Supplement of

Complex refractive index and single scattering albedo of Icelandic dust in the shortwave spectrum

Clarissa Baldo et al.

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Table S1: Experiment-averaged single scattering albedo $SSA_{avg}(\lambda)$ ± estimated uncertainty at λ = 370, 470, 520, 590, 660, 880, 950 nm of Icelandic dust for the base simulation, Test 1 and Test 2. In Test 1, corrections and calculations were performed using the SMPS and GRIMM data plus 1 SD uncertainty. In Test 2, we used the SMPS and GRIMM data minus 1 SD uncertainty (see section 2.2.1 in the main text for details).

Info	Sample ID	$SSA_{avg}(\lambda)$						
		370 nm	470 nm	520 nm	590 nm	660 nm	880 nm	950 nm
Base simulation	D3	0.93 ± 0.02	0.95 ± 0.01	0.96 ± 0.01	0.96 ± 0.01	0.96 ± 0.02	0.96 ± 0.01	0.96 ± 0.02
Base simulation	H55	0.94 ± 0.06	0.96 ± 0.08	0.96 ± 0.08	0.96 ± 0.08	0.96 ± 0.08	0.96 ± 0.07	0.96 ± 0.07
Base simulation	Land1	0.91 ± 0.05	0.94 ± 0.03	0.95 ± 0.03	0.95 ± 0.03	0.96 ± 0.04	0.96 ± 0.04	0.96 ± 0.04
Base simulation	Maeli2	0.90 ± 0.03	0.93 ± 0.02	0.94 ± 0.02	0.95 ± 0.02	0.95 ± 0.01	0.96 ± 0.01	0.95 ± 0.02
Base simulation	MIR45	0.90 ± 0.04	0.92 ± 0.03	0.93 ± 0.02	0.94 ± 0.03	0.94 ± 0.03	0.94 ± 0.03	0.94 ± 0.03
Test 1	D3	0.93 ± 0.02	0.95 ± 0.01	0.96 ± 0.01	0.96 ± 0.01	0.96 ± 0.02	0.96 ± 0.01	0.96 ± 0.01
Test 1	H55	0.94 ± 0.05	0.96 ± 0.07	0.96 ± 0.07	0.96 ± 0.08	0.96 ± 0.08	0.96 ± 0.07	0.96 ± 0.07
Test 1	Land1	0.91 ± 0.05	0.94 ± 0.03	0.95 ± 0.03	0.95 ± 0.03	0.96 ± 0.04	0.96 ± 0.04	0.96 ± 0.04
Test 1	Maeli2	0.90 ± 0.03	0.93 ± 0.02	0.94 ± 0.02	0.95 ± 0.02	0.95 ± 0.01	0.96 ± 0.02	0.96 ± 0.02
Test 1	MIR45	0.90 ± 0.04	0.92 ± 0.02	0.93 ± 0.02	0.94 ± 0.03	0.94 ± 0.03	0.94 ± 0.03	0.94 ± 0.03
Test 2	D3	0.93 ± 0.01	0.95 ± 0.01	0.96 ± 0.01	0.96 ± 0.02	0.96 ± 0.02	0.96 ± 0.02	0.96 ± 0.02
Test 2	H55	0.94 ± 0.06	0.96 ± 0.08	0.96 ± 0.08	0.96 ± 0.08	0.96 ± 0.08	0.96 ± 0.08	0.96 ± 0.08
Test 2	Land1	0.91 ± 0.04	0.93 ± 0.02	0.95 ± 0.03	0.95 ± 0.03	0.96 ± 0.03	0.96 ± 0.04	0.96 ± 0.04
Test 2	Maeli2	0.90 ± 0.02	0.93 ± 0.01	0.94 ± 0.01	0.95 ± 0.01	0.95 ± 0.01	0.95 ± 0.01	0.95 ± 0.01
Test 2	MIR45	0.90 ± 0.05	0.92 ± 0.04	0.93 ± 0.03	0.94 ± 0.04	0.94 ± 0.04	0.94 ± 0.04	0.94 ± 0.04

Table S2: Experiment-averaged imaginary index $k_{avg}(\lambda)$ ± estimated uncertainty at λ = 370, 470, 520, 590, 660, 880, 950 nm of Icelandic dust for the base simulation, Test 1 and Test 2. In Test 1, corrections and calculations were performed using the SMPS and GRIMM data plus 1 SD uncertainty. In Test 2, we used the SMPS and GRIMM data minus 1 SD uncertainty (see section 2.2.1 in the main text for details).

Info	Sample ID	$k_{avg}(\lambda)$						
		370 nm	470 nm	520 nm	590 nm	660 nm	880 nm	950 nm
Base simulation	D3	0.006 ± 0.003	0.005 ± 0.002	0.003 ± 0.002	0.002 ± 0.001	0.002 ± 0	0.002 ± 0	0.002 ± 0
Base simulation	H55	0.005 ± 0.002	0.005 ± 0.003	0.005 ± 0.002	0.002 ± 0.001	0.003 ± 0	0.002 ± 0	0.002 ± 0
Base simulation	Land1	0.005 ± 0.002	0.005 ± 0.003	0.005 ± 0.003	0.005 ± 0.002	0.004 ± 0.002	0.003 ± 0.001	0.002 ± 0.001
Base simulation	Maeli2	0.005 ± 0.003	0.005 ± 0.003	0.002 ± 0.002	0.004 ± 0.002	0.003 ± 0.001	0.002 ± 0.001	0.002 ± 0.001
Base simulation	MIR45	0.005 ± 0.002	0.005 ± 0.002	0.004 ± 0.001	0.004 ± 0.001	0.003 ± 0.001	0.003 ± 0	0.003 ± 0
Test 1	D3	0.002 ± 0.001	0.001 ± 0	0.001 ± 0	0.001 ± 0	0.001 ± 0	0.001 ± 0	0.001 ± 0
Test 1	H55	0.003 ± 0.001	0.002 ± 0.001	0.001 ± 0	0.001 ± 0	0.001 ± 0	0.002 ± 0.001	0.002 ± 0
Test 1	Land1	0.003 ± 0.002	0.002 ± 0	0.002 ± 0	0.001 ± 0	0.001 ± 0	0.001 ± 0.001	0.002 ± 0
Test 1	Maeli2	0.002 ± 0.001	0.002 ± 0.001	0.002 ± 0	0.002 ± 0	0.002 ± 0	0.002 ± 0	0.002 ± 0
Test 1	MIR45	0.002 ± 0.001	0.002 ± 0.001	0.002 ± 0.001	0.002 ± 0.001	0.002 ± 0.001	0.002 ± 0	0.002 ± 0
Test 2	D3	0.003 ± 0.001	0.002 ± 0	0.002 ± 0	0.002 ± 0	0.004 ± 0.002	0.002 ± 0	0.007 ± 0.002
Test 2	H55	0.002 ± 0	0.004 ± 0.001	0.005 ± 0.001	0.006 ± 0.002	0.007 ± 0	0.006 ± 0.002	0.007 ± 0
Test 2	Land1	0.005 ± 0	0.003 ± 0.001	0.003 ± 0.001	0.003 ± 0.001	0.004 ± 0.002	0.005 ± 0.001	0.006 ± 0.002
Test 2	Maeli2	0.004 ± 0	0.004 ± 0.002	0.002 ± 0.001	0.002 ± 0	0.002 ± 0	0.005 ± 0.001	0.005 ± 0.001
Test 2	MIR45	0.007 ± 0	0.006 ± 0	0.006 ± 0.001	0.005 ± 0	0.005 ± 0	0.006 ± 0	0.006 ± 0

Table S3: Experiment-averaged real index $n_{avg}(\lambda)$ ± estimated uncertainty at λ = 370, 470, 520, 590, 660, 880, 950 nm of Icelandic dust for the base simulation, Test 1 and Test 2. In Test 1, corrections and calculations were performed using the SMPS and GRIMM data plus 1 SD uncertainty. In Test 2, we used the SMPS and GRIMM data minus 1 SD uncertainty (see section 2.2.1 in the main text for details).

Info	Sample ID	$n_{avg}(\lambda)$						
		370 nm	470 nm	520 nm	590 nm	660 nm	880 nm	950 nm
Base simulation	D3	1.60 ± 0.02	1.61 ± 0.02	1.61 ± 0.02	1.61 ± 0.02	1.60 ± 0	1.60 ± 0	1.60 ± 0
Base simulation	H55	1.59 ± 0.02	1.60 ± 0.02	1.62 ± 0.01	1.61 ± 0.02	1.61 ± 0.03	1.60 ± 0	1.60 ± 0
Base simulation	Land1	1.59 ± 0.02	1.59 ± 0.01	1.60 ± 0.02	1.60 ± 0.02	1.61 ± 0.02	1.60 ± 0.02	1.61 ± 0.02
Base simulation	Maeli2	1.59 ± 0.02	1.60 ± 0.02	1.60 ± 0.03	1.61 ± 0.02	1.60 ± 0.02	1.61 ± 0.02	1.61 ± 0.02
Base simulation	MIR45	1.60 ± 0.02	1.60 ± 0.02	1.60 ± 0.02	1.59 ± 0.02	1.60 ± 0.02	1.60 ± 0.02	1.60 ± 0.02
Test 1	D3	1.60 ± 0.02	1.58 ± 0	1.58 ± 0	1.58 ± 0	1.60 ± 0.03	1.60 ± 0.03	1.60 ± 0.02
Test 1	H55	1.60 ± 0.02	1.60 ± 0.02	1.58 ± 0	1.59 ± 0.02	1.60 ± 0.02	1.59 ± 0.01	1.60 ± 0
Test 1	Land1	1.60 ± 0.02	1.60 ± 0	1.60 ± 0	1.60 ± 0.02	1.60 ± 0.02	1.60 ± 0.02	1.60 ± 0
Test 1	Maeli2	1.60 ± 0.02	1.60 ± 0.02	1.60 ± 0	1.60 ± 0	1.60 ± 0	1.60 ± 0	1.60 ± 0
Test 1	MIR45	1.60 ± 0.02	1.60 ± 0.02	1.60 ± 0.02	1.60 ± 0.02	1.61 ± 0.02	1.60 ± 0	1.60 ± 0
Test 2	D3	1.60 ± 0.02	1.60 ± 0.02	1.60 ± 0.02	1.59 ± 0.02	1.59 ± 0.02	1.58 ± 0	1.60 ± 0.02
Test 2	H55	1.60 ± 0.02	1.61 ± 0.02	1.62 ± 0.01	1.60 ± 0.02	1.59 ± 0	1.59 ± 0.02	1.63 ± 0
Test 2	Land1	1.62 ± 0.01	1.60 ± 0.02	1.60 ± 0.03	1.61 ± 0.03	1.60 ± 0.03	1.61 ± 0.02	1.60 ± 0.02
Test 2	Maeli2	1.62 ± 0.02	1.61 ± 0.02	1.60 ± 0.02	1.60 ± 0.02	1.60 ± 0.02	1.60 ± 0.02	1.61 ± 0.02
Test 2	MIR45	1.57 ± 0	1.59 ± 0.02	1.60 ± 0.02	1.62 ± 0	1.62 ± 0	1.58 ± 0.02	1.60 ± 0

Table S4: Comparison between $SSA_{avg}(\lambda)$ calculated using the measured Mie coefficients and the single scattering albedo retrieved using the complex refractive indices from the results of the base simulation, Test 1 and Test 2. In Test 1, corrections and calculations were performed using the SMPS and GRIMM data plus 1 SD uncertainty. In Test 2, we used the SMPS and GRIMM data minus 1 SD uncertainty (see section 2.2.1 in the main text for details). The reduced major axis (RMA) regression slope and intercept are reported, in addition to the R^2 value and root mean square error (RMSE).

