

Supplement S1: Datasets description and inventory.

Professor Zubov dataset:

Daily files, in ASCII, are labelled in using the date and an extension “.zub” and “.viz” corresponding to the instrument respectively in separate folders for Zubov and Vize vessels. In the case of the Prof. Zubov each individual daily file begin with the metadata on the top lines. Metadata consists, in the following order, latitude, longitude, date, measurement beginning and ending time, vertical resolution, beginning altitude, number of levels, number of laser shots, number of point for filtering, mean signal quick look, sky background, slope of the sky background, and value used for correct counting non linearity's, ratio between two channel if operate else 0. Then follow in columns altitude (km), scattering ratio, standard deviation of the SR, temperature in Kelvin degrees, temperature in Celsius degrees, statistical temperature error. The temperature in the file is calculated from Rayleigh scattering, if aerosols exist, temperature values are underestimated (Ketchkut, 2001, Personal communication).

The vertical resolution for all the scattering ratio profiles is 300m.

Note: The file for the measurement number 28 on table S1 do not contain the number of shots. It was filled with “NaN” in the respective column.

Table S1: Inventory of the Zubov vessel lidar aerosols scattering ratio profiles form July to September 1991. Julian date for 1991. Latitude and longitude in degree with negative sign for south and east respectively. Lower and higher altitude of the profile in meters.

No.	Date	Ho	Hf	# Day	Lat	Long	Low Z	Max Z	Levels	# Shots
1	19910712	03:19:00	03:25:00	193.1	39	-28	12200	55400	175	10000
2	19910712	22:36:00	05:28:00	193.9	36	-35	12200	61700	185	30000
3	19910713	23:22:00	00:13:00	195.0	33	-40	12200	67700	225	50000
4	19910714	21:19:00	05:31:00	195.9	30	-47	12200	65300	200	51000
5	19910715	21:21:00	21:46:00	196.9	26	-52	12200	62900	209	40000
6	19910717	00:35:00	05:45:00	198.0	22	-58	12200	59300	205	60000
7	19910717	23:17:00	23:47:00	199.0	21	-59	12200	49700	191	40000
8	19910719	22:35:00	23:08:00	200.9	19	-62	12200	60200	167	40000
9	19910720	23:13:00	03:02:00	202.0	19	-63	12200	58700	149	80000
10	19910721	21:14:00	02:34:00	202.9	19	-62	12200	47600	152	70000
11	19910722	22:19:00	22:39:00	203.9	21	-62	12200	63500	175	30000
12	19910724	23:18:00	23:30:00	206.0	21	-69	12200	51500	127	20000
13	19910725	21:53:00	23:03:00	206.9	22	-70	12200	64400	179	60000
14	19910726	21:53:00	22:28:00	207.9	20	-74	12200	65900	166	40000
15	19910730	00:00:00	22:34:00	211.9	20	-74	12200	67400	120	30000
16	19910731	21:18:00	02:03:00	212.9	21	-69	12200	60200	186	90000
17	19910801	21:20:00	01:46:00	213.9	21	-64	12200	59000	145	60000
18	19910802	20:32:00	00:50:00	214.9	19	-58	12200	79400	166	60000
19	19910803	20:17:00	21:12:00	215.8	18	-53	12200	62600	186	60000
20	19910804	21:09:00	04:46:00	216.9	18	-54	12200	60500	170	70000
21	19910807	20:27:00	20:58:00	219.9	14	-57	12200	71900	161	30000
22	19910809	05:55:00	06:18:00	221.2	10	-60	12200	44300	156	20000
23	19910809	20:41:00	00:00:00	221.9	11	-60	12200	74600	172	30000
24	19910811	21:19:00	03:29:00	223.9	12	-62	12200	55400	180	40000
25	19910812	21:08:00	03:15:00	224.9	14	-67	12200	73400	161	50000
26	19910813	21:22:00	04:01:00	225.9	16	-72	12200	56900	169	40000
27	19910818	22:18:00	22:42:00	230.9	21	-69	12200	69200	155	30000
28	19910819	21:10:00	21:16:00	231.9	21	-63	12200	58400	94	NaN
29	19910821	00:51:00	01:14:00	233.0	19	-57	12200	58400	139	30000

