Table 1. Measured growth factors, average volume weighted refractive indices, and retrieved refractive indices for all substances at 532 nm and 355 nm, at 80 % and 90 % RH. The retrieved dry refractive indices are also shown.

			532 nm		355 nm	
	Dry refractive index		m=1.504(±0.015) + *i*0.0(±0.028)		m=1.507(±0.024) + *i*0.005(±0.025)	
			80% RH	**90% RH**	**80% RH**	**90% RH**
Ammonium sulfate	Growth Factor	This study	1.44(±0.02)	1.77(±0.25)	1.44(±0.02)	1.77(±0.25)
		Literature	1.46 (±0.01)[a,b,c]	1.69(±0.01)[a,b]	1.46 (±0.01)[a,b,c]	1.69(±0.01)[a,b]
		% Difference	1.4	4.6	1.4	4.6
	Ref. Index	Volume Weighted	m=1.39(±0.02) + *i*0.0	m=1.370(±0.02) + *i*0.0	1.40(±0.02) + i0.00(±0.03)	1.39(±0.02) + i0.00(±0.03)
		Retrieved	m=1.437(±0.03) + *i*0.02(±0.04)	m=1.328(±0.01) + *i*0.0(±0.03)	1.42(±0.03) + i0.0(±0.04)	1.41(±0.06) + i0.0 (±0.04)
		% Diff (n)+i(k)	3 + *i*200	3.1 + *i*0	1.5 + i0	2.6 + i0
	Dry refractive index		m=1.558(±0.005) + *i*0.033(±0.007)		m=1.541(±0.034) + i0.18(±0.066)	
IHSS Pahokee peat	Growth Factor	This study	1.09(±0.01)	1.17(±0.02)	1.09(±0.01)	1.37(±0.02)[f]
		Literature	1.07(±0.01)[d]	1.12(±0.01)[d]	1.07(±0.01)[d]	1.23(±0.01)[d]
		% Diff	1.85	4.4	1.85	10.8
	Ref. Index	Volume Weighted	m=1.514(±0.004) + *i*0.026(±0.007)	m=1.503(±0.009) + *i*0.025(±0.007)	1.497(±0.034) + i0.139(±0.066)	1.424(±0.034) + i0.07(±0.066)
		Retrieved	m=1.495(±0.006) + *i*0.053(±0.009)	m=1.517(±0.008) + *i*0.025(±0.014)	1.578(±0.047) + i0.171(±0.072)	1.415(±0.045) + i0.064(±0.053)
		% Diff (n)+i(k)	1.3 + *i*68	0.9 + *i*0	5.3 + i20	0.6 + i8.9
	Dry refractive index		m=1.595(±0.031) + *i*0.154(±0.021)		m=1.431(±0.034) + i0.178(±0.066)	
AS :Nig[g]	Growth Factor	This study	1.28(±0.02)	1.45(±0.02)	1.28(±0.02)	1.45(±0.02)
		Literature	1.29(±0.02)[e]	1.45(±0.1)[e]	1.29(±0.02)[e]	1.45(±0.1)[e]
		% Diff	0.8	0	0.8	0
	Ref. Index	Volume Weighted	m=1.431(±0.031) + *i*0.084(±0.021)	m=1.396(±0.031) + *i*0.046(±0.021)	1.388(±0.034) + i0.084(±0.066)	1.378(±0.034) + i0.058(±0.066)
		Retrieved	m=1.40(±0.01) + *i*0.086(±0.013)	m=1.329(±0.008) + *i*0.04(±0.017)	1.402(±0.037) + i0.079(±0.058)	1.377(±0.05) + i0.087(±0.064)
		% Diff (n)+i(k)	2.2 + *i*2.3	4.9 + *i*14	1.0 + i6	0.01 + i40
	Dry refractive index		m=1.626(±0.021) + *i*0.243(±0.023)		m=1.568(±0.056) + i0.305(±0.171)	
Nigrosine	Growth Factor	This study	1.12(±0.02)	1.24(±0.1)	1.12(±0.02)	1.24(±0.1)
		Literature	1.15[h]	1.34[h]	1.15[h]	1.34[h]
		% Diff	2.6	7.8	2.6	7.8
	Ref. Index	Volume Weighted	m=1.544(±0.021) + *i*0.174(±0.023)	m=1.493(±0.021) + *i*0.132(±0.023)	1.508(±0.056) + i0.217(±0.171)	1.465(±0.056) + i0.160(±0.171)
		Retrieved	m=1.464(±0.004) + *i*0.216(±0.014)	m=1.504(±0.012) + *i*0.168(±0.024)	1.542(±0.066) + i0.249(±0.14)	1.477(±0.058) + i0.145(±0.087)
		% Diff (n)+i(k)	5.3 + *i*21.5	0.7 + *i*24	2.2 + i14	0.8 + i9.8

