

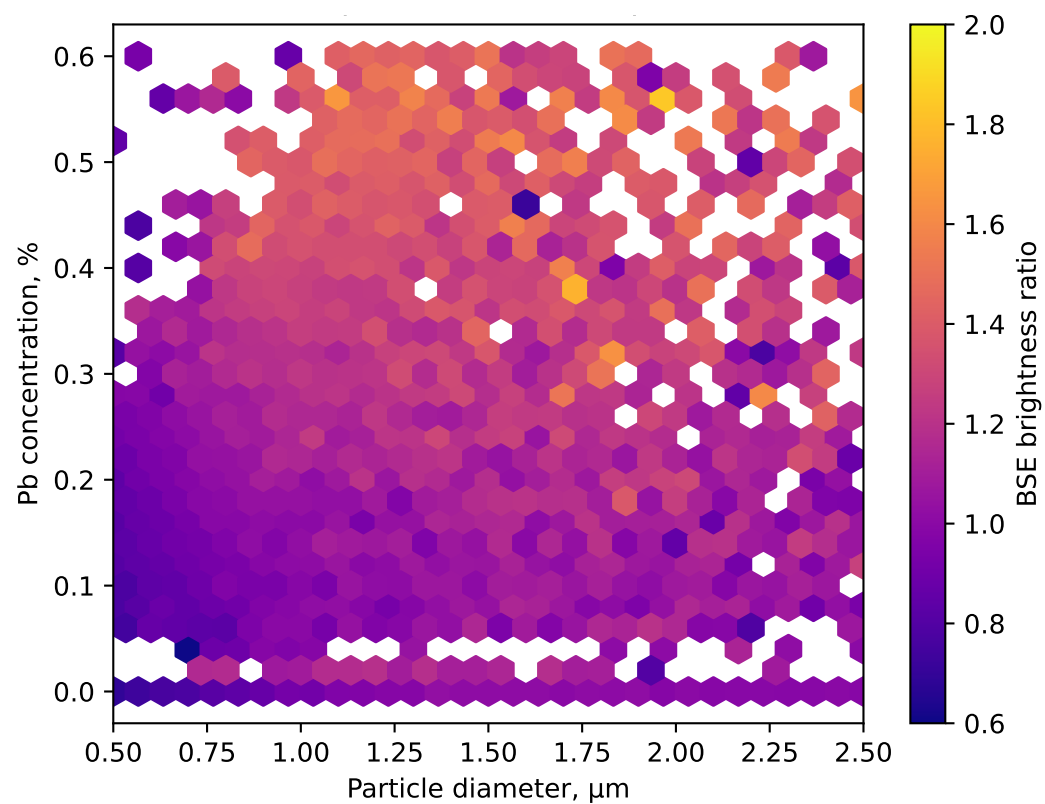


Figure S1. Backscattered-electron image brightness as a function of the quantified Pb content, for the ten samples with most Pb particles at Lecce.