Info	Sample ID	Slope	Intercept	R^2	RMSE
Base Simulation	D3	4.75	-3.62	0.84	0.06
Test 1	D3	1.15	-0.13	0.95	0.01
Test 2	D3	2.64	-1.59	0.29	0.04
Base Simulation	H55	6.69	-5.50	0.68	0.07
Test 1	H55	4.46	-3.33	0.95	0.03
Test 2	H55	-3.28	4.03	0.72	0.08
Base Simulation	Land1	2.72	-1.68	0.75	0.06
Test 1	Land1	1.92	-0.87	0.96	0.02
Test 2	Land1	1.62	-0.62	0.43	0.04
Base Simulation	Maeli2	2.49	-1.44	0.79	0.04
Test 1	Maeli2	0.76	0.22	0.88	0.01
Test 2	Maeli2	1.75	-0.72	0.59	0.03
Base Simulation	MIR45	2.46	-1.38	0.89	0.04
Test 1	MIR45	0.81	0.18	0.80	0.01
Test 2	MIR45	2.24	-1.20	0.95	0.05

Table S5: Reference complex refractive indices of the individual mineral components of Icelandic dust

Mineral	Reference	370 nm		470 nm		520 nm		590 nm		660 nm		880 nm		950 nm	
		n	k	n	k	n	k	n	k	n	k	n	k	n	k
Augite	Egan and Hilgeman (1979)	1.71	0.001	1.69	0.001	1.69	0.001	1.69	0.001	1.67	0.001	1.69	0.002	1.68	0.002
Basaltic glass	Pollack et al. (1973)	1.57	-	1.57	0.001	1.57	0.001	1.57	0	1.56	0	1.55	0.001	1.55	0.001
Feldspar	Egan and Hilgeman (1979)	1.59	0	1.57	0	1.58	0	1.57	0	1.56	0	1.56	0	1.56	0
Goethite	Bedidi and Cervelle (1993)	-	-	2.4	0.078	2.29	0.125	2.24	0.082	2.2	0.108	-	-	-	-
Hematite	(O-RAY) - Querry (1985)	2.47	1.202	3.24	0.874	3.26	0.587	3.31	0.202	3.05	0.051	2.81	0.026	2.79	0.022
Hematite	(E-RAY) - Querry (1985)	2.24	1.034	2.86	0.758	2.88	0.532	2.93	0.229	2.74	0.096	2.55	0.057	2.53	0.051
Hematite	Longtin et al. (1988)	2.56	0.793	2.99	0.274	3.1	0.149	3.06	0.053	2.97	0.006	2.73	0.004	2.71	0.002
Hematite	Bedidi and Cervelle (1993)	-	-	3.26	0.298	3.29	0.228	3.13	0.244	2.98	0.17	-	-	-	-
Hematite	Triaud (2005)	2.15	1.049	2.91	0.862	3.07	0.634	2.94	0.322	2.84	0.23	2.71	0.132	2.69	0.117
Magnetite	Querry (1985)	2.45	0.108	2.37	0.054	2.35	0.083	2.34	0.131	2.36	0.137	2.21	0.173	2.16	0.234
Magnetite	Huffman and Stapp (1973)	2.34	0.843	2.47	0.698	2.51	0.634	2.55	0.578	2.56	0.498	2.42	0.37	2.35	0.415
Olivine	Fabian et al. (2001)	-	-	1.85	0.001	1.85	0.001	1.85	0.001	1.85	0.001	1.85	0.001	1.85	0.002
Quartz	Gao et al. (2013)	1.49	0	1.48	0	1.48	0	1.48	0	1.48	0	1.47	0	1.47	0
Quartz	Rodríguez-de Marcos et al. (2016)	1.48	0.003	1.47	0.002	1.47	0.002	1.46	0.002	1.46	0.002	1.46	0.001	1.46	0.001
Quartz	Lemarchand (2013)	1.49	0	1.48	0	1.48	0	1.47	0	1.47	0	1.47	0	1.47	0
Quartz glass	Khashan and Nasif (2001)	1.51	0	1.53	0	1.51	0	1.51	0	1.51	0	1.56	0	1.55	0
Quartz glass	Philip (1985)	1.54	0.001	1.53	0.002	1.53	0.002	1.53	0.002	1.53	0.002	1.52	0.004	1.51	0.004

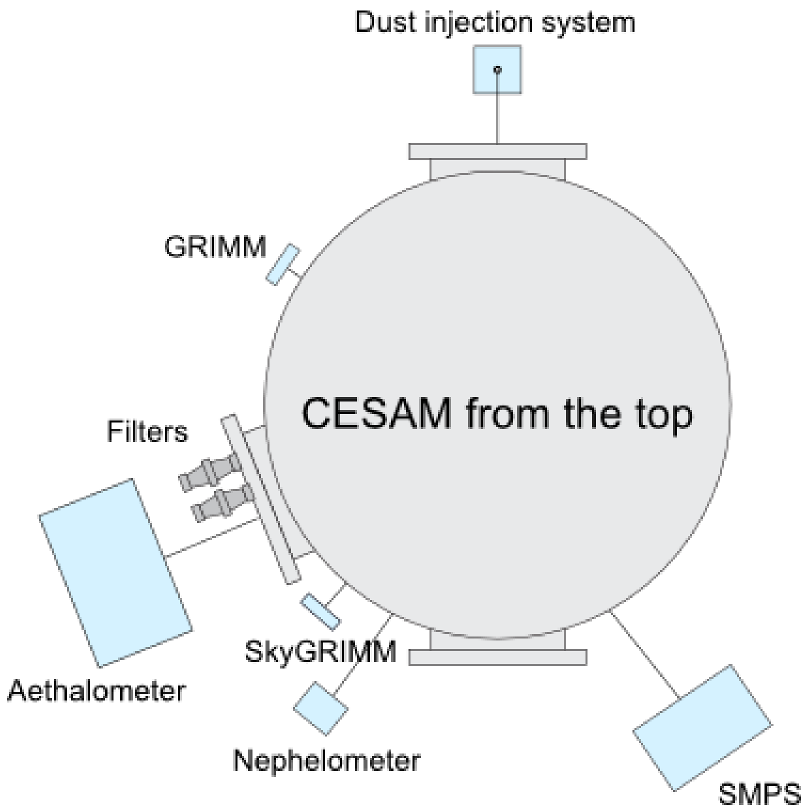

Figure S1: Schematic diagram of the CESAM set up for the experiments on Icelandic dust.

Maeli2

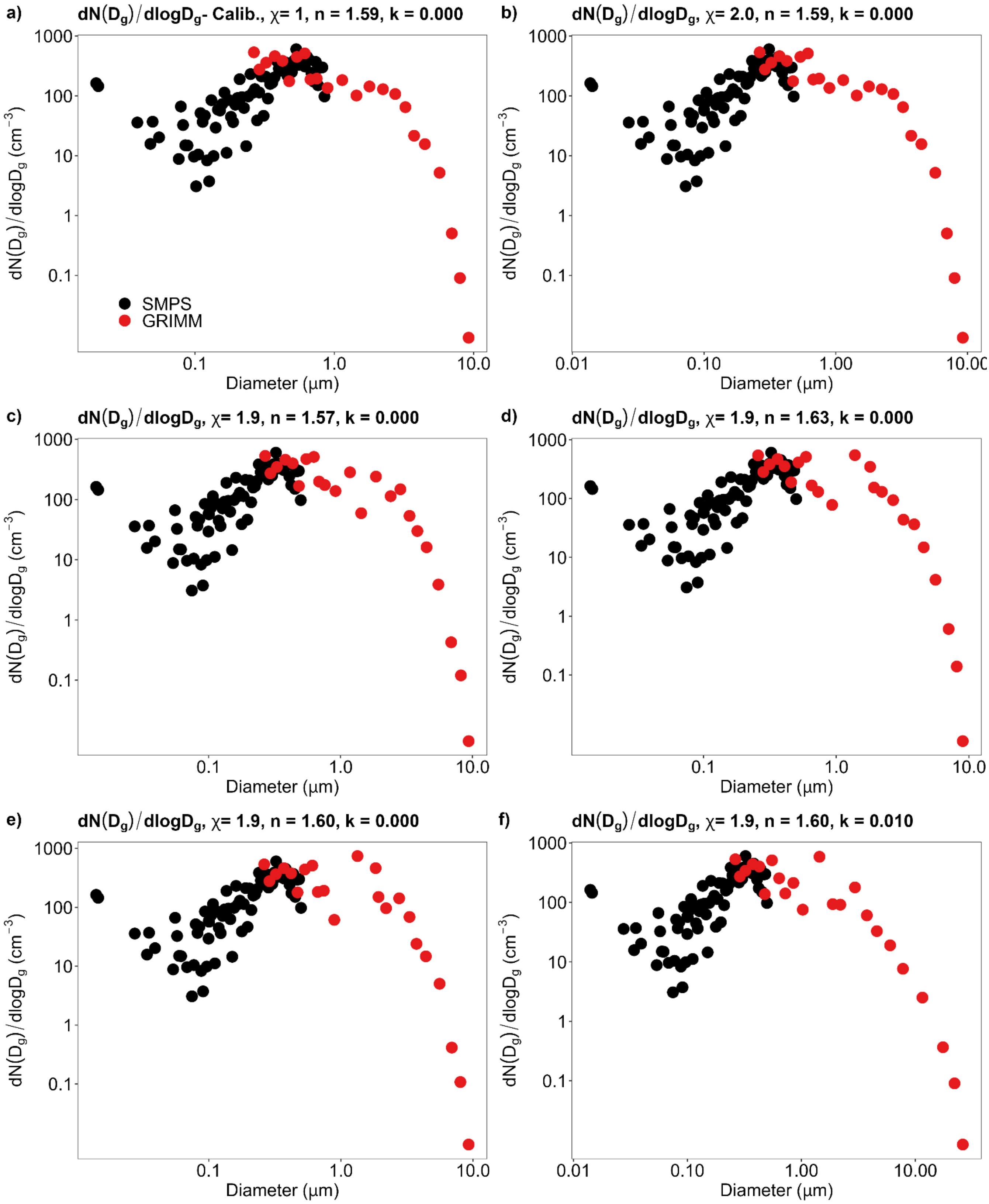

Figure S2: Geometrical size distributions dN(D_g)/dlogD_g at 30 min after the injection peak obtained a) using the calibration values of χ, n and k; b-f) for different χ-n-k combinations. χ is the dynamic shape factor used to convert the mobility diameter D_m measured by the SMPS into geometrical diameters D_g. n and k are respectively the real and imaginary part of the complex refractive index used to convert the optical diameter D_{op} measured by the GRIMM into D_g. Sample ID: Maeli2.