[a] Gysel et al., 2002; [b] Dinar et al., 2008; [c] Sjogren et al., 2007; [d] Brooks et al., 2004 [f] Measurement performed at 95 % RH; [e] Derived using the ZSR relation; [g] 1:1 molar ratio. [h] Taken from: https://sciencepolicy.colorado.edu/events/rendezvous/2007/posters/II21K.pdf.

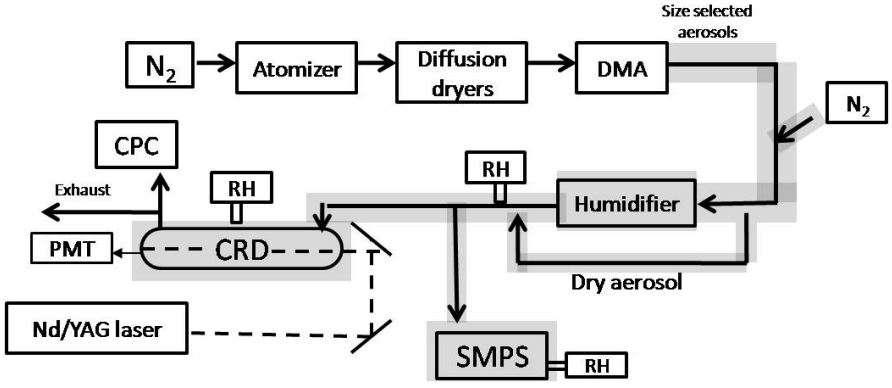

Fig. 1. Schematic of the laboratory setup. The bold arrows show the aerosol flow and the dotted lines represent the laser's light paths. The temperature and relative humidity meters are marked as "RH". Abbreviations: CPC, condensation particle counter; PMT, photomultiplier; DMA, differential mobility analyzer.

