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The white-light humidified optical particle spectrometer (WHOPS) – a novel airborne system to characterize aerosol hygroscopicity

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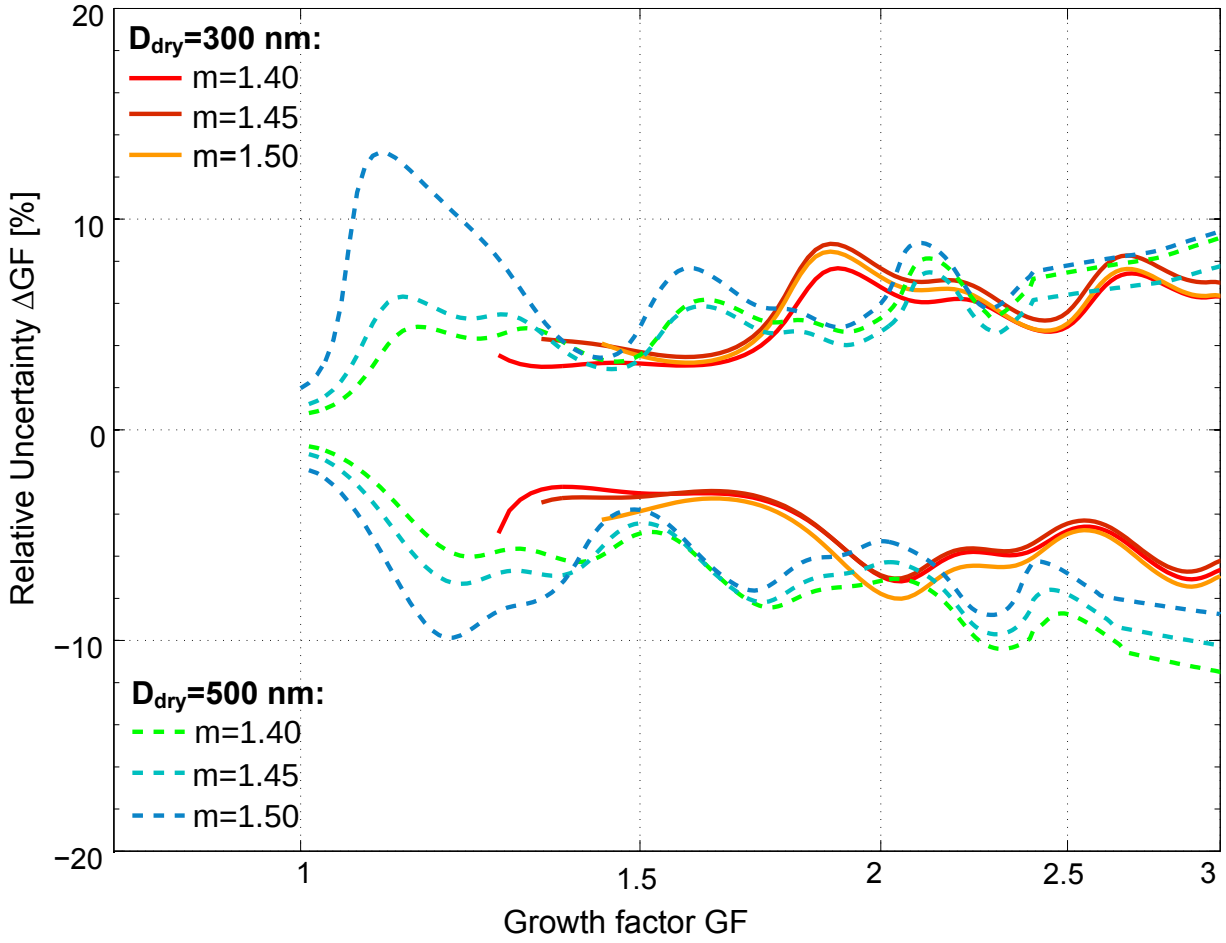

Figure S1. Relative uncertainty of the GF measured by the WHOPS arising from the accuracy and precision of the scattering cross section.

Figure S1 illustrates the relative uncertainty of the GF arising from the accuracy and precision of the scattering cross section as described in Sec. 3.1.4 of the manuscript. Results are shown for dry particle diameters of 300 (red and orange colors) and 500 nm (green and blue colors) for three different indices of refraction, i.e., 1.40, 1.45 and 1.50. The calculations for m=1.50 are equivalent to the results presented in Fig. 9, except for the fact that Fig. 9 separately shows the individual contributions to GF uncertainty from the accuracy and precision of the scattering cross section as well as the ambiguity uncertainty. Here the combined effect of accuracy and precision of the scattering cross section are displayed. Ambiguity uncertainty is not taken into account in this figure for two main reasons: for the 300 nm particles the ambiguity uncertainty dominates in the range GF<~1.4 (see Fig. 9), however, particles in this GF range cannot be reliably detected in the WHOPS as discussed in Sec. 3.1.1. Therefore, the lines for 300 nm particles are only drawn for GFs above the threshold, where ambiguity uncertainty becomes smaller than other uncertainties. On the other hand, both the 300 and 500 nm particles are influenced by the ambiguity uncertainty above GF~5 and ~3, respectively. Nevertheless, particles are anyways rarely expected at GF>3. Besides, it can be seen that the positive and negative uncertainty is not symmetric, which is due to non-linear Mie curves. This figure shows that the GF uncertainty, for the displayed GF range, only weakly depends on variations of the effective index of refraction. Thus we can conclude that the error estimates given in Fig. 9 and the associated discussion, are representative for field measurements done by the WHOPS.