.64	113.00	08/01/2016 10:12	09/01/2016 13:04	3783	NE

Table S2. Recoveries (%) calculated based on the digestion of n aliquots of the Arizona Test Dust (ATD) fine fraction 0–3 µm (ATD, Powder Technology Inc., USA) during this study (n=1), during the protocol assessment study (n=3) from Perron et al. (2020), and using the laboratory averaged recovery (n=7).

	Al	Cr	Fe	Mo	Ni
HEOBI (this study)	98	94	92	78*	126*
Perron et al., 2020	99		102		
Home laboratory average	103	102	96	89	122

*Measurements of Mo and Ni in aerosols were not corrected for their small deviation to 100% recovery because these elements were only used for comparing measurements obtained between samples from this study rather than comparing measurement to previous studies.

Table S3. Details associated with rock samples dredged during the “HEOBI” campaign including sample collection date and location (latitude and longitude) and a visual description of the rock.

Sample ID	Collection date	Latitude	Longitude	Visual classification	Composition	Physiographic features
R1	08/02/2016	-52.969	73.529	Lava	Basanite	Seamount North of Heard
R2	03/02/2016	-53.282	73.323	Lava	Basanite	Debris avalanche East of Heard
R3	03/02/2016	-53.251	73.230	Lava	Basalt	Debris avalanche West of Heard
R4	05/02/2016	-53.05	72.56	Lava	Phonolite	Seamount West of McDonalds
R5	29/01/2016	-53.0	72.57	Volcanic glass	Phonolite	Seamount North of McDonalds
R6	29/01/2016	-53.0	72.57	Lava	Phonolite	Seamount North of McDonalds

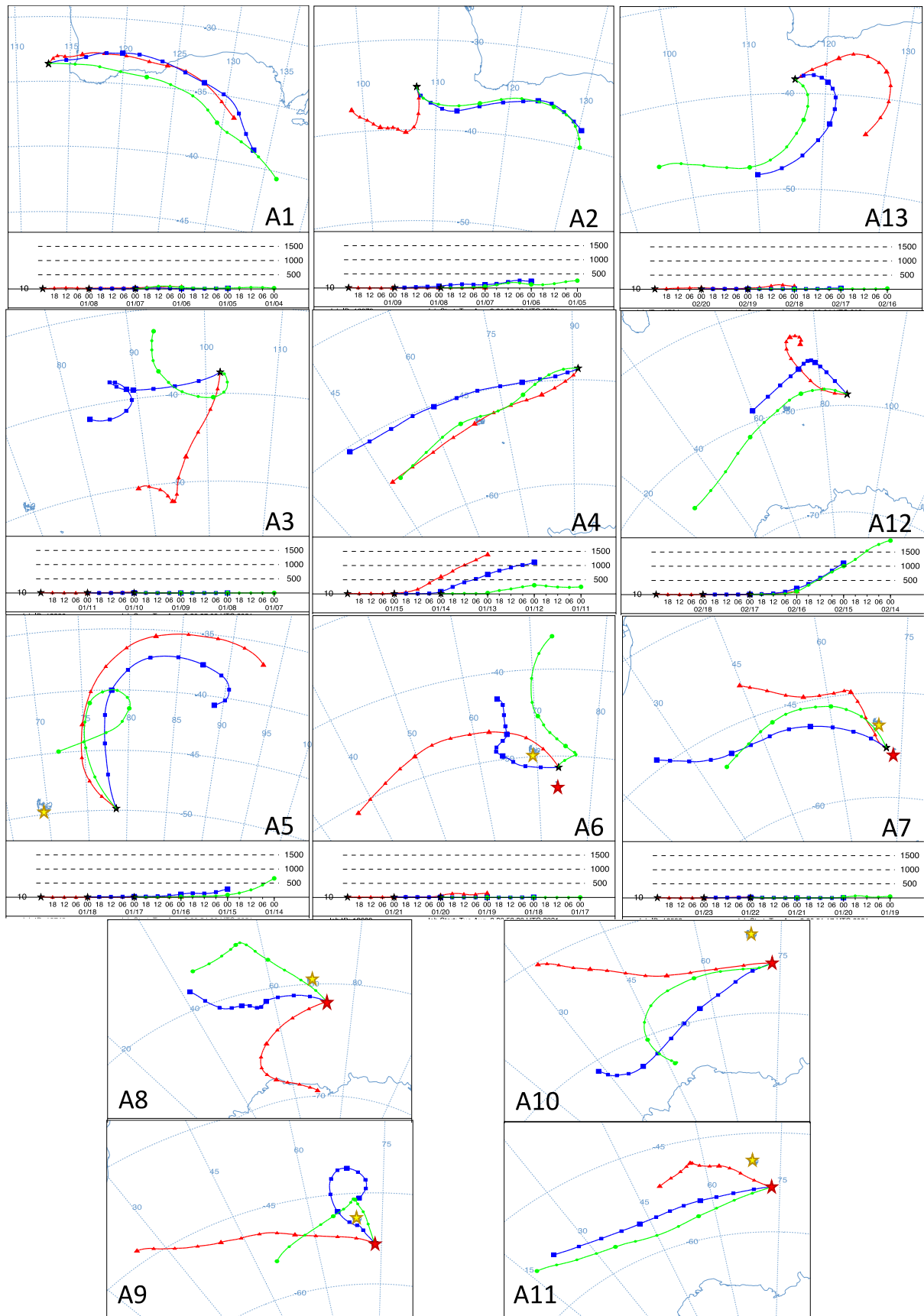


Figure S3 (part ii). Typical 3-day air-mass back-trajectories (length of most sample collection) obtained using the NOAA Air Resource Laboratory HYSPLIT online model for aerosols collected during the HEOBI campaign. Because HYSPLIT does not capture local

atmospheric features, it is only used in this study to dissociate samples receiving (a) prevailing oceanic influence (aerosols A3-A12) from the Southern Ocean; to (b) samples receiving terrestrial air-masses from the south western Australian coastline (aerosols A1, A2, and A13). When possible, the Kerguelen Islands and HIMI, are indicated by a yellow star and a red star, respectively.