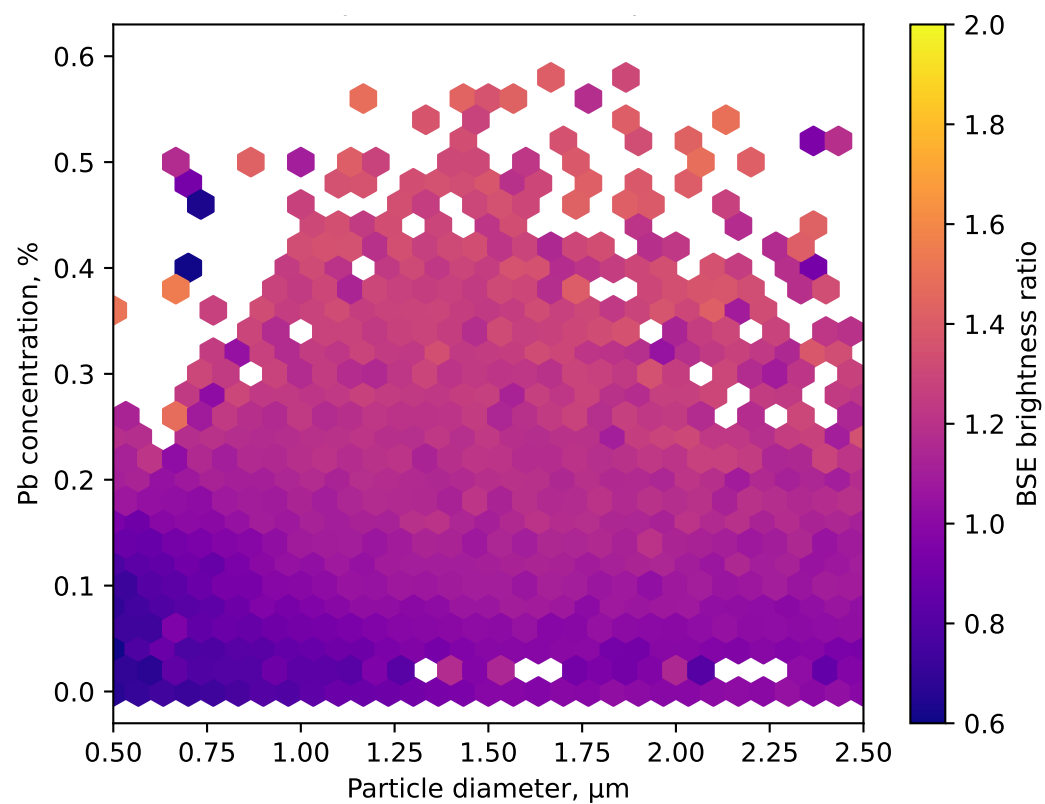


Figure S2. Backscattered-electron image brightness as a function of the quantified Pb content, for the ten samples with most Pb particles at San Lawrenz.

