a: not included in final PPE dataset				Country	Bulgaria&Georgia	Canada	China	China	China	China	China	China	China	China	China	China
b: included in final dataset, Poa is not the original reference				Region	Black Sea region	Quebec	Bashang steppe	northern	Hulunbeier	Sunitezuoq	Xilinhaote	northeast Inner Mongolia	northern	Changbai Mt.	Shandong	Tibetan Plateau
c: Data extracted from Li et al. 2018				sample type	pollen trap	lake	soil	lake				soil	soil & pollen trap	Moss	moss	Lake
				reference	Filipova-Marinova et al., 2010	Chaput & Gajewski (2018)	Ge et al., 2015 (c)	Han et al., 2017	He et al., 2016 (c)	He et al., 2016 (c)	He et al., 2016 (c)	Li et al. in prep (c)	Li et al., 2011 (c)	Li et al., 2015	Li et al., 2017	Wang and Herzschuh, 2011
				Reference ID	0	1	2	3	4	5	6	7	8	9	10	11
				Model	Composite dispersal function DF5	ERV-2	Model 3	Model 1	Model 3	Model 3	Model 3	Model 1	Model1.soil	-	ERV-3	Model 2
Taxon	Target taxon	n	n (Poa ref.)	Reference Taxon	Quercus	Betula	Poaceae	Poaceae	Poaceae.re	Poaceae.re	Poaceae.re	Poaceae	Poaceae.re	Quercus	Poaceae	Poaceae
Abies	Abies	3.00	2.00			1.47±0.38 a										
Acer	Acer	4.00	1.00			0.29±0.03 a										
Acer rubrum	Acer	2.00	0.00													
Acer saccharum	Acer	2.00	0.00													
Aesculus (b)	Aesculus	1.00	0.00		1.03 b											
Alnus_shrub	Alnus	1.00	1.00													
Alnus_tree	Alnus	5.00	4.00													
Alnus	Alnus	8.00	1.00													
Ambrosia	Ambrosia	1.00	1.00													
Apiaceae	Apiaceae	2.00	2.00													
Artemisia	Artemisia	17.00	9.00				19.33±0.41	1.29±0.27	2.44 a	0.47 a	100 a	19.03±0.27	226.43 a		24.70±0.36	3.20±0.60
Asteraceae	Asteraceae	5.00	5.00												1.06±0.21	
Aster/Anthemis-type	Asteraceae	1.00	1.00												1.26±0.40	
Asterac. SF. Cichor	Asteraceae	3.00	3.00												0.86±0.11	
Avena-type	PoaceaeCrop	1.00	0.00													
Avena-type b (b)	PoaceaeCrop	1.00	0.00													
Avena triticum (b)	PoaceaeCrop	1.00	0.00													
Betula_shrub	Betula	2.00	2.00													
Betula_tree	Betula	7.00	6.00													
Betula	Betula	19.00	5.00			1.00±0.00 a		1.16±0.43						5.04±0.15 a		
Brassicaceae	Brassicaceae	2.00	2.00												0.89±0.18	
Calluna	Ericales	3.00	2.00													
Calluna vulgaris	Ericales	3.00	3.00													
Campanula gieseckiana	Campanulaceae	1.00	1.00													
Carpinus	Carpinus	5.00	2.00		1.03 a											
Caryophyllaceae	Caryophyllaceae	3.00	3.00									78.20±5.85 a			0.87±0.14	
Castanea	Castanea	1.00	1.00												11.49±0.49	
Cerealia	Cerealia	5.00	5.00													
Cercis	Fabaceae	1.00	0.00		0.96 a											
Chenopodiaceae	Chenopodiaceae	13.00	8.00				21.01±2.47 a	50.49±3.56 a	10.88 a	16.85 a	205 a	3.57±0.81	71.43 a		0.18±0.16	5.30±1.10
Compositae	Asteraceae	5.00	2.00				7.73±0.54 a	0.19±0.20 a	0.73 a	3.13 a	472 a					
Convolvulaceae	Convolvulaceae	1.00	1.00				0.18±0.03									
Cornus	Cornaceae	1.00	1.00													
Corylus	Corylus	5.00	3.00													
Cupressaceae	Cupressaceae	1.00	1.00												1.11±0.09	
