Supplement of

The recovery and re-calibration of a 13-month aerosol extinction profiles dataset from searchlight observations from New Mexico, after the 1963 Agung eruption.

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Table T1: List the observations grouped by the same nights they were conducted.

Obs #	Date Observ.			Hours (< 00 MST)				No.	Hours (> 00 MST)				No.
1	1963	Dec	12						1963	Dec	12	0103	1
2	1963	Dec	13	1963	Dec	12	2242	1					
3	1963	Dec	15						1963	Dec	15	0335	1
4	1963	Dec	17	1963	Dec	16	2020 2123 2217	3	1963	Dec	17	0007 0200 0256	3
5	1963	Dec	18	1963	Dec	17	2142 2230 2340	3	1963	Dec	18	0036 0135 0231	3
6	1963	Dec	19	1963	Dec	18	2040 2100 2205	3	1963	Dec	19	0047 0215 0303 0425	4
7	1964	Feb	14	1964	Feb	13	2130 2330	2	1964	Feb	14	0056 0238 0336	3
8	1964	Feb	15	1964	Feb	14	2304	1					
9	1964	Feb	16						1964	Feb	16	0305 0353	2
10	1964	Feb	17	1964	Feb	16	2033	1					
11	1964	Feb	18	1964	Feb	17	2327	1	1964	Feb	18	0115 0304	2
12	1964	Mar	14						1964	Mar	14	0120 0200	2
13	1964	Mar	15	1964	Mar	14	2045 2225	2	1964	Mar	15	0235 0403	2
14	1964	Apr	9	1964	Apr	8	2238 2343	2	1964	Apr	9	0050 0154 0250	3
15	1964	Apr	11	1964	Apr	10	2033	1	1964	Apr	11	0200 0253	2
16	1964	Apr	13	1964	Apr	12	2008 2110 2214	3	1964	Apr	13	0018 0058 0219 0320	4
17	1964	Apr	14	1964	Apr	13	2215 2315	2	1964	Apr	14	0020 0125 0232 0330	4
18	1964	Apr	15	1964	Apr	14	2002 2300	2					
19	1964	Apr	16	1964	Apr	15	2240 2340	2	1964	Apr	16	0038 0130 0220	3
20	1964	May	8						1964	May	8	0215 0305	2
21	1964	May	9	1964	May	8	2150	1	1964	May	9	0035 0205	2
22	1964	May	10	1964	May	9	2108 2216	2	1964	May	10	0308	2
23	1964	May	11	1964	May	10	2305	2					
24	1964	Jun	9	1964	Jun	8	2234	1	1964	Jun	9	0122 0243	2
25	1964	Jun	10	1964	Jun	9	2050 2200	2					
26	1964	Jun	11						1964	Jun	11	0003	1
27	1964	Jun	12	1964	Jun	11	2100 2325	2					
28	1964	Jul	6						1964	Jul	6	0145 0305	2
29	1964	Jul	7	1964	Jul	6	2231	1					
30	1964	Sep	3						1964	Sep	3	0046 0138	2
31	1964	Oct	3	1964	Oct	2	2040 2217 2347	3	1964	Oct	3	0142 0303	2
32	1964	Oct	6	1964	Oct	5	1945	1					
33	1964	Nov	4						1964	Nov	4	0230 0419	2
34	1964	Nov	6	1964	Nov	5	2241	1	1964	Nov	6	0028	1
35	1964	Dec	11	1964	Dec	10	2240	1					
36	1964	Dec	12						1964	Dec	12	0023 0200 0300 0358	4

