

1 **Supplement A - A New Method for Measuring Optical Scattering Properties of Atmospherically**
2 **Relevant Dusts Using the Cloud and Aerosol Spectrometer with Polarization (CASPOL)**

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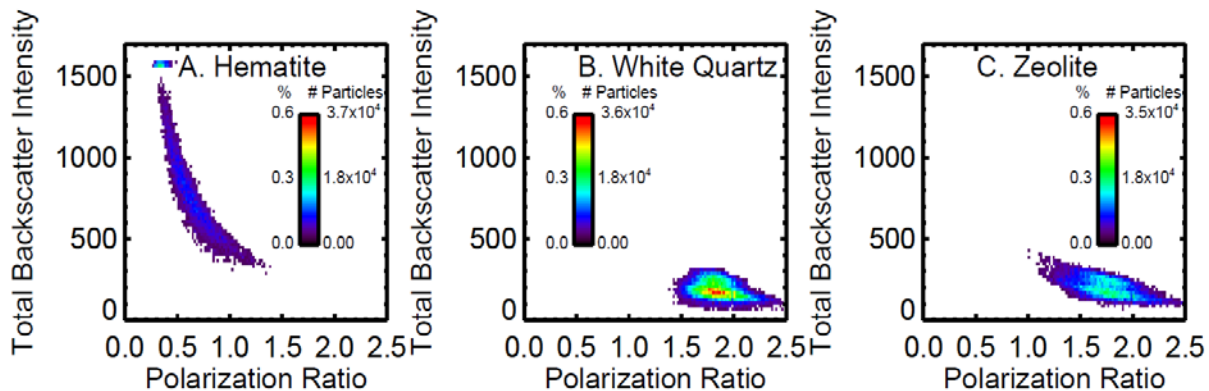
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13 While the laboratory data collected by the CASPOL is very promising, one consideration is that
14 the particle concentrations generated in this study are drastically higher than those in the atmosphere.
15 To test of the feasibility of using CASPOL to sample dust storm particles in-situ, we have produced
16 scattering signatures based on an atmospherically relevant number concentration of particles during a
17 high dust event. Iwasaka et al. (1983) reported dust concentrations of 50 cm^{-3} (upper atmosphere) and
18 225 cm^{-3} (lower atmosphere) during an Asian dust event. Similar values have been reported by Gringel
19 and Muhleisen (1977) and Prodi and Fea (1979). Thus, we estimate that a CASPOL mounted on an
20 aircraft during flight through a hypothetical dust storm would sample ~ 50 dust particles per cm^{-3} or
21 more. Assuming the standard CASPOL flow rate (1.2 L min^{-1}), $\geq \sim 60,000$ particles would be detected
22 in a one minute sampling period within the dust storm. Applying the analysis technique described in
23 Section 3.5, we generated signature plots for 60,000 particles of each dust type instead of the original
24 concentrations approximately 10^5 particles.

25 The results of this estimation can be seen in Figure S1, which shows that for the three
26 representative dusts discussed, the shape, position and relative intensities of the signatures are
27 comparable to the ones generated from the data with much larger aerosol concentrations (Figure 9).
28 Thus we conclude that the same three Groups may be established, and that such data might be obtained
29 when flying through a dust storm or during other intense atmospheric dust phenomena even when
30 sampling times may be quite short.

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33 **Figure S1. The total backscatter intensity vs. polarization ratio for representative members of the**
 34 **optical scattering Groups A (hematite), B (white quartz) and C (zeolite), using a total number of**
 35 **particles of 60,000.**

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37 **Supplemental References**

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