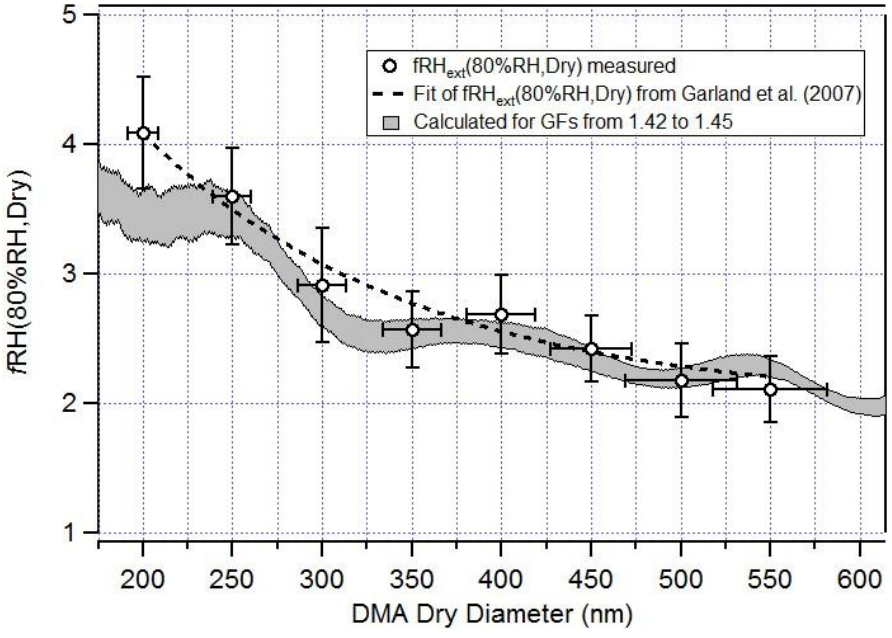

Fig. 2. Measured $f\mathrm{RH}_{ext}$(80 % RH,Dry) as a function of size (solid circles) for pure ammonium sulfate. The dashed line shows the exponential fit from the measurements performed by Garland et al. (2007) for ammonium sulfate at the same RH. The shaded area is the calculated $f\mathrm{RH}_{\mathrm{ext}}$ (80 % RH, Dry) range, based on the growth factors measured with the SMPS.

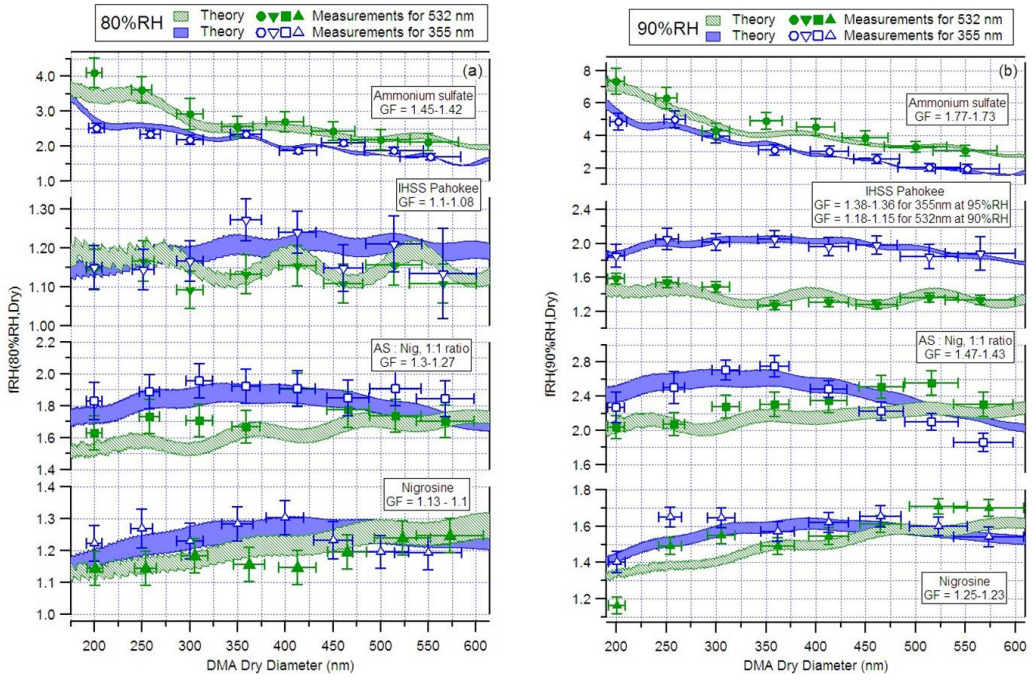

Fig. 3. Size dependence of $f\mathrm{RH}_{\mathrm{ext}}$ (80 %RH,Dry) **(a)** and $f\mathrm{RH}_{\mathrm{ext}}$(90 %RH,Dry) **(b)** for pure ammonium sulfate (top panel; circles), IHSS Pahokee peat (inverted triangles). the mixture of ammonium sulfate and nigrosine at 1 : 1 molar ratio (squares), and pure nigrosine (triangles) at 532 nm(full green markers) and 355 nm (open blue markers). The shaded areas represent the theoretical size dependence calculated from the measured growth factors from the SMPS. The data for the growth factors are indicated in the legend.