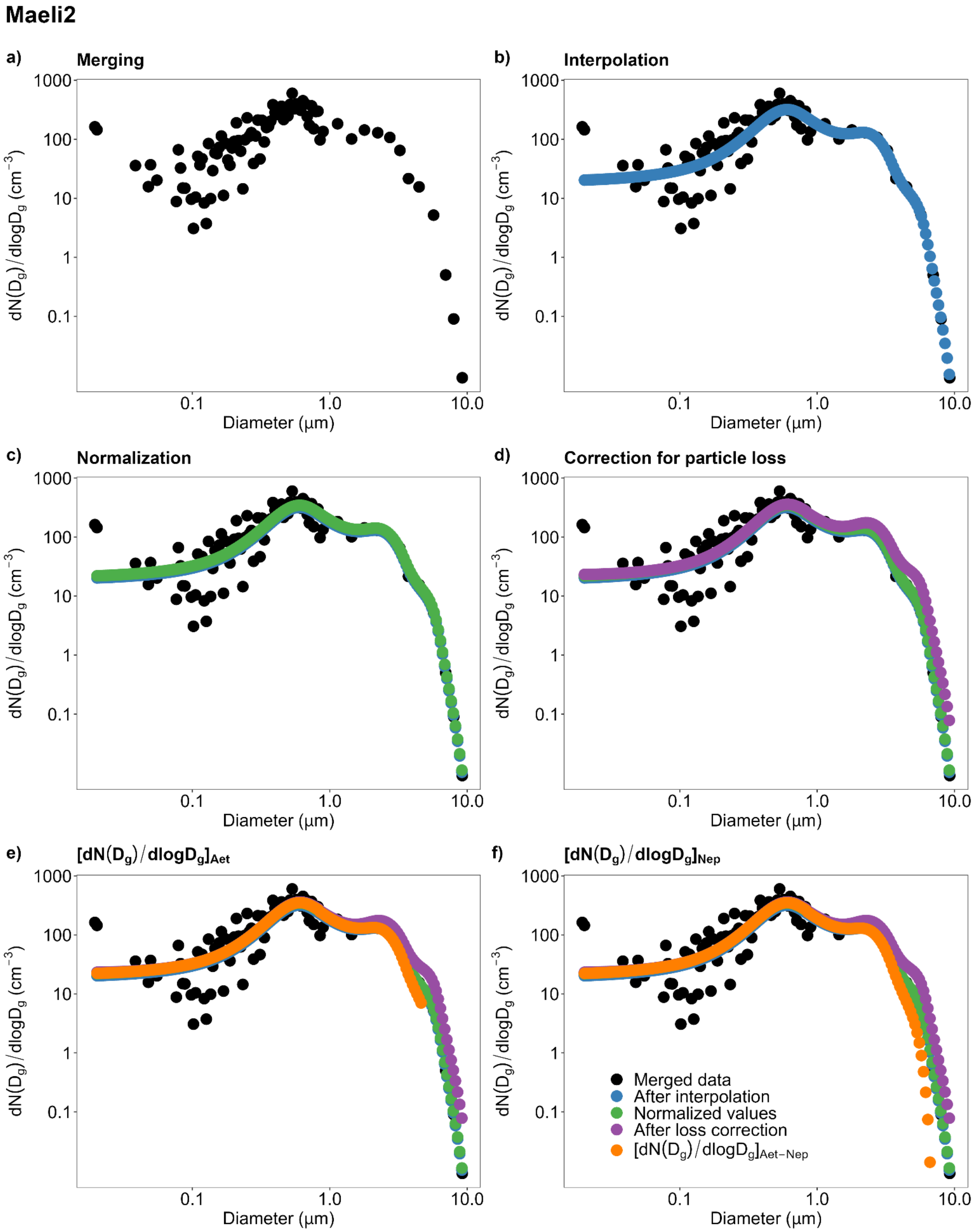

Figure S3: Processing of size distribution data. Geometrical size distributions $dN(D_g)/dlogD_g$ at 30 min after the injection peak obtained using the calibration values of the parameters χ, n, and k. a) Merging of the geometrical size distributions $dN/dlogD_g$ of SMPS and GRIMM; b) Interpolation of the merged size distribution; c) Normalization; d) Correction for particle loss to determine the real size distribution in CESAM. e-f) Size distribution of particles sampled by Shortwave Optical Properties Analyzers (SW-OPAs) aethalometer (e) and nephelometer (f). Sample ID: Maeli2.

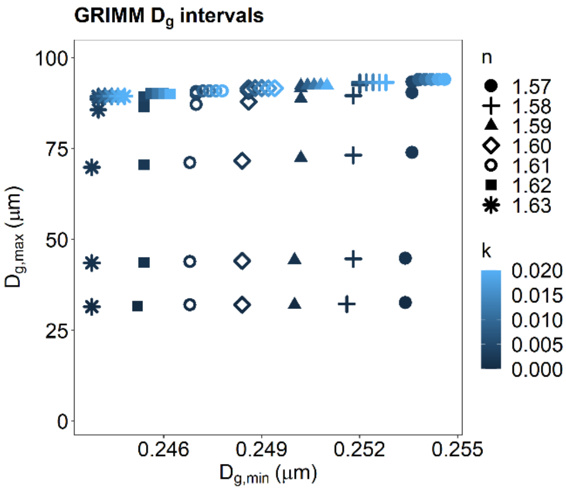

Figure S4: GRIMM D_g intervals. $D_{g,max}$ and $D_{g,min}$ are the upper and lower limit of the D_g intervals. n and k are respectively the real and imaginary part of the complex refractive indices used to convert the optical diameter D_{op} measured by the GRIMM into geometrical diameters D_g.

Maeli2

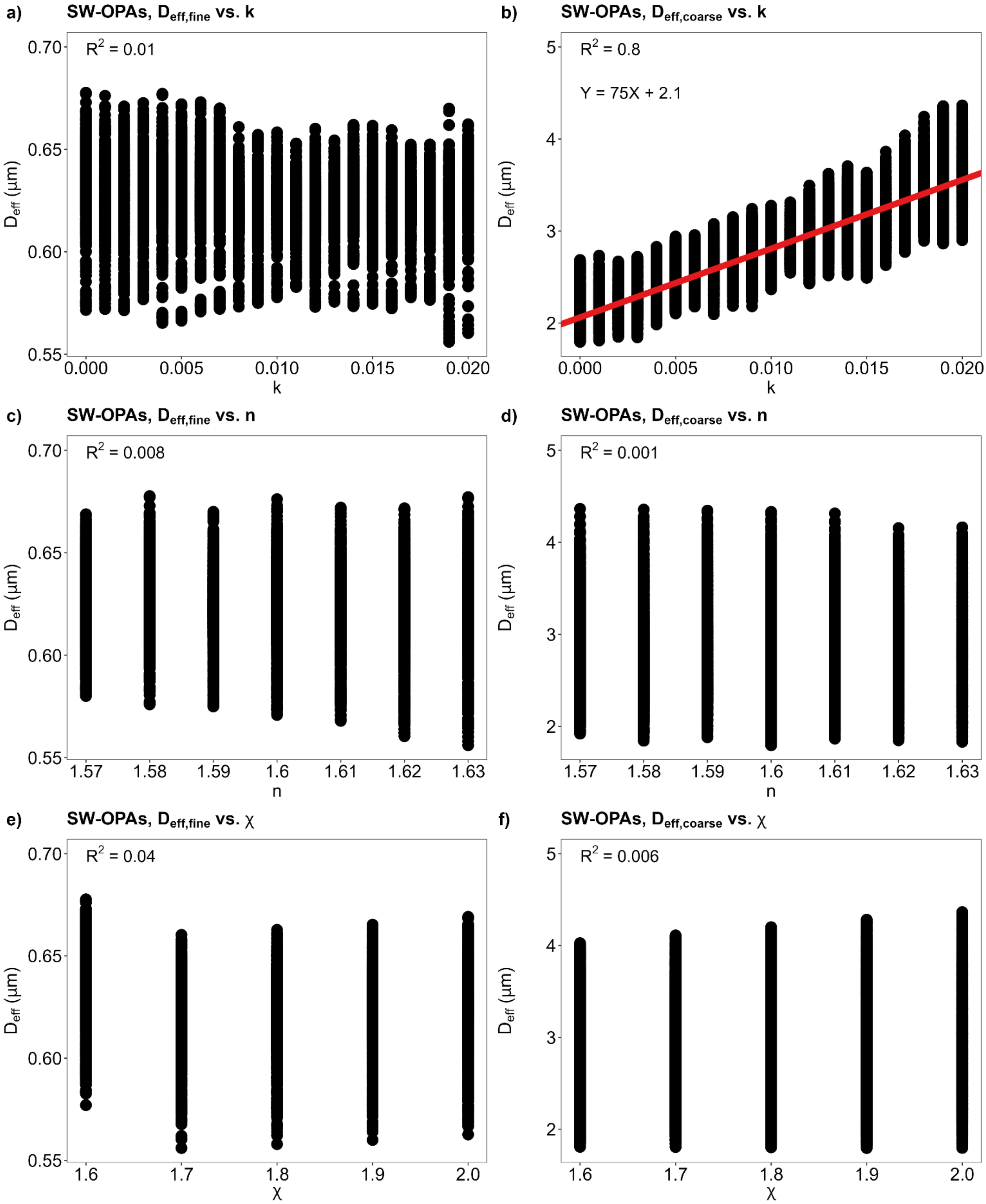

Figure S5: Comparison between the effective diameter of the coarse fractions ($D_{eff,coarse}$) and of the fine fractions ($D_{eff,fine}$) calculated using the SW-OPA size distributions and the input parameters χ, n, and k.

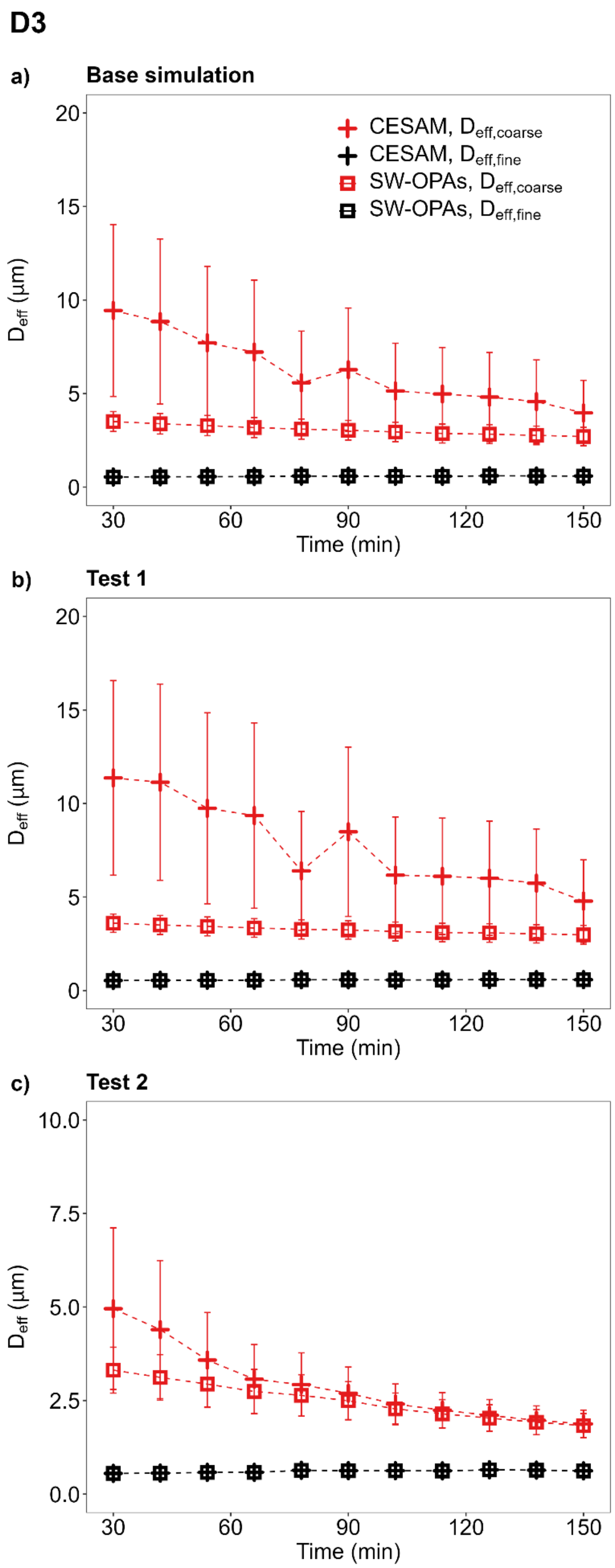

Figure S6: Effective diameters D_{eff} of dust particles sampled by the SW-OPAs and in CESAM, from 30 min after the injection peak to 2.5 h. a) Base simulation; b) Test 1; c) Test 2. D_{eff} was calculated for particles > 1 µm ($D_{eff,coarse}$) and ≤ 1 µm ($D_{eff,fine}$). Data were reported as 12-min average. In Test 1, corrections and calculations were performed using the SMPS and GRIMM data plus 1 SD uncertainty. In Test 2, we used the SMPS and GRIMM data minus 1 SD uncertainty (see section 2.2.1 in the main text for details). Sample ID: D3.