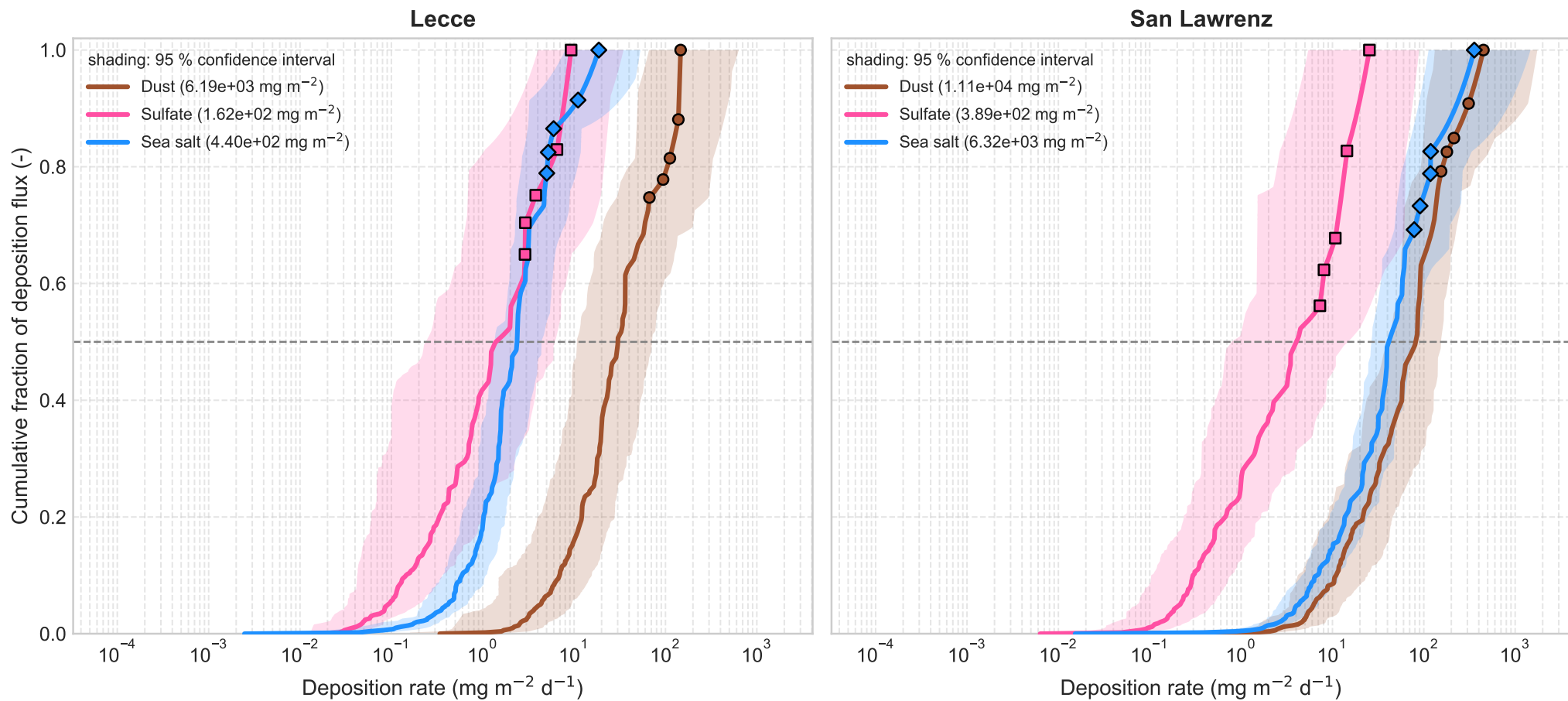


Figure S3. Cumulative deposition-flux curves for Lecce and San Lawrenz, with the 95 % confidence range shown as a shaded band. Symbols mark the five events with the highest deposition rate for each particle class and site.

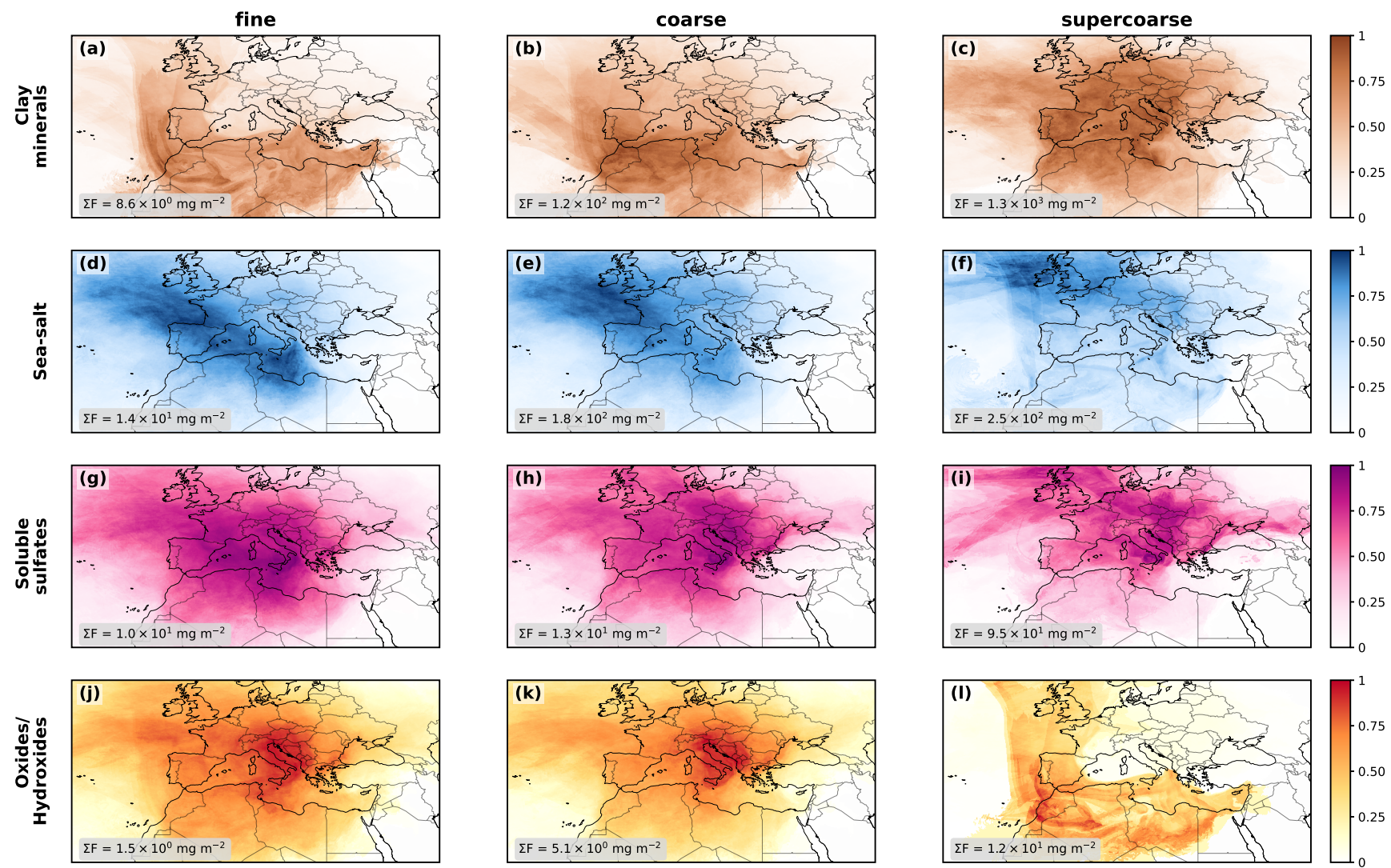


Figure S4. Size-resolved potential source regions by particle class at Lecce.