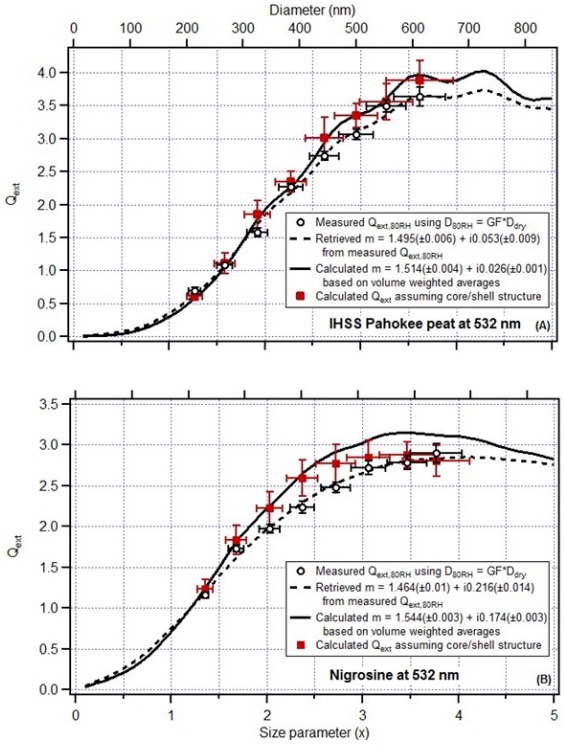

Fig. 4. Extinction efficiency vs. size at 80% RH for Pahokee peat aerosol. The open circles represent the measured $Q_{\mathrm{ext,80\,\%RH}}$ using the measured hygroscopic growth. The dotted line is the Q_{ext} curve for the retrieved RI from the $Q_{\mathrm{ext,80\,\%RH}}$ measurements. The solid line shows the expected Q_{ext} curve from the calculated RI assuming homogeneous mixing and using a volume weighted mixing rule to calculate the complex refractive index.