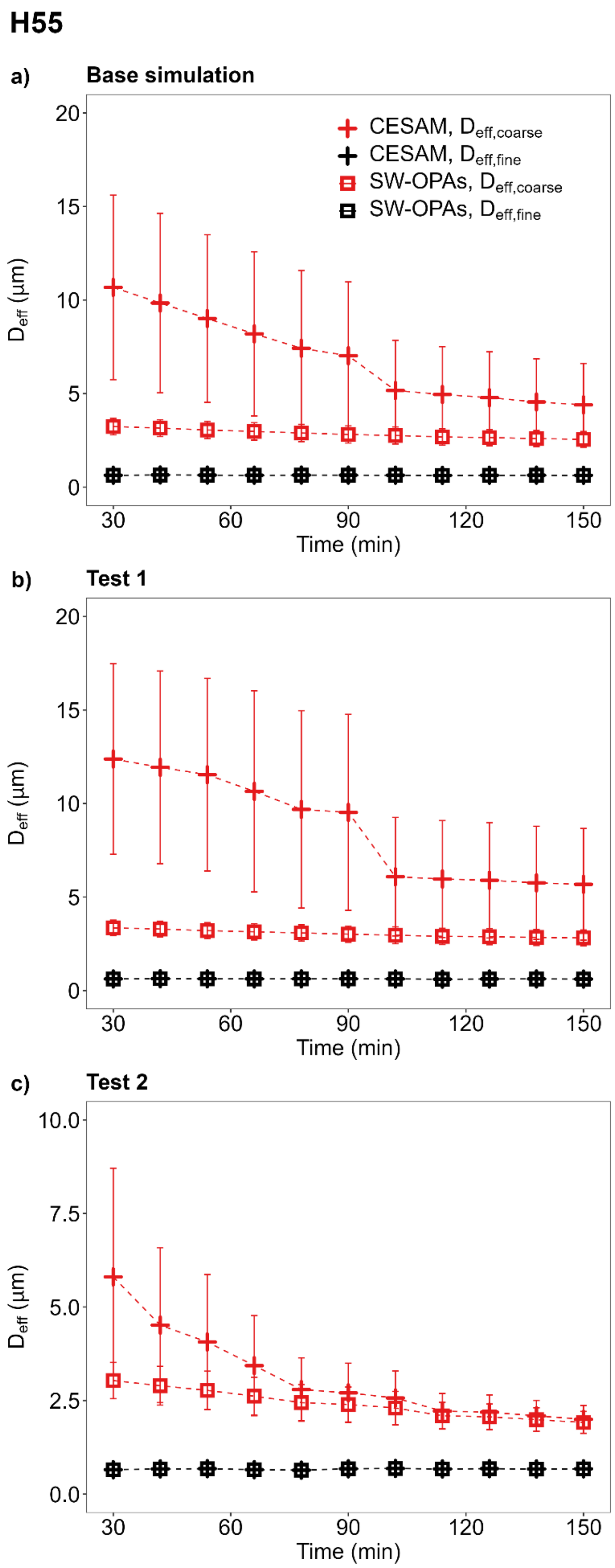

Figure S7: Effective diameters D_{eff} of dust particles sampled by the SW-OPAs and in CESAM, from 30 min after the injection peak to 2.5 h. a) Base simulation; b) Test 1; c) Test 2. D_{eff} was calculated for particles > 1 µm ($D_{eff,coarse}$) and ≤ 1 µm ($D_{eff,fine}$). Data were reported as 12-min average. In Test 1, corrections and calculations were performed using the SMPS and GRIMM data plus 1 SD uncertainty. In Test 2, we used the SMPS and GRIMM data minus 1 SD uncertainty (see section 2.2.1 in the main text for details). Sample ID: H55.

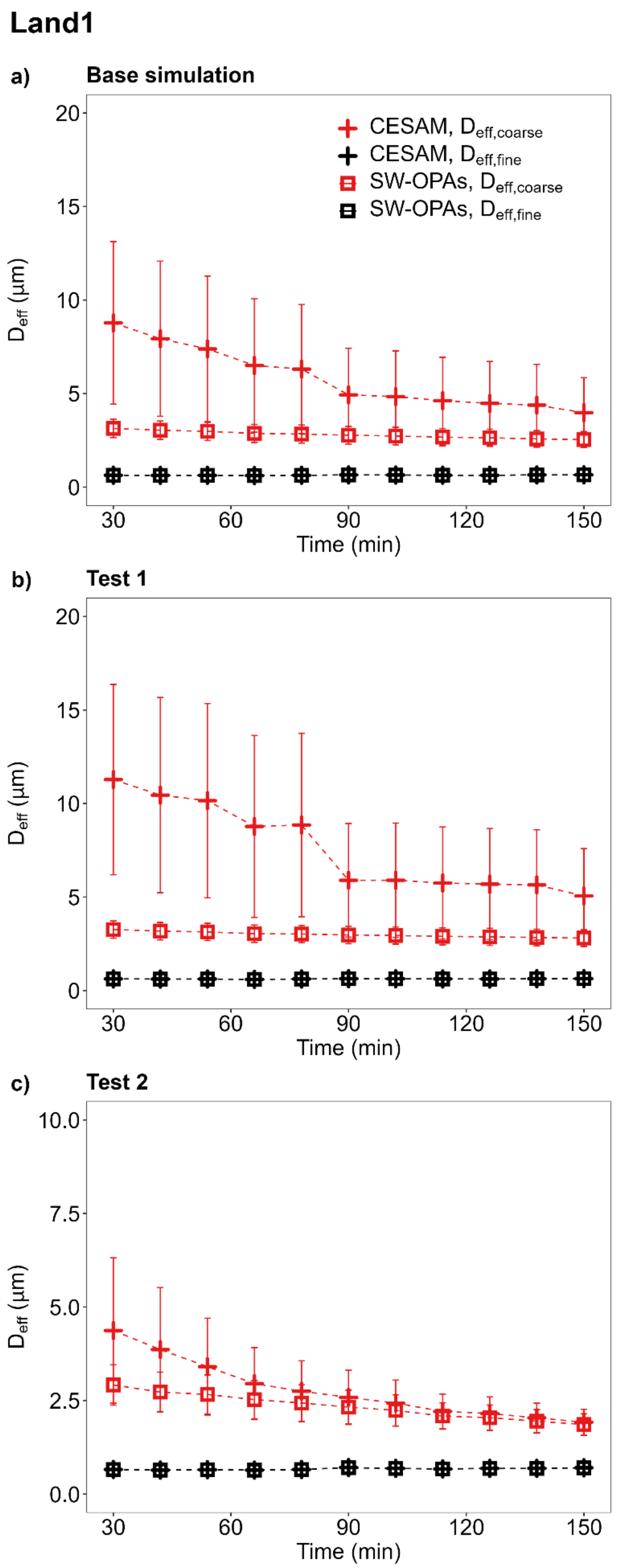

Figure S8: Effective diameters D_{eff} of dust particles sampled by the SW-OPAs and in CESAM, from 30 min after the injection peak to 2.5 h. a) Base simulation; b) Test 1; c) Test 2. D_{eff} was calculated for particles > 1 µm ($D_{eff,coarse}$) and ≤ 1 µm ($D_{eff,fine}$). Data were reported as 12-min average. In Test 1, corrections and calculations were performed using the SMPS and GRIMM data plus 1 SD uncertainty. In Test 2, we used the SMPS and GRIMM data minus 1 SD uncertainty (see section 2.2.1 in the main text for details). Sample ID: Land1.

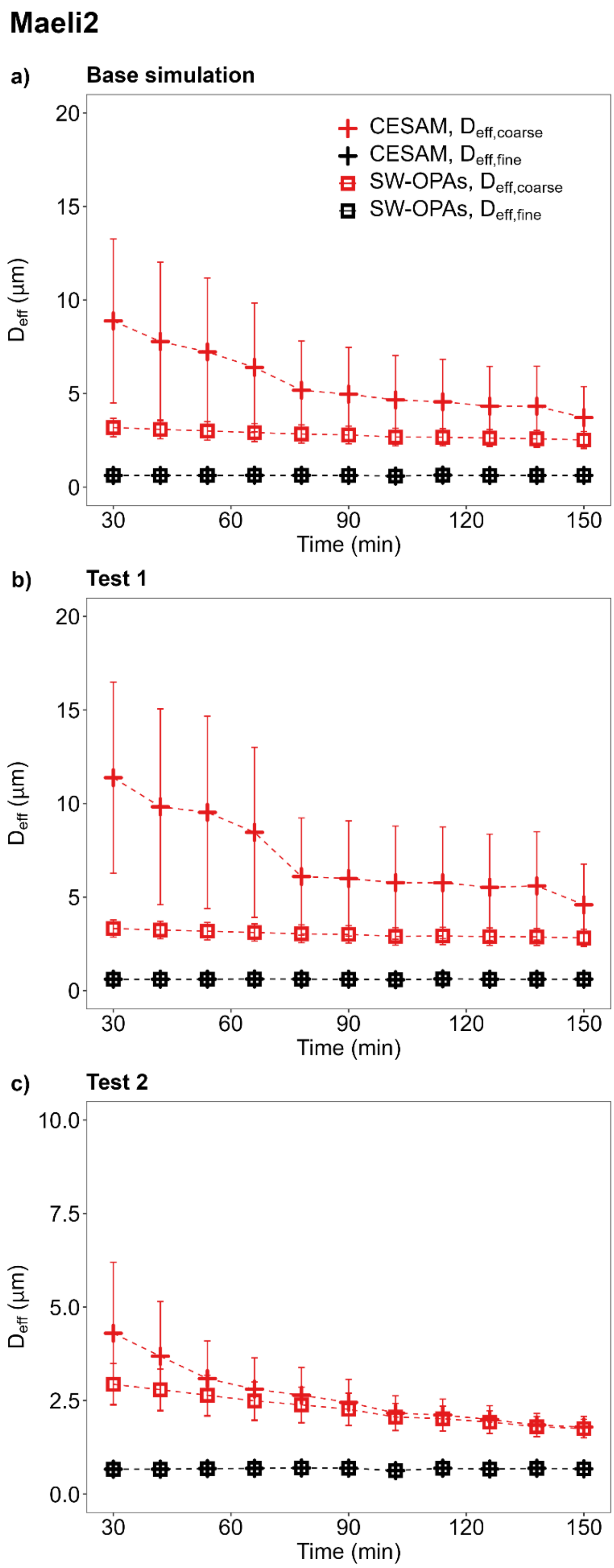

Figure S9: Effective diameters D_{eff} of dust particles sampled by the SW-OPAs and in CESAM, from 30 min after the injection peak to 2.5 h. a) Base simulation; b) Test 1; c) Test 2. D_{eff} was calculated for particles > 1 µm ($D_{eff,coarse}$) and ≤ 1 µm ($D_{eff,fine}$). Data were reported as 12-min average. In Test 1, corrections and calculations were performed using the SMPS and GRIMM data plus 1 SD uncertainty. In Test 2, we used the SMPS and GRIMM data minus 1 SD uncertainty (see section 2.2.1 in the main text for details). Sample ID: Maeli2.