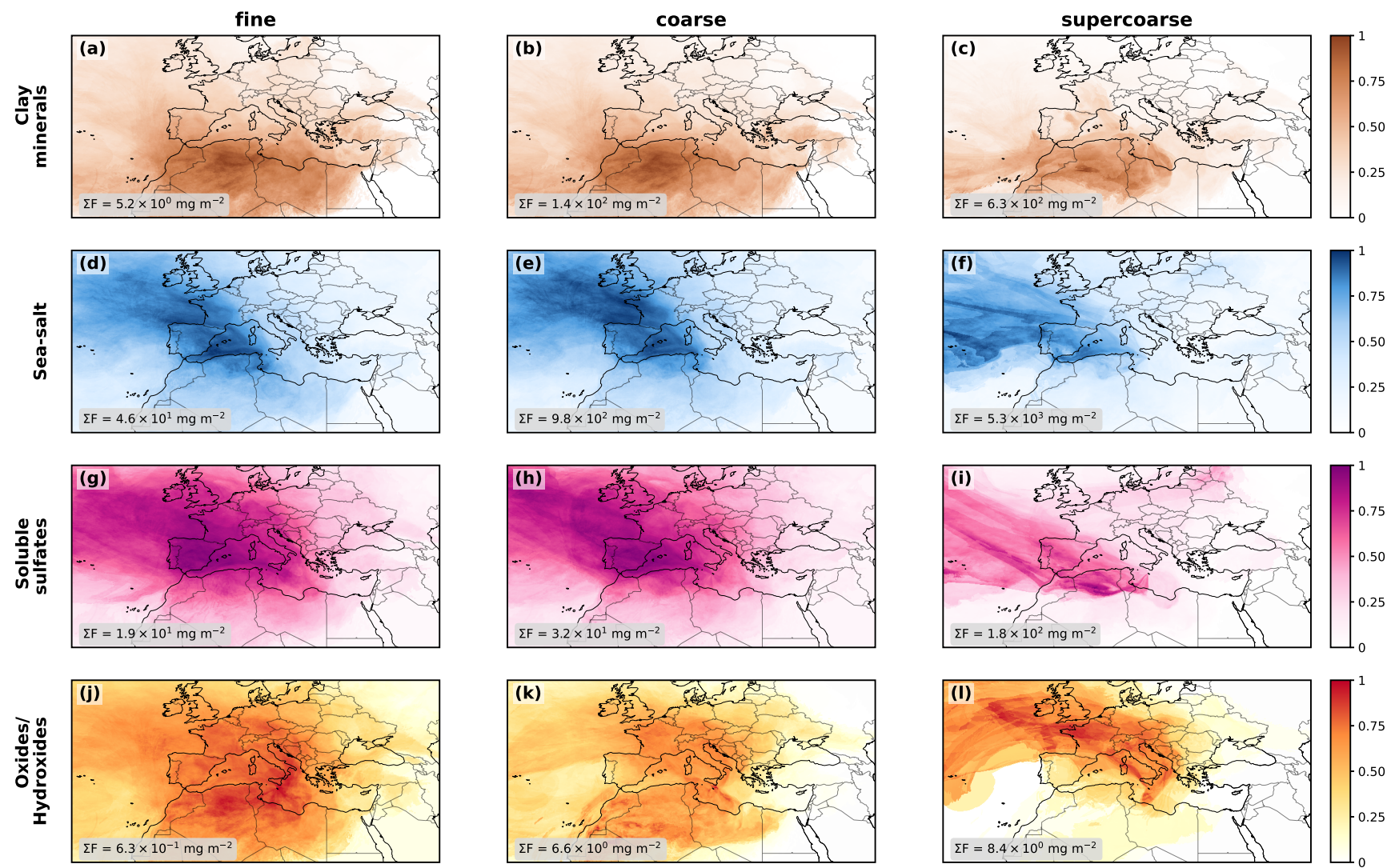


Figure S5. Size-resolved potential source regions by particle class at San Lawrenz.