Cyperaceae	Cyperaceae	24.00	17.00				8.90±0.33 a	0.01±0.01	2.66 a	0.19 a	0.13 a				0.21±0.07	0.65±0.4
Elaeagnaceae (b)	Elaeagnaceae	1.00	0.00													
Empetrum	Ericales	2.00	2.00													
Ephedra	Ephedra	1.00	1.00													
Equisetum	Equisetum	1.00	1.00													
Ericaceae	Ericales	3.00	3.00													
Fabaceae	Fabaceae	2.00	2.00				0.20±0.10									
Fagus	Fagus	11.00	4.00		0.78 a	7.19±1.52 a										
Filipendula	Rosaceae	2.00	2.00													
Fraxinus	Fraxinus	11.00	2.00											0.76±0.14 a		
Galium-type	Rubiaceae	3.00	3.00												1.23±0.36	
Graminae	Poaceae	1.00	0.00													
Hippophae	Elaeagnaceae	1.00	0.00													
Hordeum-type (b)	PoaceaeCrop	2.00	0.00													
Humulus	Humulus	1.00	1.00												16.43±1.00	
Iridaceae	Iridaceae	1.00	1.00													
Juglans	Juglans	5.00	1.00		1.37 a									1.94±0.09 a	0.30±0.05	
Juniperus	Juniperus	5.00	4.00													
Lamiaceae	Lamiaceae	1.00	1.00				0.20±0.13									
Larix	Larix	7.00	2.00											0.30±0.04 a		
Leucanthemum vulgate	Asteraceae	2.00	2.00													
Liliaceae	Liliaceae	1.00	1.00				1.49±0.11									
Maclura	Moraceaea	1.00	1.00													
Mentha type(Thymus)	Lamiaceae	1.00	1.00									2.27±0.35				
Nitraria (b)	Nitraria	1.00	0.00										20.00 b			
Picea	Picea	15.00	8.00			0.60±0.16 a										
Pinus	Pinus	24.00	11.00					20.07±6.96						3.11±0.10 a	8.96±0.23	
Pinus cembra	Pinus	1.00	1.00													
Plantago lanceolata	Plataginaceae	7.00	6.00													
Plantago media	Plataginaceae	1.00	1.00													
Plantago montana-type	Plataginaceae	1.00	1.00													
Plantago maritima	Plataginaceae	1.00	1.00													
Poaceae	Poaceae	33.00	26.00				1.00	1.00	1.00 a	1.00 a	1.00 a	1.00	1.00 a		1.00±0.00	1.00
Populus	Populus	4.00	2.00			0.11±0.15 a										
Potentilla t	Rosaceae	7.00	7.00				0.22±0.09									
Pterocarya (b)	Pterocarya	1.00	0.00		8.06											
Quercus	Quercus	23.00	8.00		1.00 a	3.28±0.35 a		58.05±9.54 a						1.00±0.00 a	4.89±0.16	
Ranunculaceae	Ranunculaceae	3.00	2.00													
Ranunculus acris-type	Ranunculaceae	2.00	2.00													
Rhinantus-type	Orobanchaceae	1.00	1.00													
Robinia/Sophora	Fabaceae	1.00	1.00												0.78±0.03	
Rubiaceae	Rubiaceae	2.00	2.00													
Rumex	Rumex	2.00	2.00													
Rumex (sect.) acetosa	Rumex	5.00	4.00													
Rumex acetosella	Rumex	1.00	1.00													
Salix	Salix	12.00	9.00													
Sambucus nigra-type	Sambucus nigra-type	1.00	1.00													
Sanguisorba	Sanguisorba	1.00	1.00									24.07±3.50				
Secale (b)	PoaceaeCrop	3.00	0.00													
Sinapis type	Brassicaceae	1.00	0.00													
Stellera	Thymelaceae	1.00	1.00									33.05±3.78				
Thalictrum	Thalictrum	2.00	2.00													
Thymus praecox	Lamiaceae	1.00	1.00													
Tilia	Tilia	8.00	2.00											0.16±0.04 a		
Tilia begoniifolia	Tilia	1.00	0.00		2.58 a											
Tilia tomentosa	Tilia	1.00	0.00		0.71 a											