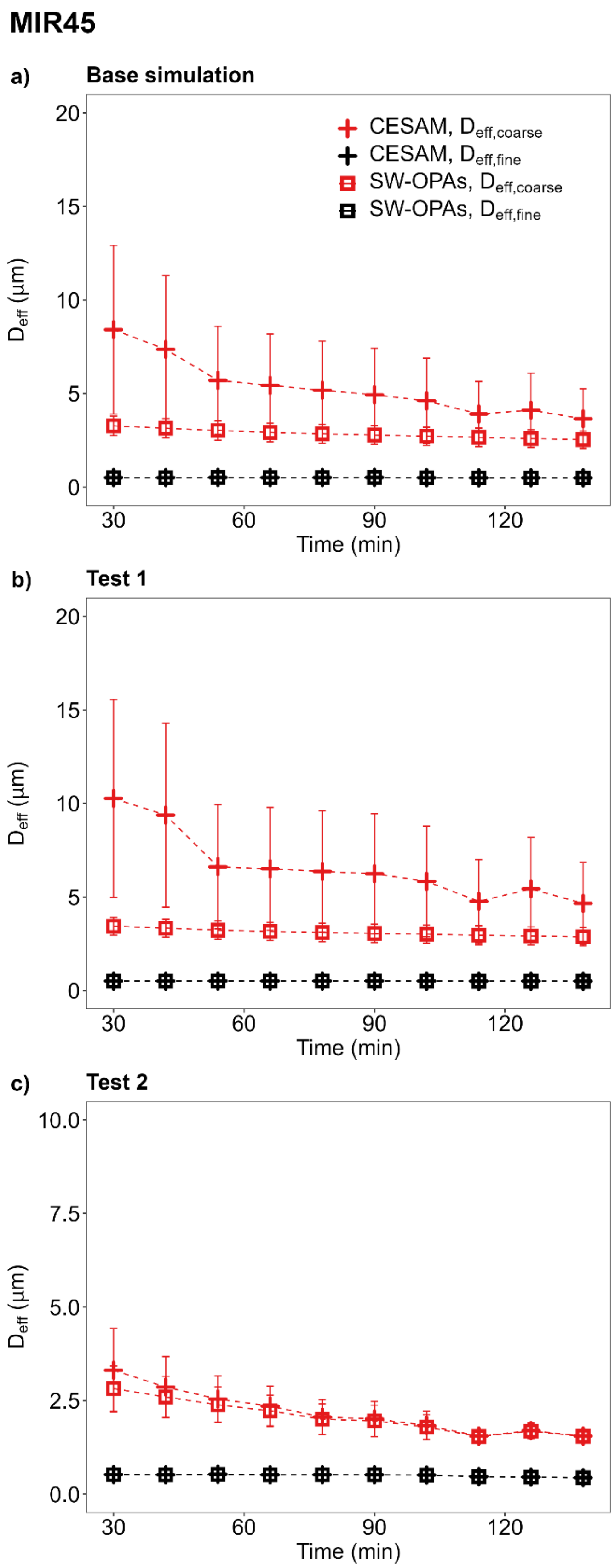

Figure S10: Effective diameters D_{eff} of dust particles sampled by the SW-OPAs and in CESAM, from 30 min after the injection peak to 2.5 h. a) Base simulation; b) Test 1; c) Test 2. D_{eff} was calculated for particles > 1 µm ($D_{eff,coarse}$) and ≤ 1 µm ($D_{eff,fine}$). Data were reported as 12-min average. In Test 1, corrections and calculations were performed using the SMPS and GRIMM data plus 1 SD uncertainty. In Test 2, we used the SMPS and GRIMM data minus 1 SD uncertainty (see section 2.2.1 in the main text for details). Sample ID: MIR45.

D3

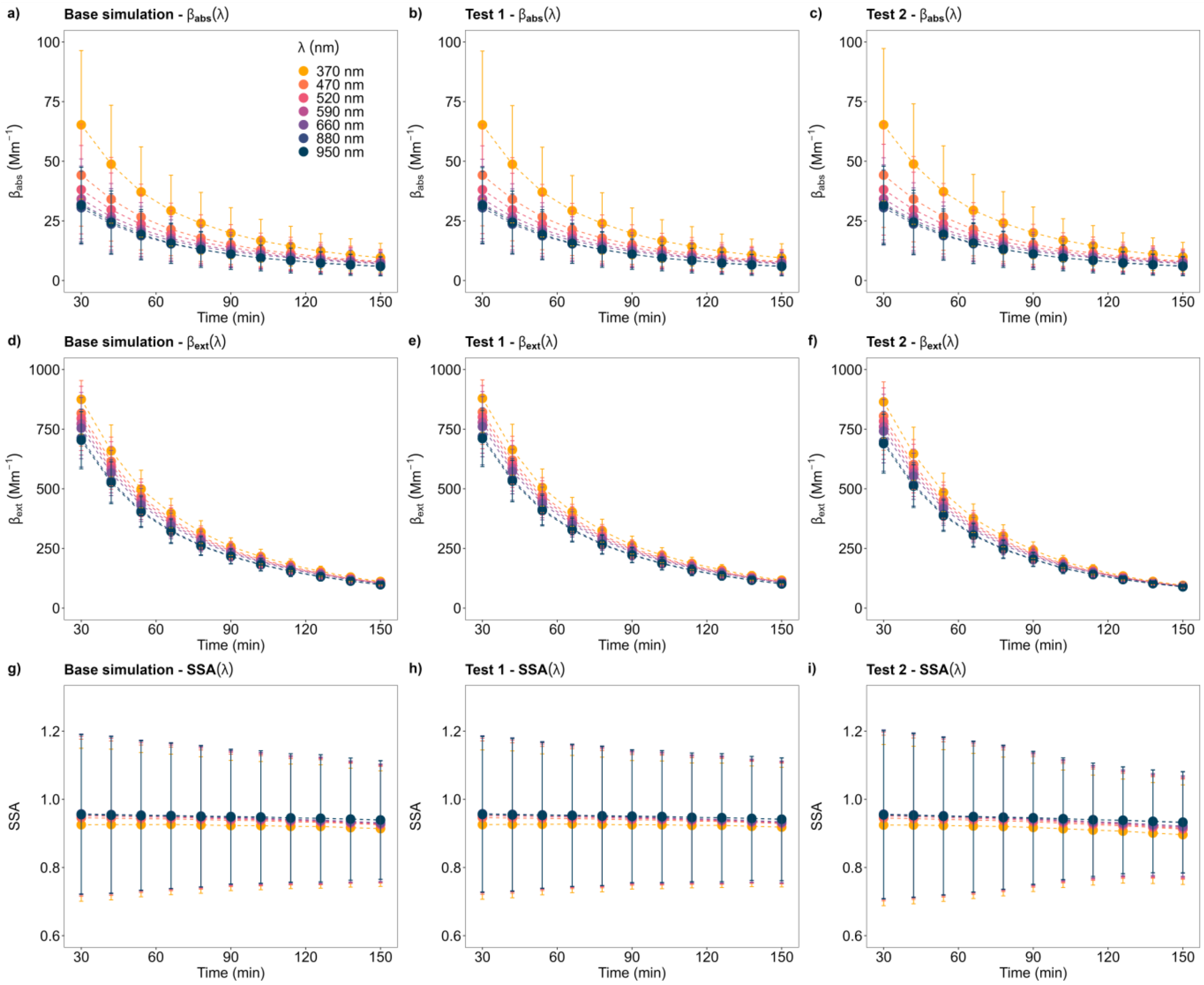

Figure S11: Extinction coefficient $\beta_{ext}(\lambda)$, absorption coefficient $\beta_{abs}(\lambda)$, and single scattering albedo SSA(λ) at λ = 370, 470, 520, 590, 660, 880, 950 nm, from 30 min after the injection peak to 2.5 h. a-c) Base simulation; d-f) Test 1; g-i) Test 2. Data were reported as 12-min average. In Test 1, corrections and calculations were performed using the SMPS and GRIMM data plus 1 SD uncertainty. In Test 2, we used the SMPS and GRIMM data minus 1 SD uncertainty (see section 2.2.1 in the main text for details). Sample ID: D3.

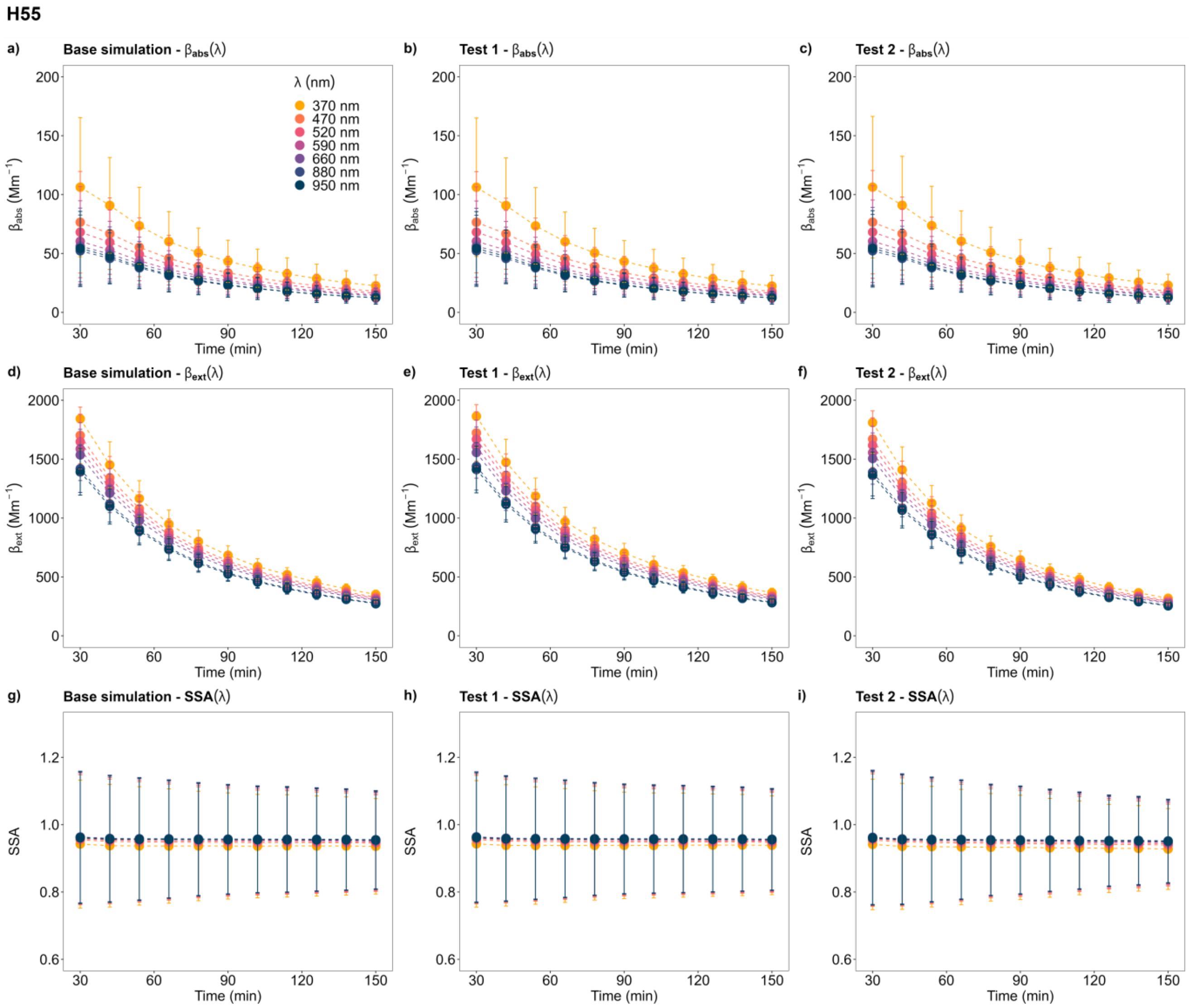

Figure S12: Extinction coefficient $\beta_{ext}(\lambda)$, absorption coefficient $\beta_{abs}(\lambda)$, and single scattering albedo SSA(λ) at λ = 370, 470, 520, 590, 660, 880, 950 nm, from 30 min after the injection peak to 2.5 h. a-c) Base simulation; d-f) Test 1; g-i) Test 2. Data were reported as 12-min average. In Test 1, corrections and calculations were performed using the SMPS and GRIMM data plus 1 SD uncertainty. In Test 2, we used the SMPS and GRIMM data minus 1 SD uncertainty (see section 2.2.1 in the main text for details). Sample ID: H55.