Category	Class	Group	Sub	F	Na	Mg	Al	Si	P	S	Cl	K	Ca	Ti	Cr	Mn	Fe	Ni	Cu	Sr	Zr	Ag	Ba	Pb
Dust	Clay minerals	Kaolinite-like	1				0.500	0.500																
Dust	Clay minerals	Illite/muscovite-like	1				0.444	0.444				0.111												
Dust	Clay minerals	Illite/muscovite-like	2	0.067			0.400	0.400				0.133												
Dust	Clay minerals	Smectite-like	1		0.037		0.478	0.478					0.006											
Dust	Clay minerals	Smectite-like	2		0.036	0.079	0.238	0.634					0.013											
Dust	Clay minerals	Smectite-like	3		0.048		0.159	0.476									0.317							
Dust	Clay minerals	Chlorite-like	1			0.375	0.200	0.300									0.125							
Dust	Clay minerals	Chlorite-like	2			0.150	0.200	0.300									0.350							
Dust	(Phyllo-)silicates/clay minerals	Palygorskite-like	1			0.250	0.083	0.667																
Dust	(Phyllo-)silicates/clay minerals	Palygorskite-like	2			0.400		0.600																
Dust	(Phyllo-)silicates/clay minerals	High Al mixed silicates	1		0.067	0.067	0.333	0.333				0.067	0.067				0.067							
Dust	(Phyllo-)silicates/clay minerals	Biotite-like	1	0.059		0.265	0.118	0.353				0.118					0.088							
Dust	Feldspars	Microcline-like	1				0.200	0.600				0.200												
Dust	Feldspars	Anorthoclase-like	1		0.050		0.200	0.600				0.150												
Dust	Feldspars	Albite-like	1		0.200		0.200	0.600																
Dust	Feldspars	Oligoclase-like	1		0.160		0.240	0.560					0.040											
Dust	Feldspars	Andesine-like	1		0.120		0.280	0.520					0.080											
Dust	Feldspars	Labradorite-like	1		0.080		0.320	0.480					0.120											
Dust	Feldspars	Bytownite-like	1		0.040		0.360	0.440					0.160											
Dust	Feldspars	Anorthite-like	1				0.400	0.400					0.200											
Dust	Other silicates	Quartz-like	1				0.010	0.990																
Dust	Other silicates	Pyrophyllite-like	1				0.333	0.667																
Dust	Other silicates	Kyanite-like	1				0.667	0.333																
Dust	Other silicates	Zoisite-like	1				0.375	0.375					0.250											
Dust	Other silicates	Epidote-like	1				0.094	0.375					0.250				0.281							
Dust	Other silicates	Vermiculite-like	1			0.225	0.537	0.125									0.113							
Dust	Other silicates	Titanite-like	1	0.033			0.067	0.333					0.317	0.250										
Dust	Other silicates	Ca(Mg)-rich silicate/Ca(Mg)-Si-mixture	1			0.143	0.214	0.357					0.286											
Dust	Other silicates	Olivine-like	1			0.533		0.333									0.133							
Dust	Other silicates	Pyroxene/amphibole-like	1		0.022	0.200	0.089	0.422					0.200	0.022			0.044							
Dust	Other silicates	Pyroxene/amphibole-like	2			0.250		0.500					0.250											
Dust	Other silicates	Pyroxene/amphibole-like	3					0.500					0.250				0.250							
Dust	Other silicates	Pyroxene/amphibole-like	4			0.350		0.533									0.117							
Dust	Other silicates	Pyroxene/amphibole-like	5	0.036	0.054	0.071	0.071	0.536				0.018	0.107				0.107							
Dust	Other silicates	Pyroxene/amphibole-like	6			0.250		0.500									0.250							
Dust	Other silicates	Pyroxene/amphibole-like	7			0.500		0.500																
Dust	Other silicates	Pyroxene/amphibole-like	8			0.338		0.500					0.025				0.138							
Dust	Other silicates	Complex mixed feldspars	1		0.093	0.037	0.185	0.556				0.093					0.037							
Dust	Other silicates	Medium Al mixed silicates	1		0.080	0.080	0.200	0.400				0.080	0.080				0.080							
Dust	Other silicates	Complex quartz-like	1				0.115	0.885																
Dust	Other silicates	Complex clay/feldspar mixture	1		0.067	0.067	0.167	0.500				0.067	0.067				0.067							
Dust	Ca-rich	Calcite-like	1										1.000											
Dust	Ca-rich	Dolomite-like	1			0.500							0.500											
Dust	Ca-rich	Apatite-like	1	0.111					0.333				0.556											