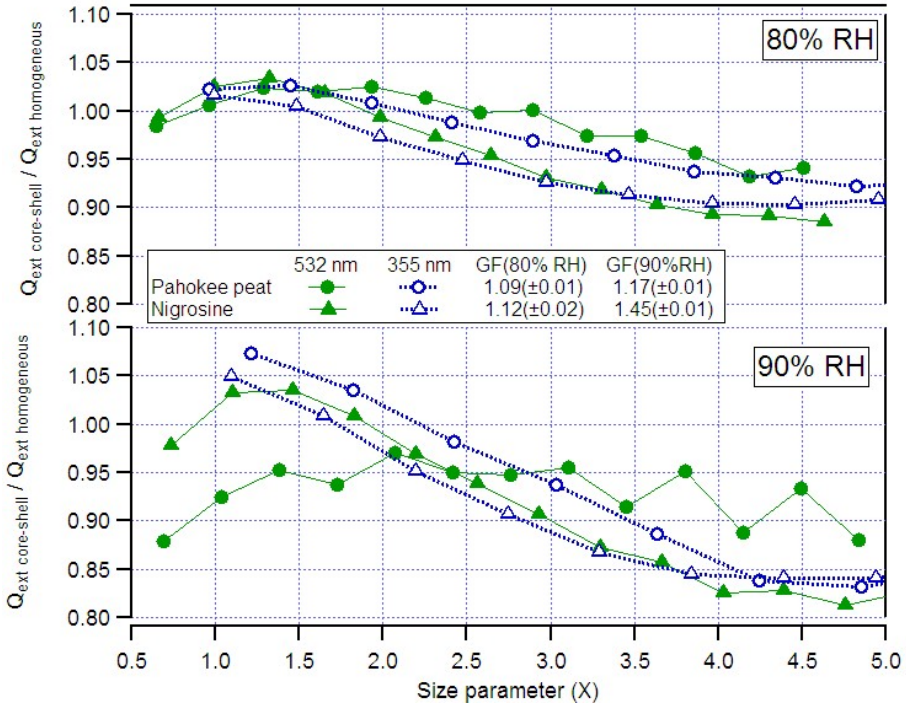

Fig. 5. Ratio of Qext-core-shell to Qext-homogeneous as a function of size parameter for Pahokee peat (circles) and nigrosine(triangles) at 532 nm(green) and 355 nm (blue) at 80 % and 90 % RH. The growth factor for both substances at 80 % and 90 % RH are shown in the legend for comparison.

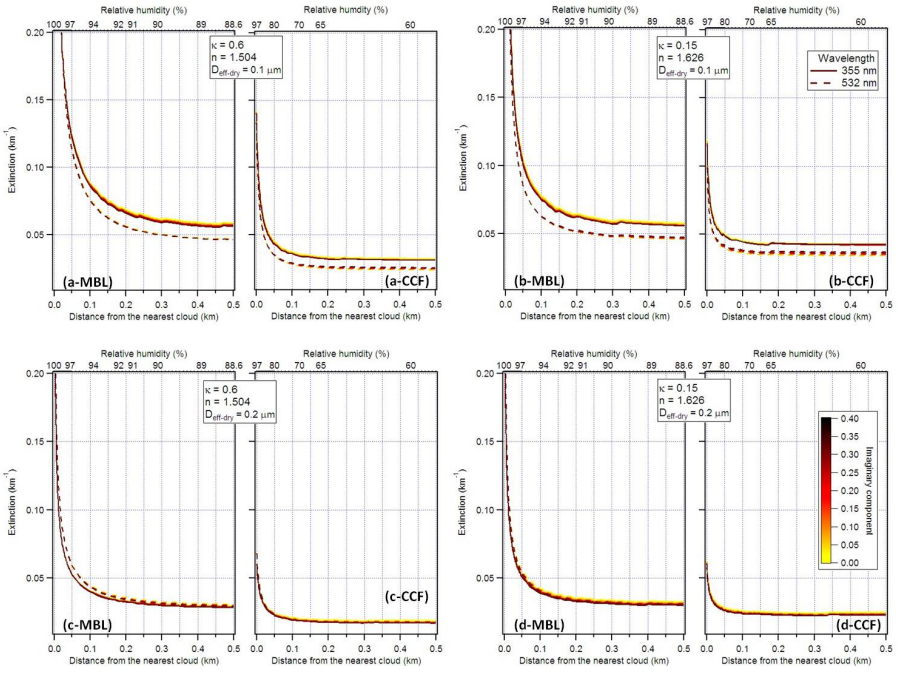

Fig. 6. Extinction as a function of distance from the nearest cloud (d_C), for four different scenarios: **(a)** the hygroscopicity parameter (κ) set at 0.6, the real part of the refractive index (n) set at 1.504, and the dry effective diameter ($D_{eff-dry}$) set at 0.1 µm; **(b)** $\kappa = 0.15$, $n = 1.626$, and $D_{eff-dry} = 0.1$ µm; **(c)** $\kappa = 0.6$, $n = 1.504$, and $D_{eff-dry} = 0.2$ µm; **(d)** $\kappa = 0.15$, $n = 1.626$, and $D_{eff-dry} = 0.2$ µm. For each scenario two different relative humidity fields were used: one typical for the marine boundary layer (MBL), and the other describing a continental Cumulus cloud field (CCF). Two wavelengths: 355 nm (solid lines) and 532 nm (dashed lines), are shown. The imaginary component (color scale) was varied in each case from 0 to 0.4.