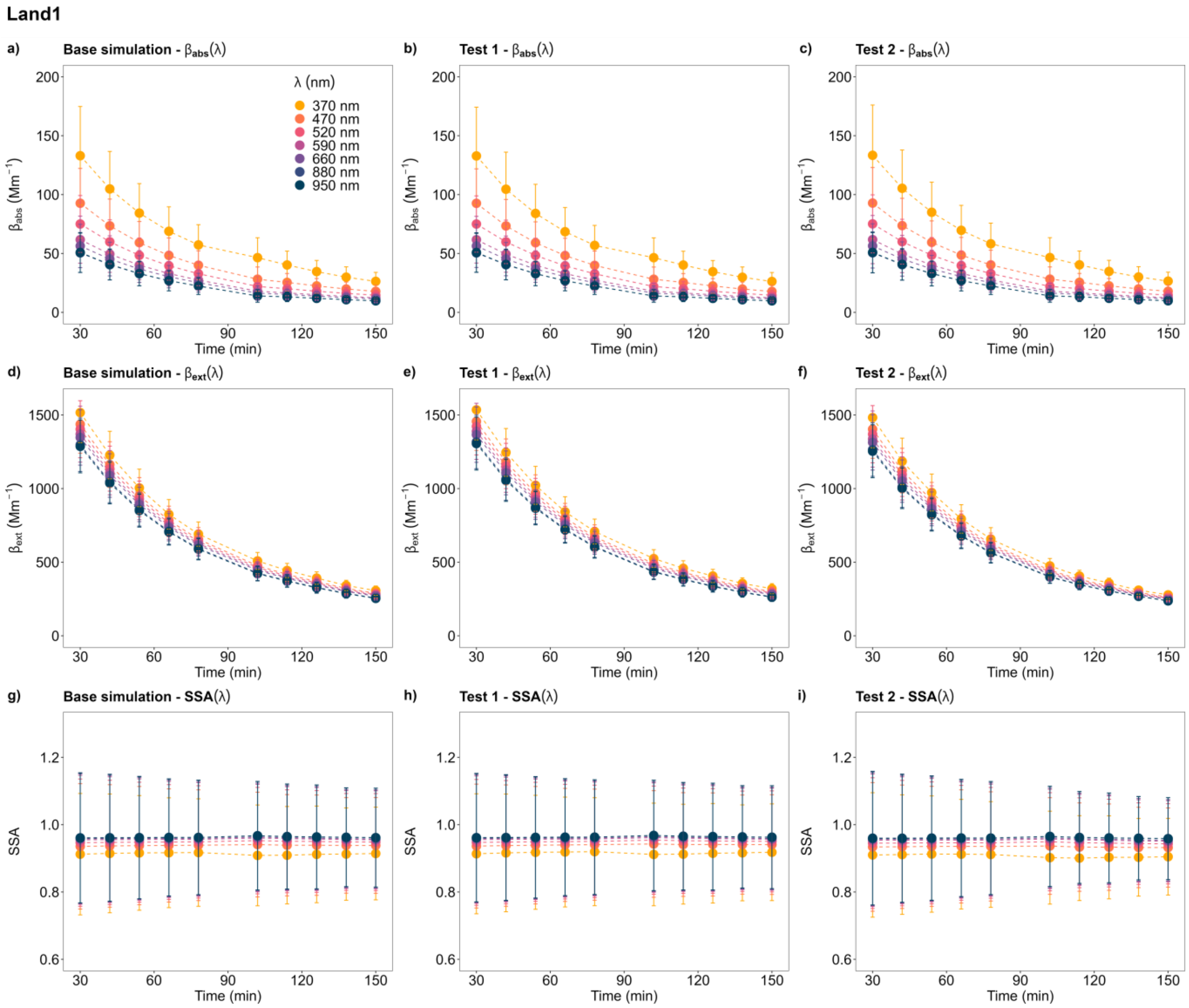

Figure S13: Extinction coefficient $\beta_{ext}(\lambda)$, absorption coefficient $\beta_{abs}(\lambda)$, and single scattering albedo SSA(λ) at λ = 370, 470, 520, 590, 660, 880, 950 nm, from 30 min after the injection peak to 2.5 h. a-c) Base simulation; d-f) Test 1; g-i) Test 2. Data were reported as 12-min average. In Test 1, corrections and calculations were performed using the SMPS and GRIMM data plus 1 SD uncertainty. In Test 2, we used the SMPS and GRIMM data minus 1 SD uncertainty (see section 2.2.1 in the main text for details). Sample ID: Land1.

Maeli2

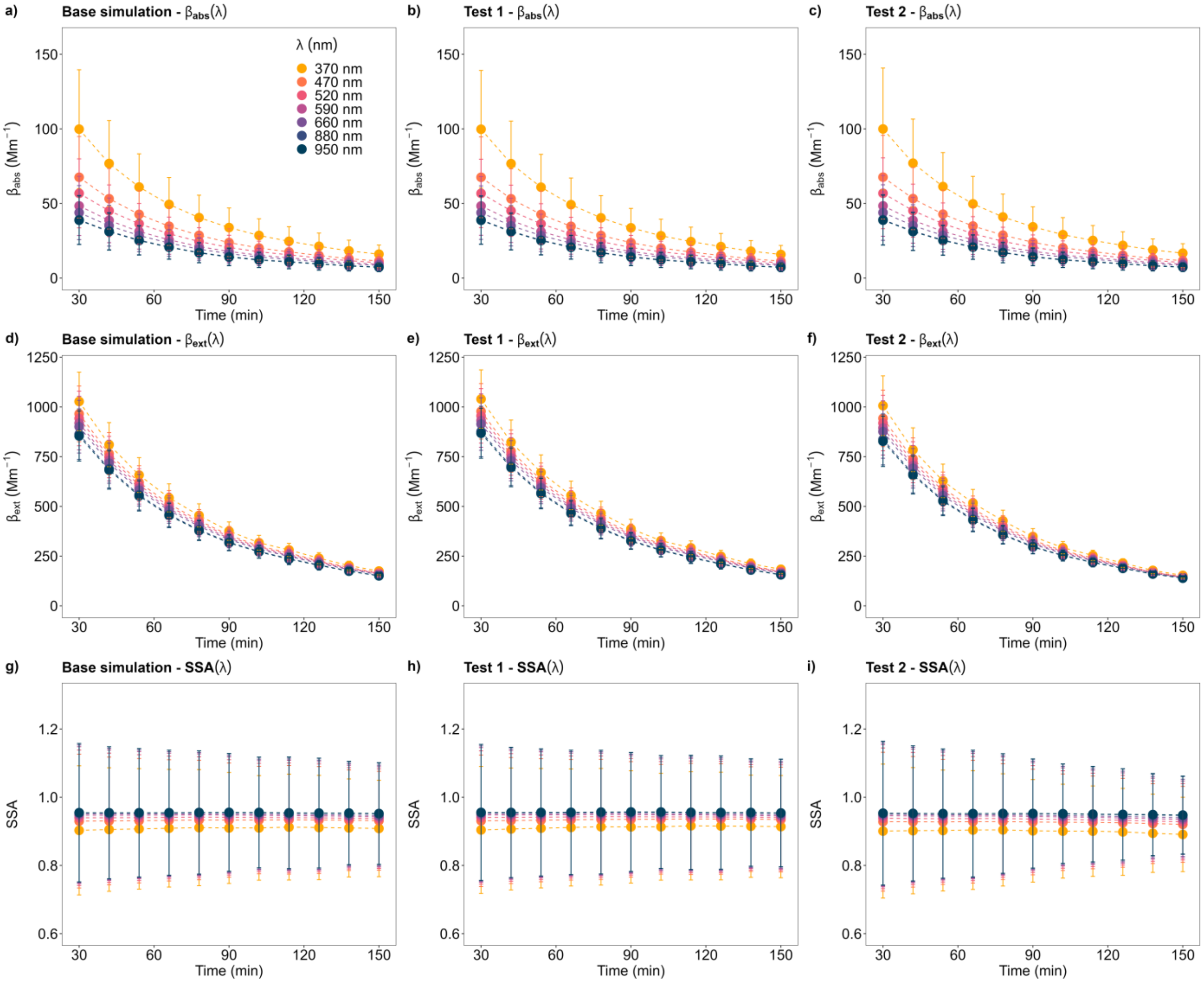

Figure S14: Extinction coefficient $\beta_{ext}(\lambda)$, absorption coefficient $\beta_{abs}(\lambda)$, and single scattering albedo SSA(λ) at λ = 370, 470, 520, 590, 660, 880, 950 nm, from 30 min after the injection peak to 2.5 h. a-c) Base simulation; d-f) Test 1; g-i) Test 2. Data were reported as 12-min average. In Test 1, corrections and calculations were performed using the SMPS and GRIMM data plus 1 SD uncertainty. In Test 2, we used the SMPS and GRIMM data minus 1 SD uncertainty (see section 2.2.1 in the main text for details). Sample ID: Maeli2.

