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Supporting Information for

Pollen as atmospheric cloud condensation nuclei

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Contents of this file

Introduction

This supplementary information provides supporting data for the above manuscript. Text information includes detailed acknowledments for the individual station observations used in Figure 4.

Figure S1 shows the individual data points used to calculate S_c as shown in Figure 2 of the main manuscript. Within the CCN counter, SPP were exposed to a series of supersaturations with respect to water to determine the CCN/CN ratio for the given pollen type and particle size. Error for the S_c calculation (noted in text) is determined from the variance of the error from the Matlab nonlinear fit, and represents the error in S_c due to the nonlinear fit function.

Figure S2 shows the composition of single 200 nm SPP particles evaluated with Energy Dispersive X-ray Spectrometry (EDS) (IXRF Sedona SD Model SDD 3030-300C+) detector after coating with iodine vapor[36] and gold for the evaluation of composition of the 200 nm samples.

Figure S3 shows the effects of time in solution on the calculation of critical supersaturation for one pollen type (Quercus).

Text S1.

Surface pollen count data from 74 stations in the Northeastern and Southeastern United States was generated by the National Allergy Board of the American Academy of Allergy, Asthma and Immunology (AAAAI) and was utilized in Figure 4 of the manuscript. This data was graciously provided by the following researchers: David Shulan, M.D. (Certified Allergy Consultants, Albany, NY), Guy Robinson, PhD (The Louis Calder Center, Armonk, NY), Kim T. Hovanky, MD FAAAAI & Sheila M. Amar, MD FAAAAI, FACAAI (Allergy & Asthma Center of Georgetown, Austin, TX (Georgetown)), Jonathon Matz, MD FAAAAI & David Golden, MD FAAAAI (Dr.

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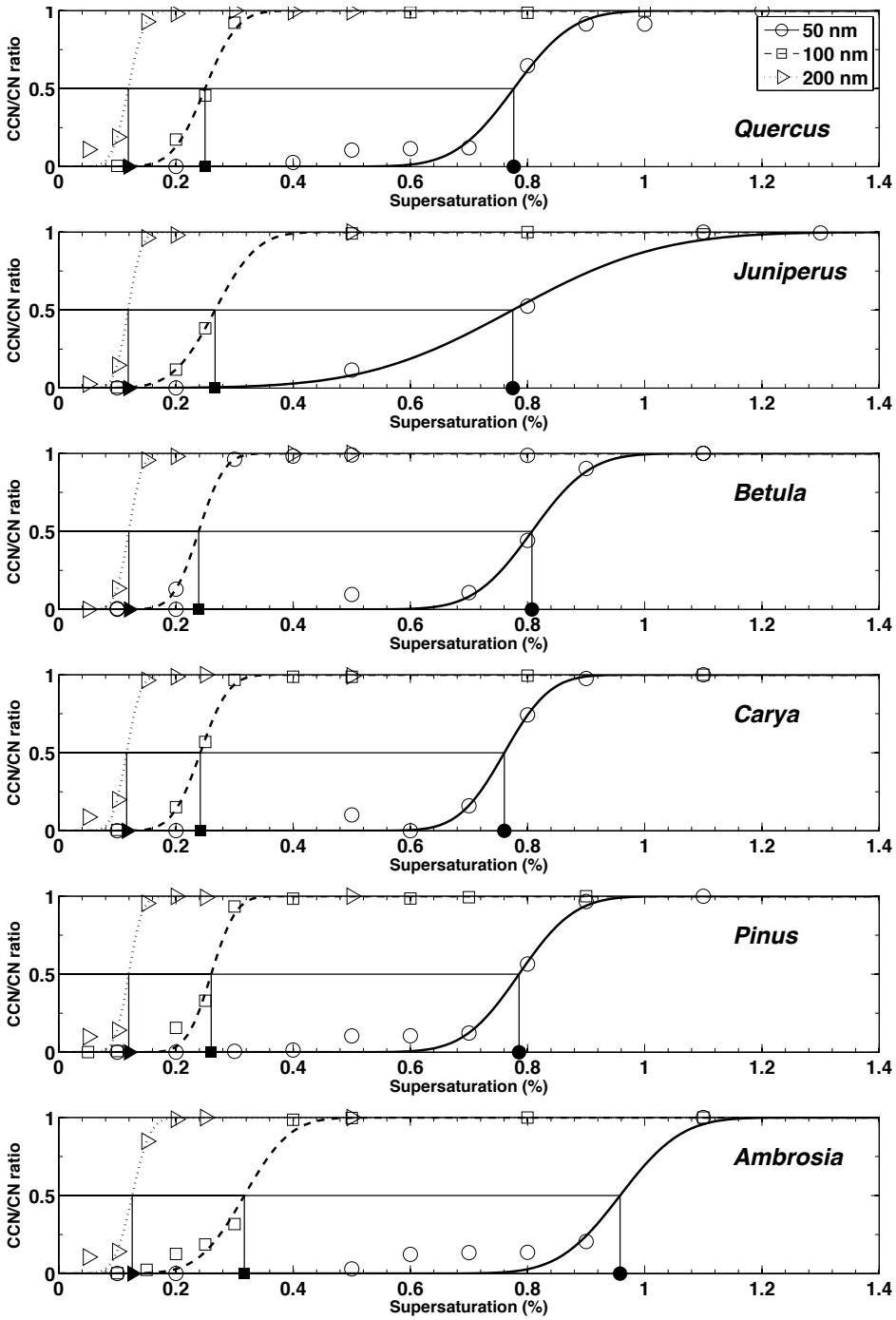

Figure S1. Determination of S_c for each size and pollen type. For each pollen type, total CCN and CN counts were measured at a range of five to ten supersaturation values (open symbols; circles = 50 nm, squares = 100 nm, and triangles=200 nm). Each size and pollen type was fitted with a nonlinear function (solid line=50 nm, dashed line =100 nm, and dotted line=200 nm) to determine the growth curve of each particle type over a range of supersaturations specified by the CCN instrument. S_c is determined when the CCN/CN ratio is 0.5 (thin lines and solid symbols on x-axis). S_c values (solid symbols) for each size and pollen type are shown in Figure 2.