Dust	Ca-rich	Apatite-like	2						0.333		0.111		0.556											
Dust	Ca-rich	Apatite-like	3						0.375				0.625											
Dust	Ca-rich	Fluorite-like	1	0.667									0.333											
Sulfate	Stable sulfates	Barite-like	1							0.500													0.500	
Sulfate	Stable sulfates	Celestine-like	1							0.500										0.500				
Sulfate	Stable sulfates	Alunite-like	1				0.500			0.333		0.167												
Sulfate	Stable sulfates	Gypsum-like	1							0.500			0.500											
Sulfate	Soluble sulfates	Sodium sulfate	1		0.667					0.333														
Sulfate	Soluble sulfates	Sodium sulfate	2		0.500					0.500														
Sulfate	Soluble sulfates	Glauberite-like	1		0.400					0.400			0.200											
Sulfate	Soluble sulfates	Ammonium-sulfate-like	1							1.000														
Sulfate	Soluble sulfates	Complex sulfate	1		0.333					0.667														
Sulfate	Soluble sulfates	Complex sulfate	2			0.200				0.800														
Sulfate	Soluble sulfates	Complex sulfate	3							0.667		0.333												
Sulfate	Soluble sulfates	Complex sulfate	4		0.167					0.667		0.167												
Sulfate	Soluble sulfates	Complex sulfate	5		0.133	0.067				0.667		0.133												
Sulfate	Soluble sulfates	Complex sulfate	6		0.170	0.117				0.489		0.011	0.213											
Sulfate	Soluble sulfates	Complex soluble salt	1		0.333					0.333	0.333													
Sulfate	Soluble sulfates	Complex soluble salt	2			0.200				0.400	0.400													
Sulfate	Soluble sulfates	Complex soluble salt	3							0.333	0.333	0.333												
Sulfate	Soluble sulfates	Complex soluble salt	4		0.167					0.333	0.333	0.167												
Sulfate	Soluble sulfates	Complex soluble salt	5		0.133	0.067				0.333	0.333	0.133												
Sulfate	Soluble sulfates	Pb-containing	2		0.110	0.040				0.490		0.040	0.200											0.120
Sulfate	Soluble sulfates	Pb-containing	3							0.667														0.333
Sea-salt	Sea-salt	Sea-salt	1		0.420	0.048				0.025	0.489	0.009	0.009											
Sea-salt	Sea-salt	Aged sea-salt	1		0.419	0.047				0.271	0.244	0.009	0.009											
Other	Oxides/hydroxides	Fe-oxide/Fe-hydroxide-like	1				0.077	0.154									0.769							
Other	Oxides/hydroxides	Rutile-like	1											1.000										
Other	Oxides/hydroxides	Perovskite-like	1										0.500	0.500										
Other	Oxides/hydroxides	Ilmenite-like	1										0.500				0.500							
Other	Oxides/hydroxides	Titanomagnetite-like	1										0.167				0.833							
Other	Sea-salt/silicate mixtures	Sea-salt/silicate mixture	1		0.333			0.333			0.333													
Other	Sea-salt/silicate mixtures	Sea-salt/silicate mixture	2		0.250		0.250	0.250			0.250													
Other	Sea-salt/silicate mixtures	Aged sea-salt/silicate mixture	1		0.333			0.333		0.167	0.167													
Other	Sea-salt/silicate mixtures	Aged sea-salt/silicate mixture	2		0.250		0.250	0.250		0.125	0.125													
Other	Sea-salt/silicate mixtures	Aged sea-salt/silicate mixture	3		0.500			0.250		0.125	0.125													
Other	Sea-salt/silicate mixtures	Aged sea-salt/silicate mixture	4		0.400		0.200	0.200		0.100	0.100													
Other	Sulfate/silicate mixtures	Sodium sulfate/silicate mixture	1		0.333			0.333			0.333													
Other	Sulfate/silicate mixtures	Sodium sulfate/silicate mixture	2		0.250		0.250	0.250			0.250													
Other	Sulfate/silicate mixtures	Sodium sulfate/silicate mixture	3		0.500			0.250			0.250													
Other	Sulfate/silicate mixtures	Sodium sulfate/silicate mixture	4		0.400		0.200	0.200			0.200													
Other	Sulfate/silicate mixtures	Sulfate/silicate mixture	1					0.500			0.500													
Other	Sulfate/silicate mixtures	Sulfate/silicate mixture	2				0.333	0.333			0.333													