MIR45

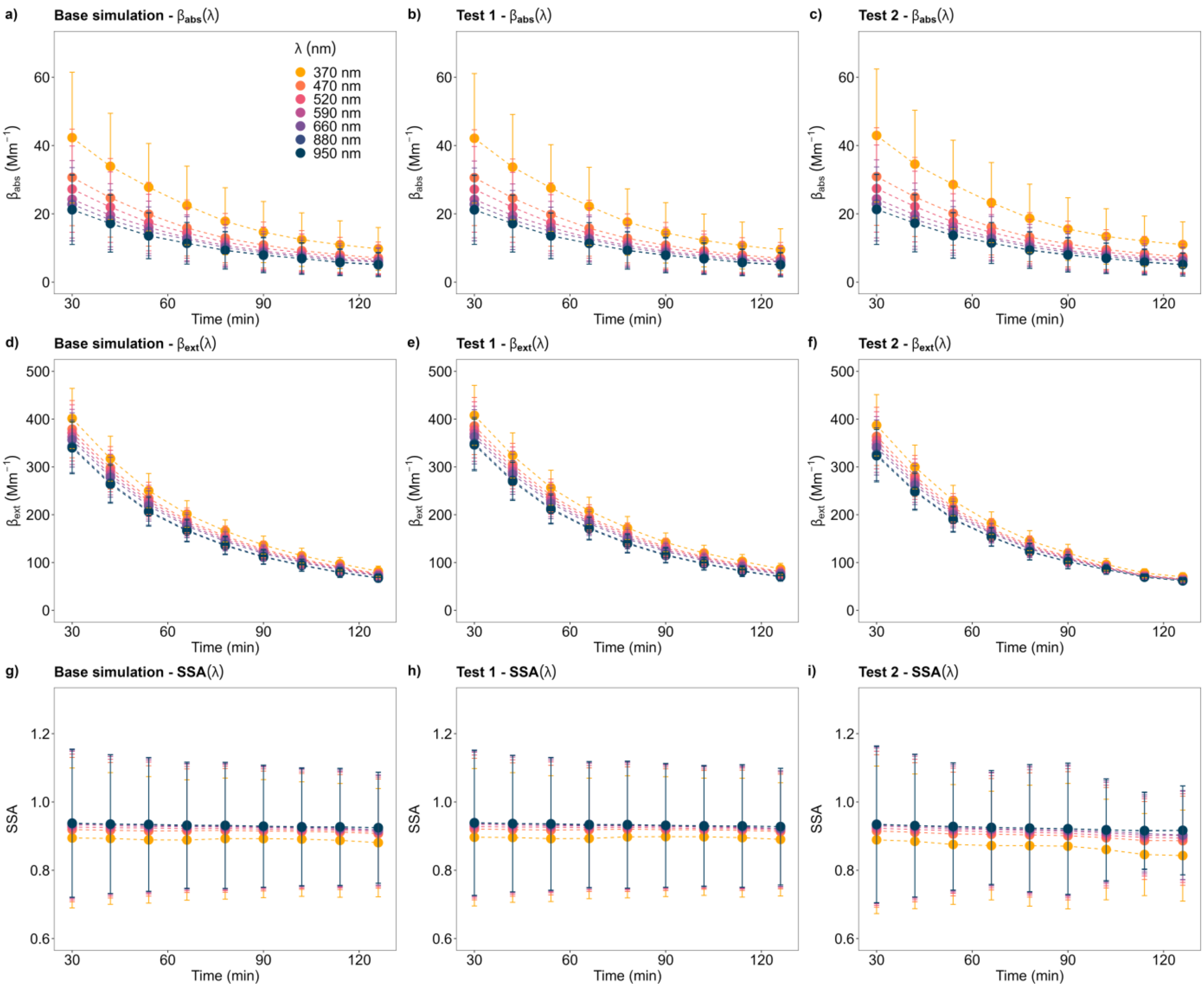

Figure S15: Extinction coefficient $\beta_{ext}(\lambda)$, absorption coefficient $\beta_{abs}(\lambda)$, and single scattering albedo SSA(λ) at λ = 370, 470, 520, 590, 660, 880, 950 nm, from 30 min after the injection peak to 2.5 h. a-c) Base simulation; d-f) Test 1; g-i) Test 2. Data were reported as 12-min average. In Test 1, corrections and calculations were performed using the SMPS and GRIMM data plus 1 SD uncertainty. In Test 2, we used the SMPS and GRIMM data minus 1 SD uncertainty (see section 2.2.1 in the main text for details). Sample ID: MIR45.

D3

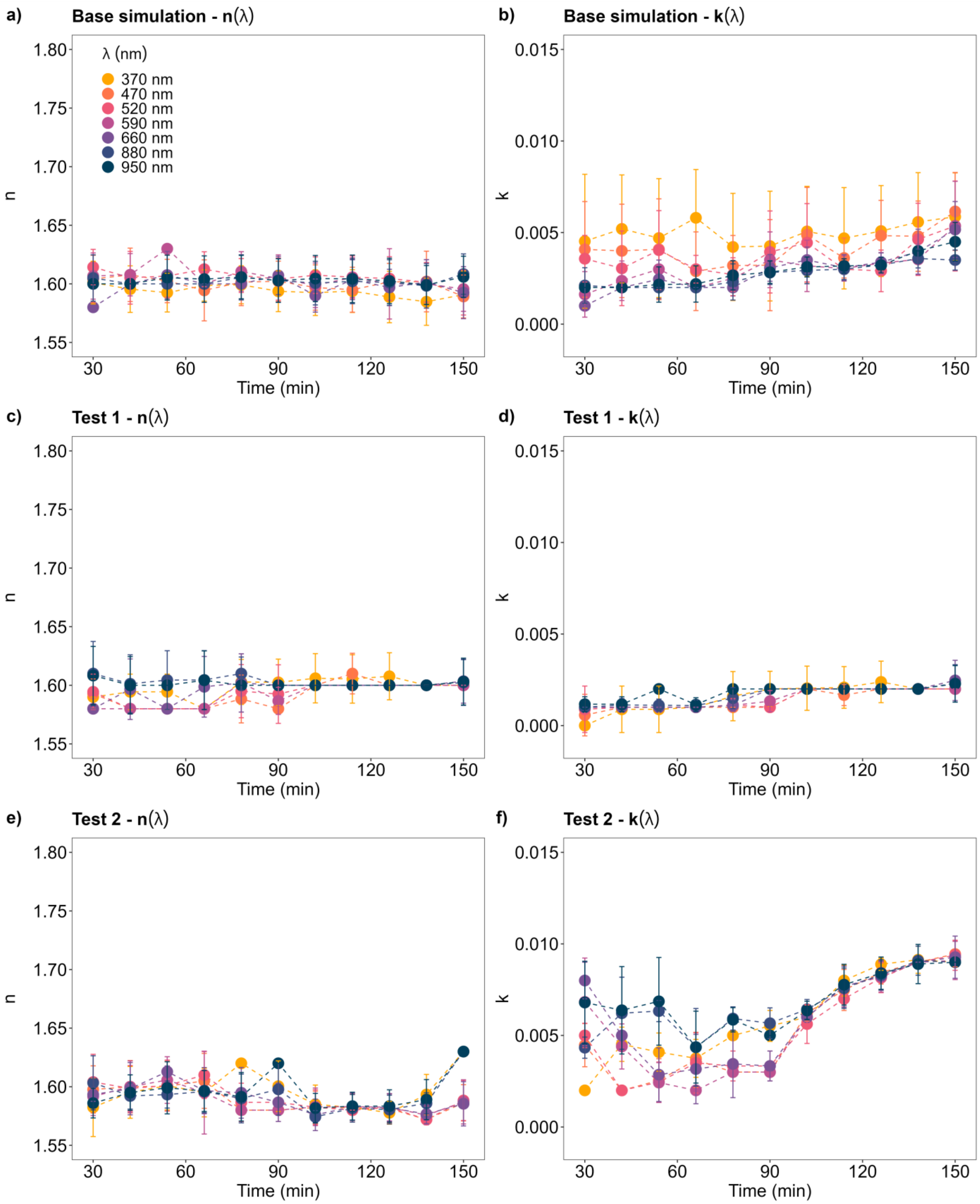

Figure S16: Real index n(λ) and imaginary index k(λ) at λ = 370, 470, 520, 590, 660, 880, 950 nm, from 30 min after the injection peak to 2.5 h. a-b) Base simulation; c-d) Test 1; e-f) Test 2. Data were retrieved at 12-min resolution. In Test 1, corrections and calculations were performed using the SMPS and GRIMM data plus 1 SD uncertainty. In Test 2, we used the SMPS and GRIMM data minus 1 SD uncertainty (see section 2.2.1 in the main text for details). Sample ID: D3.

H55

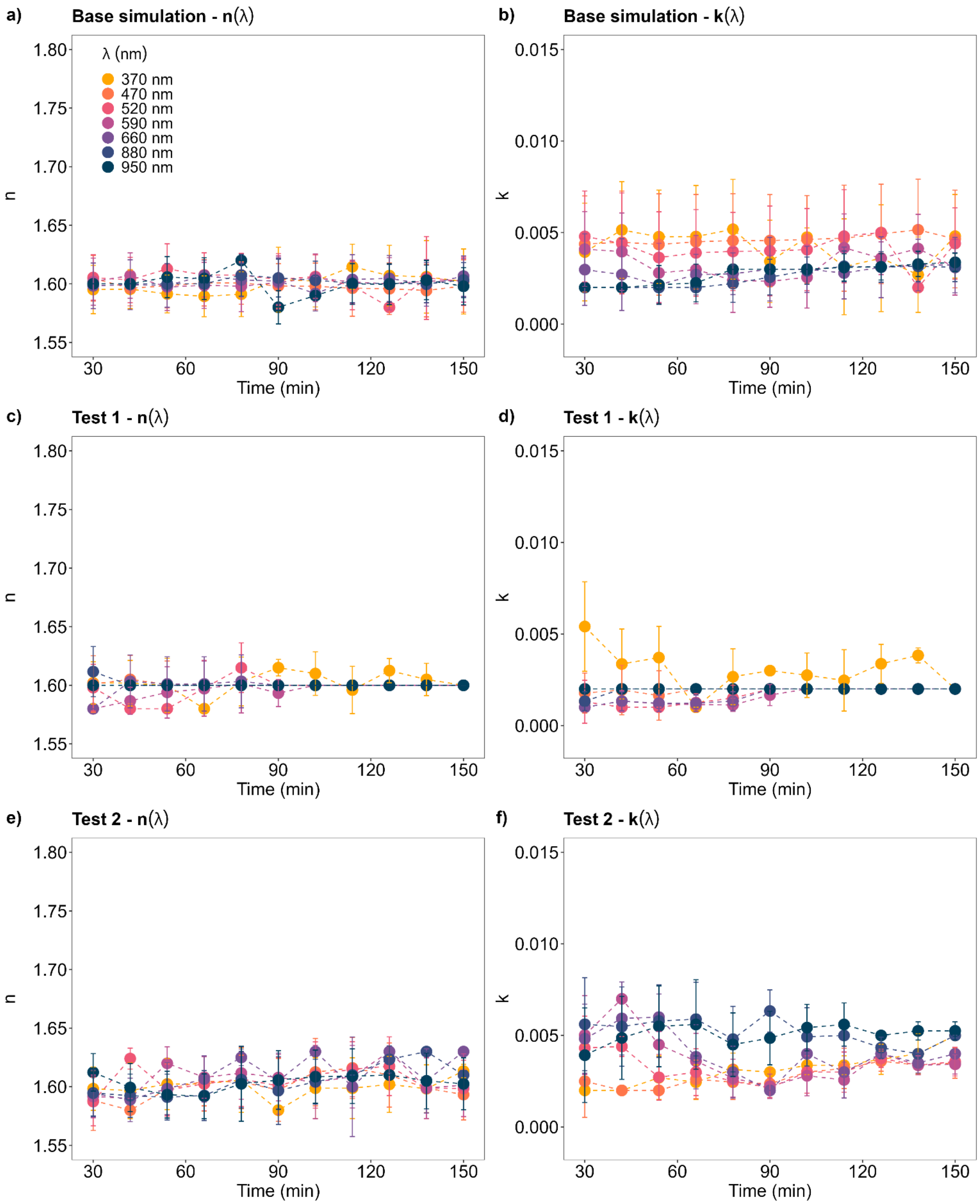

Figure S17: Real index n(λ) and imaginary index k(λ) at λ = 370, 470, 520, 590, 660, 880, 950 nm, from 30 min after the injection peak to 2.5 h. a-b) Base simulation; c-d) Test 1; e-f) Test 2. Data were retrieved at 12-min resolution. In Test 1, corrections and calculations were performed using the SMPS and GRIMM data plus 1 SD uncertainty. In Test 2, we used the SMPS and GRIMM data minus 1 SD uncertainty (see section 2.2.1 in the main text for details). Sample ID: H55.