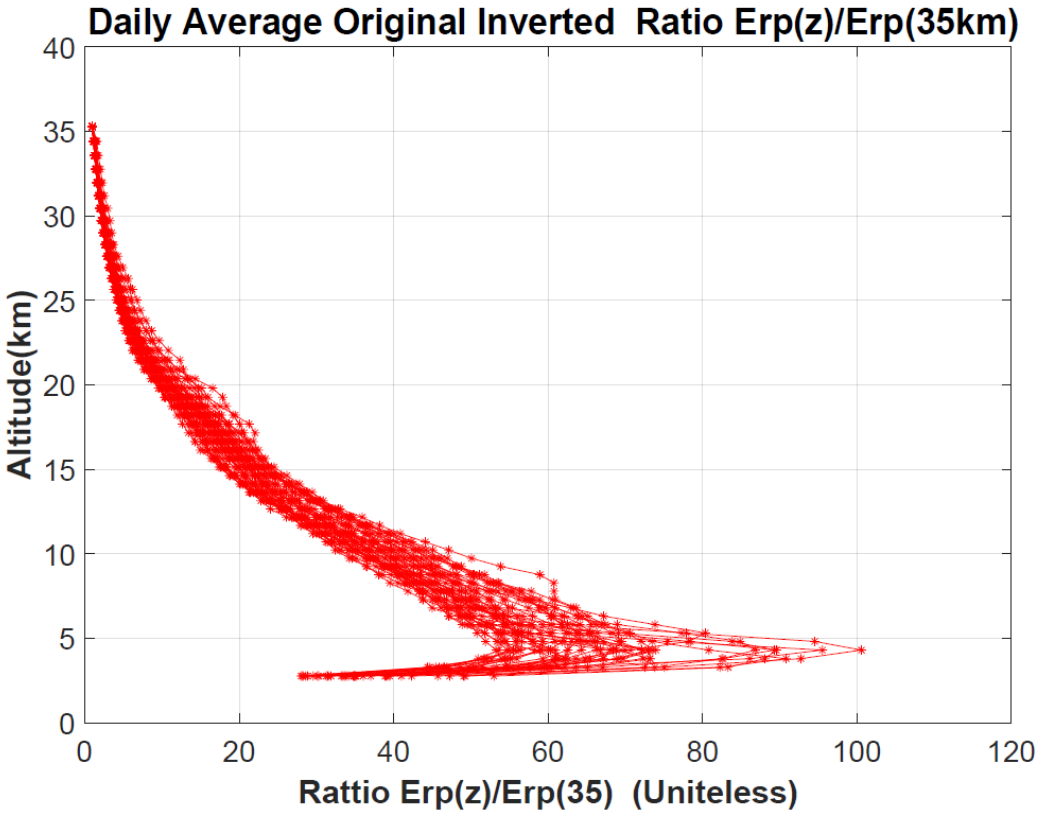

Figure S1: Plot of the36 daily averaged $\frac{E_{rp}(z)}{E_{rp}(35)}$ *profile, showing the inflection point in all the profiles in a point located at 4.3 km (level 4*

Molecular, aerosol and ozone transmission algorithm validation

The algorithm used to calculate $T_r^*(z)$, $T_p^*(z)$ and $T_{O3}^*(z)$ was tested with the commercially available MODTRAN-4 atmospheric radiation transfer code, run in the transmittance mode (Berk et al., 1998). In the cases of $T_r^*(z)$, and $T_{O3}^*(z)$, the tests were conducted using the molecular and ozone profiles from the 1976 US Standard Atmosphere (U.S. Standard Atmosphere, 1976) both for the algorithm and for MODTRAN-4. In the case of $T_p^*(z)$ the combined profiles for desert aerosol extinction in the troposphere and moderate volcanic stratospheric aerosols in the stratosphere aerosols, in the embedded in the MODTRAN-4 code, was used. The purpose of this combined profile was to resemble the conditions at White Sands.

Figure 2S shows the transmissions calculated by the self-designed algorithm and the MODTRAN-4 code. It shows a high level of agreement at all levels for both $T_r^*(z)$, $T_{O3}^*(z)$ and almost at all except around 5 km for $T_p^*(z)$.The mean values of the absolute percent differences between the transmission calculated using the slant path algorithm and calculated using the MODTRAN-4 code showed that transmission errors are 0.17% for $T_r^*(z)$, 0.04% for $T_{O3}^*(z)$ and lower 1.17 % for $T_p^*(z)$ in the 5 to 35 km layer. The error for $T_p^*(z)$ from 10 to 35 km decreases to 0.8%.

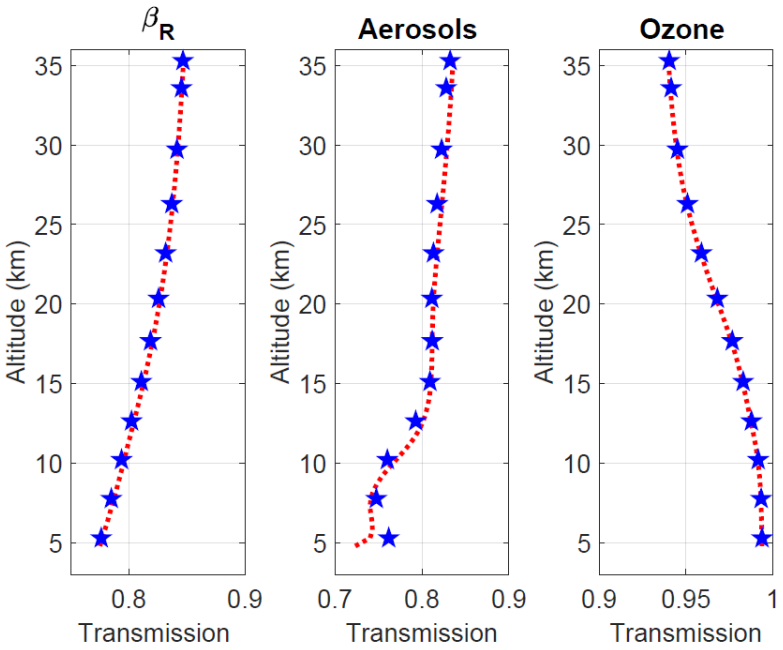

Figure S2: Comparison of the molecular, aerosol and ozone transmissions, calculated with the algorithm we designed (red discontinuous lines) and the MODTRAN 4 code (markers in blue).