

Supplementary material

Brown carbon absorption in the red and near infrared spectral region

András Hoffer¹, Ádám Tóth², Mihály Pósfai², Chul Eddy Chung³, András Gelencsér^{1,2}

¹MTA-PE Air Chemistry Research Group, Veszprém, P.O. Box 158, H-8201, Hungary

²Department of Earth and Environmental Sciences, University of Pannonia, Veszprém, P.O. Box 158, H-8201, Hungary

³Division of Atmospheric Sciences, Desert Research Institute, Reno, NV 89512, USA

The data of Figure 3 are summarized in Table S1. The CLAP and aethalometer data at similar wavelengths were measured simultaneously.

Wavelength (nm)		Absorption coefficient (Mm^{-1})			
		Black locust		Norway Spruce	
		Weingartner	Schmid	Weingartner	Schmid
Aethalometer	370	535.57	615.98	582.45	674.15
	470	353.10	367.47	368.54	384.19
	521	260.28	262.02	263.04	264.20
	590	181.75	176.73	178.64	172.64
	660	153.04	145.55	145.27	136.39
	880	53.23	49.10	45.77	40.95
	950	39.93	36.76	33.49	29.76
CLAP	467	340.14		382.03	
	528	247.94		270.54	
	652	128.61		132.66	

Table S1. Absorption coefficient measured by the aethalometer and the CLAP

For the absorption coefficient the correction factor obtained from the nigrozin measurements was 1.098, and that for the scattering coefficient was 0.614. The correction factor for the absorption is well within the estimated error of 25%. As regards the scattering correction factor it is important to note that Massoli et al. (2009) found the uncertainty of the scattering coefficient measured by a TSI nephelometer to be 25–30% for particles with single scattering albedo of 0.4, and 16–18% for SSA of 0.5. The single scattering albedo of nigrozin particles were on average 0.41 as calculated from the measured absorption coefficient at 652 nm and from the interpolated scattering coefficient at 633 nm. Since the SSA of tar ball particles at 652 nm (measured absorption and interpolated scattering coefficient) was on average 0.53, the correction may be applied for the tar balls within the 25% uncertainty limit.

	S467*	A467	S550	A550*	S652*	A652	S700	A700*	S880*	A880*	S950*	A950*	AE880	AE950
Bl. d1	195.2	363.2	133.7	235.7	78.1	140.8	64.3	115.1	34.3	60.1	27.8	48.4	52.6	39.3
Bl. d2	200.9	385.6	138.7	249.1	80.6	148.3	66.4	121.0	35.5	62.8	28.8	50.4	61.4	45.9
Bl. d3	206.2	377.5	142.8	244.7	83.8	146.2	69.2	119.4	37.4	62.3	30.4	50.1	68.1	51.3
Bl. d4	204.9	428.9	136.9	274.2	76.6	160.9	62.1	130.6	31.6	66.7	25.2	53.2	52.6	39.2
Ns. d1	208.9	333.9	143.4	207.9	81.2	117.7	66.4	94.3	34.7	46.1	27.9	36.3	38.8	27.9
Ns. d2	243.4	354.8	167.3	218.7	95.0	122.8	77.8	98.0	40.8	47.3	32.9	37.1	46.2	33.7
Ns. d3	216.6	347.7	147.4	213.4	83.3	119.4	68.0	95.1	35.3	45.7	28.3	35.7	46.0	33.5
Ns. d4	224.6	363.2	153.4	224.6	87.4	126.7	71.5	101.2	37.4	49.2	30.1	38.6	50.4	37.1
Ns. d5	222.4	371.0	150.9	228.3	84.7	128.1	69.0	102.2	35.6	49.3	28.5	38.6	42.9	31.5
Ns. d6	244.4	415.5	166.2	255.5	93.6	143.4	76.3	114.3	39.5	55.1	31.7	43.2	50.5	37.1
Ns. d7	264.2	457.9	179.7	279.8	101.0	155.9	82.3	123.9	42.6	59.2	34.2	46.2	43.4	31.9
Ns. d8	303.0	489.5	206.8	297.8	117.4	165.4	95.9	131.3	50.1	62.4	40.3	48.7	55.6	40.9

Table S2: The scattering (S) and absorption (A for the CLAP and AE for the aethalometer) coefficient (Mm^{-1}) of tar balls at different wavelengths served as input parameters for the calculation of the index of refraction.

* indicate that the data were intra- or extrapolated

Bl. – Black locust

Ns. – Norway spruce