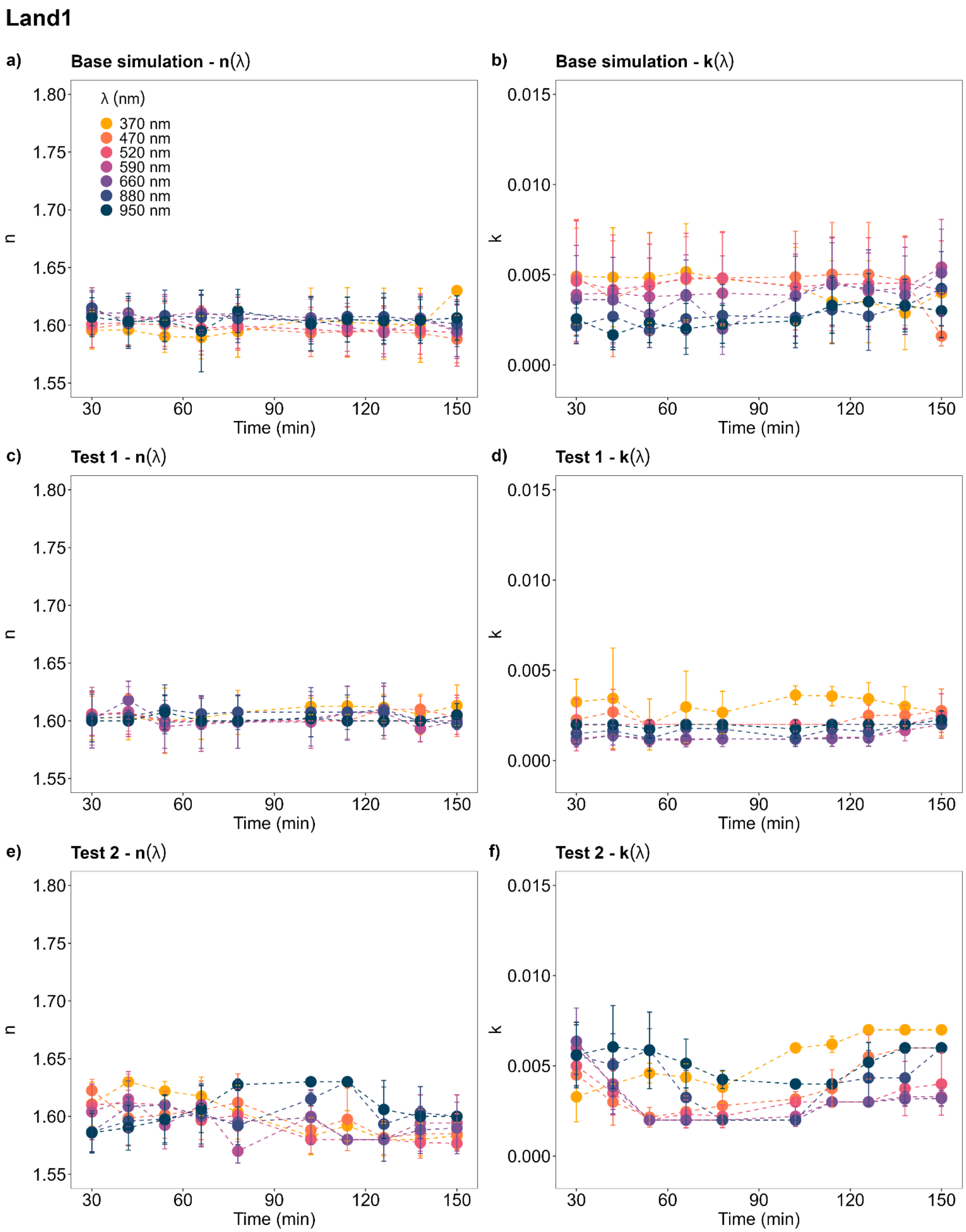

Figure S18: Real index n(λ) and imaginary index k(λ) at λ = 370, 470, 520, 590, 660, 880, 950 nm, from 30 min after the injection peak to 2.5 h. a-b) Base simulation; c-d) Test 1; e-f) Test 2. Data were retrieved at 12-min resolution. In Test 1, corrections and calculations were performed using the SMPS and GRIMM data plus 1 SD uncertainty. In Test 2, we used the SMPS and GRIMM data minus 1 SD uncertainty (see section 2.2.1 in the main text for details). Sample ID: Land1.

Maeli2

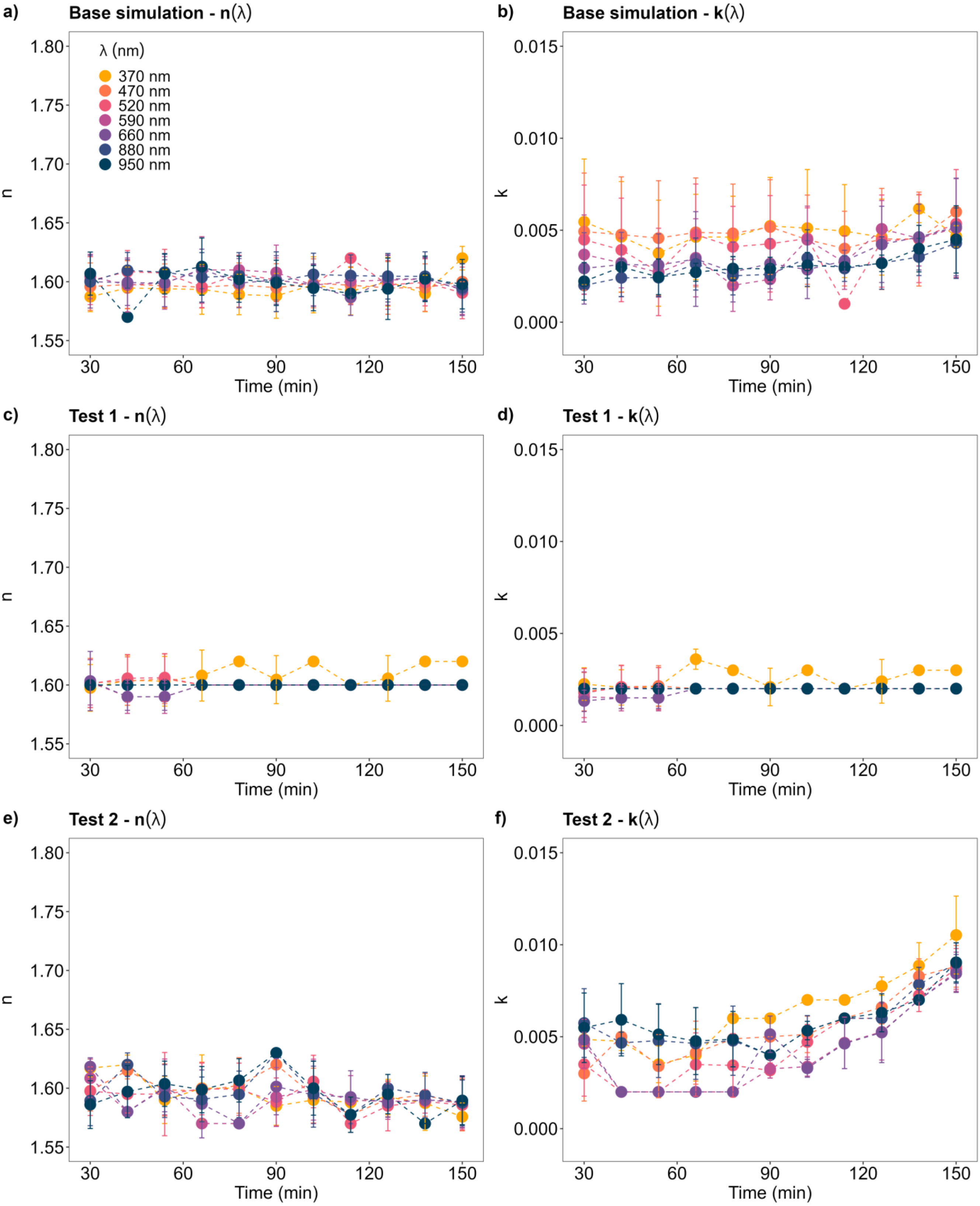

Figure S19: Real index n(λ) and imaginary index k(λ) at λ = 370, 470, 520, 590, 660, 880, 950 nm, from 30 min after the injection peak to 2.5 h. a-b) Base simulation; c-d) Test 1; e-f) Test 2. Data were retrieved at 12-min resolution. In Test 1, corrections and calculations were performed using the SMPS and GRIMM data plus 1 SD uncertainty. In Test 2, we used the SMPS and GRIMM data minus 1 SD uncertainty (see section 2.2.1 in the main text for details). Sample ID: Maeli2.

MIR45

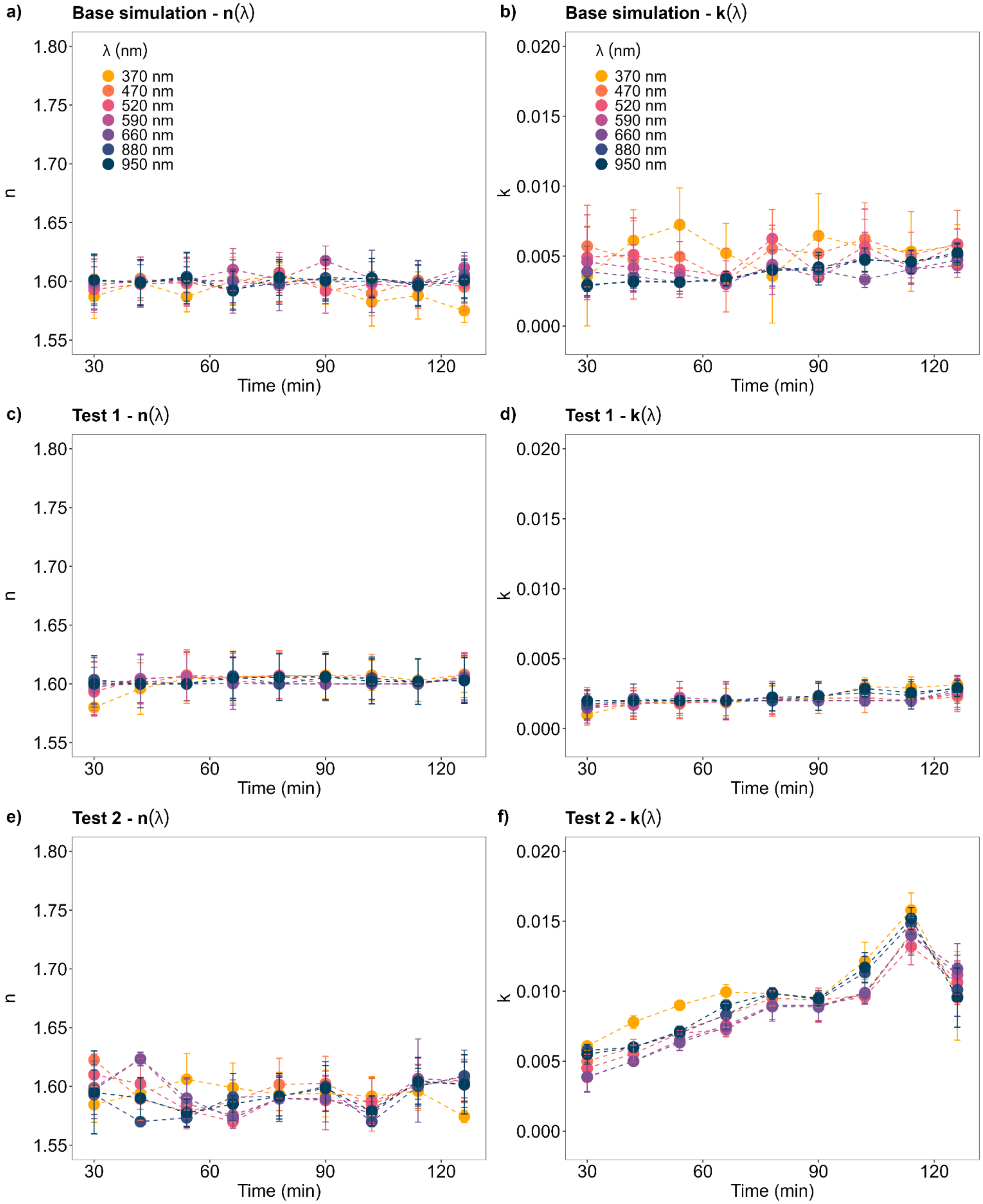

Figure S20: Real index n(λ) and imaginary index k(λ) at λ = 370, 470, 520, 590, 660, 880, 950 nm, from 30 min after the injection peak to 2.5 h. a-b) Base simulation; c-d) Test 1; e-f) Test 2. Data were retrieved at 12-min resolution. In Test 1, corrections and calculations were performed using the SMPS and GRIMM data plus 1 SD uncertainty. In Test 2, we used the SMPS and GRIMM data minus 1 SD uncertainty (see section 2.2.1 in the main text for details). Sample ID: MIR45.

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