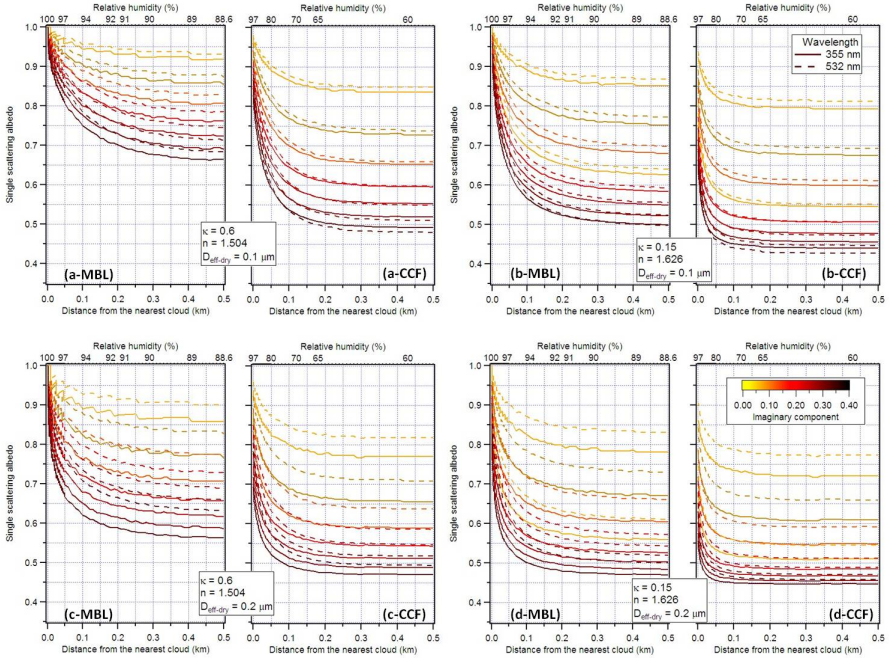

Fig. 7. Single scattering albedo (ω) as a function of distance from the nearest cloud (d_C) for the same scenarios as in Fig. 7. See Fig. 7 caption for full description.

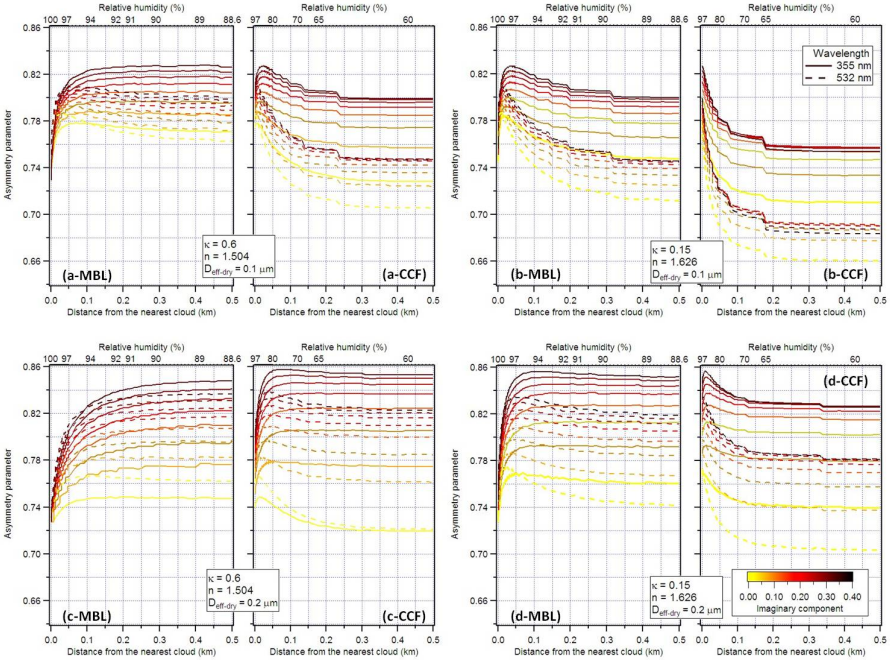

Fig. 8. Asymmetry parameter (g) as a function of distance from the nearest cloud (d_c) for the same scenarios as in Figs. 7 and 8. See Fig. 7 caption for full description.