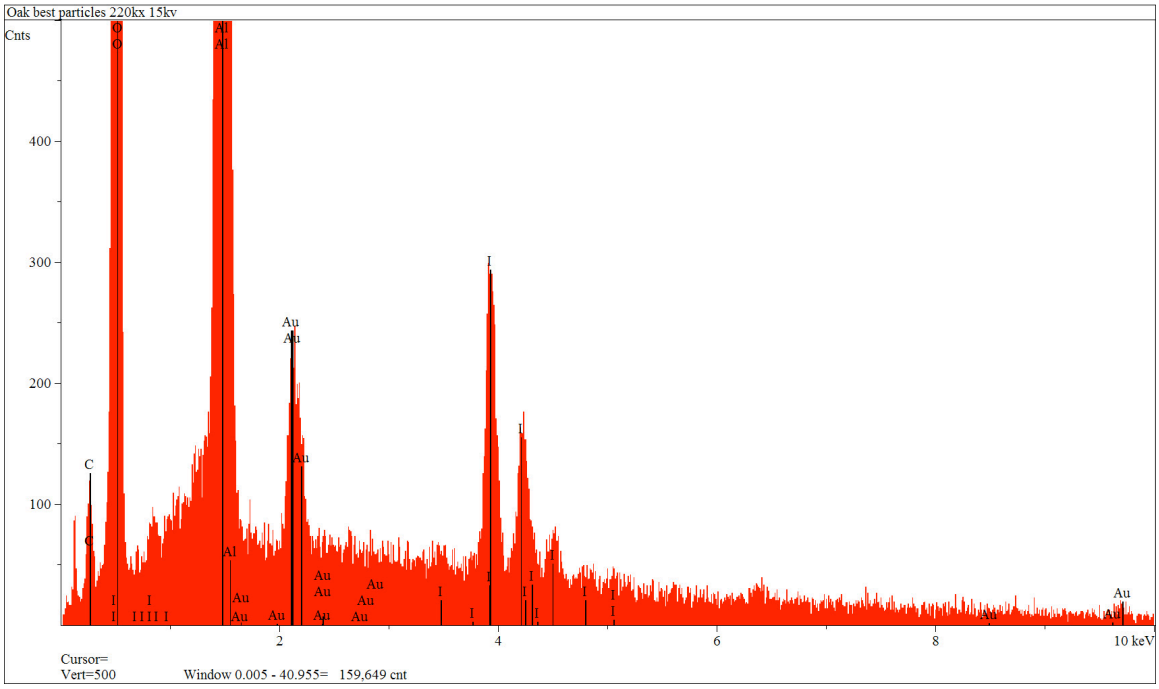

Figure S2. Energy-dispersive X-ray Spectroscopy (EDS) elemental composition of *Quercus* sub-pollen particles (SPP). SPP samples were collected on aluminum foil upon exiting the DMA, then exposed to iodine vapor to test the presence of starch. Samples were also treated with gold coating to enhance images. Elemental composition (in order of strongest signal) shows the presence of aluminum from the background material (~1.5 keV), oxygen from organic matter (~1 keV), iodine indicating the presence of starch (3.5-4.5 keV), gold from the visualization coating (2-3 keV) and carbon from organic matter (0.5 keV).

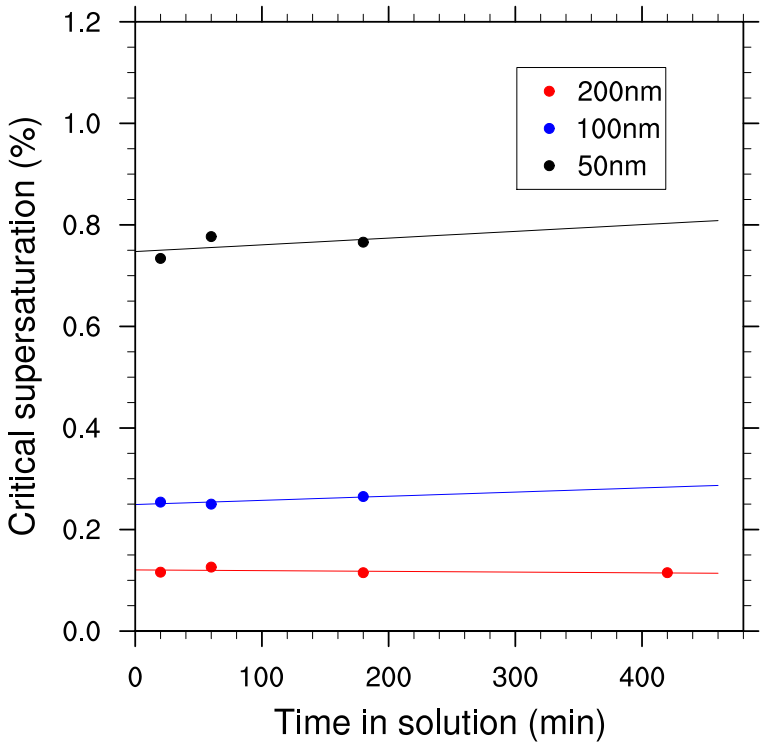

Figure S3. Effects of pollen solution timing on the determination of S_c. Time in solution is defined as the length of time (minutes) of the live pollen sample in solution prior to filtering and atomization.