30	19910822	00:09:00	03:40:00	234.0	18	-53	12200	67100	154	50000
31	19910823	20:43:00	21:06:00	235.9	18	-52	12200	62000	155	30000
32	19910825	20:18:00	20:24:00	237.8	16	-47	12200	40100	124	10000
33	19910826	20:26:00	23:41:00	238.9	15	-43	12200	54500	137	50000
34	19910829	20:04:00	20:21:00	241.8	10	-29	12200	56600	150	20000
35	19910903	21:19:00	21:38:00	246.9	8	-25	12200	53600	178	30000
36	19910904	19:41:00	05:54:00	247.8	9	-24	12200	57500	158	80000
37	19910905	20:12:00	20:31:00	248.8	8	-24	12200	58100	126	30000
38	19910908	19:35:00	22:42:00	251.8	8	-24	12200	56600	119	25000
39	19910909	20:05:00	03:53:00	252.8	8	-24	12200	64400	132	30000
40	19910912	21:17:00	05:47:00	255.9	12	-22	12200	58400	157	80000
41	19910913	20:34:00	05:42:00	256.9	15	-21	12200	50000	162	95000
42	19910914	20:55:00	02:49:00	257.9	18	-20	12200	65600	108	40000
43	19910915	19:21:00	05:20:00	258.8	21	-19	12200	49100	145	60000
44	19910916	23:17:00	04:49:00	260.0	25	-18	12200	61700	150	50000
45	19910917	22:05:00	06:20:00	260.9	27	-16	12200	53000	150	90000
46	19910918	22:18:00	03:03:00	261.9	30	-15	12200	56900	184	60000
47	19910919	21:14:00	01:38:00	262.9	35	-13	12200	47900	142	40000
48	19910921	20:34:00	20:48:00	264.9	43	-10	12200	67700	149	20000

Professor Vize dataset:

In the case of the Prof. Vize each individual daily file begin also with the metadata on the top lines, containing in the following order latitude, longitude, date, vertical resolution, beginning altitude, number of steps and number of laser shots. Then only two columns altitude (km) and scattering ratio follow. No information on the time the measurements began and ended is provided.

Table S2: Inventory of the Vize vessel lidar aerosols scattering ratio profiles form January and February 1992. Julian date for 1992. Latitude and longitude in degree with negative sign for south and east respectively. Lower and higher altitude of the profile in meters. Original SR files did not contain the hours the measurements were conducted.

No.	Date	# Day	Lat	Long	Low Z	Max Z	Levels	Shots
1	19920126	26	-8	-2	12300	40200	94	833
2	19920127	27	-4	-8	12300	40200	94	333
3	19920128	28	0	-12	12300	40200	94	1200
4	19920129	29	4	-16	12300	40200	94	1200
5	19920130	30	9	-18	12300	40200	94	1200
6	19920131	31	14	-20	12300	40200	94	1200
7	19920201	32	20	-19	12300	40200	94	851
8	19920204	35	34	-13	12300	40200	94	1200
9	19920206	37	43	-11	12300	40200	94	1200
10	19920219	50	56	18	12300	40200	94	1200
11	19920220	51	59	27	12300	40200	94	1200

Both datasets are available at PANGAEA open access data repository:

Antuña-Marrero, J. C., Mann, G., Keckhut, P., S. Avdyushin, B. Nardi and and L. W. Thomason, Ship borne lidar measurements in the Atlantic of the 1991 Mt Pinatubo eruption. PANGAEA, <https://doi.pangaea.de/10.1594/PANGAEA.912770> , 2020.