Triticum-type (b)	PoaceaeCrop	2.00	0.00													
Trollius europaeus	Ranunculaceae	1.00	1.00													
Tsuga (b)	Tsuga	4.00	0.00			17.14±1.64 a										
Ulmus	Ulmus	6.00	3.00					9.44±3.50						1.40±0.35 a	1.00±0.31	
Urtica	Urtica	1.00	1.00													
Vaccinium	Ericales	1.00	1.00													
Vitex negundo	Lamiaceae	1.00	1.00												0.00±0.02 a	
Wild Herbs (b)	wild herbs	2.00	0.00													

	Country	China	China	China	China	Czech Republic	Denmark	Denmark	England	England	Estonia	Finland	Germany
	Region	Xinglong Mountain	Xilinhaote	Taiyue	Changbai	Central Bohemia	South Jutland		Calthorpe	Wheatfen	Southeast	northern	Brandenburg
	sample type	moss	Soil			Moss	moss	lake sediment	Moss	Moss	Lake	Moss	Lake
	reference	Wu et al., 2013 (c)	Xu et al., 2014	Zhang et al. 2017 (c)	Zhang et al. 2017 (c)	Abraham and Kozáková, 2012	Andersen 1967	Nielsen 2004	Bunting et al., 2005	Bunting et al., 2005	Poska et al., 2011	Räsänen et al., 2007	Matthias et al., 2012
	Reference ID	12	13	14	15	16	17	18	19	20	21	22	23
	Model	Model 1	ERV2	Model 3	Model 3	ERV-1	?	ERV-1	Average	Average	ERV-1	ERV-3	allFIDage_ERV3
Taxon	Reference Taxon	Poaceae.re	Poaceae	Poaceae.re	Poaceae.re	Poaceae	Fagus	Poaceae	Quercus	Quercus	Poaceae	Poaceae	Pinus
Abies													
Acer													
Acer rubrum													
Acer saccharum													
Aesculus (b)													
Alnus_shrub													
Alnus_tree						2.56±0.32					13.93±0.15		
Alnus							1.5 a		1.39 a	0.53 a			2.74±0.22 a
Ambrosia													
Apiaceae													
Artemisia		908.00±41.00 a	11.21±0.31	0.01±1.60 a	21.53±2.16 a	2.77±0.39					3.48±0.19		
Asteraceae			0.39±0.16										
Aster/Anthemis-type													
Asterac. SF. Cichor													
Avena-type													0.01±1.89 a
Avena-type b (b)													
Avena triticum (b)													
Betula_shrub													
Betula_tree											1.81±0.02	4.60±0.70	
Betula		16.00±1.00 a		13.16±0.08 a	11.67±0.22 a		4.1 a		1.29 a				1.70±0.34 a
Brassicaceae			7.48±0.33										
Calluna													
Calluna vulgaris								1.10±0.05					
Campanula gieseckiana													
Carpinus													1.67±0.09 a
Caryophyllaceae													
Castanea													
Cerealia						0.05±0.00		0.75±0.04			1.60±0.07		
Cercis													
Chenopodiaceae			6.74±0.79			4.28±0.27							
Compositae													
Convolvulaceae													
Cornus													
Corylus										0.16 a			
Cupressaceae													
Cyperaceae		1.00±0.00 a	0.94±0.08	0.03±0.07 a	0.05±0.07 a						1.23±0.09	0.00±0.00 a	
Elaeagnaceae (b)				8.88±1.30 b									
Empetrum												0.07±0.06	
Ephedra			0.96±0.14										
Equisetum													
Ericaceae													
Fabaceae													
Fagus							1.00 a	5.09±0.22					1.03±0.08 a
Filipendula											3.13±0.24		
Fraxinus					0.21±0.06 a	1.11±0.09	0.60 a		0.15 a	0.01 a			1.19±0.12 a
Galium-type													
Graminae													
Hippophae		167.00±19.00 a											
Hordeum-type (b)													1.59±0.34 b
Humulus													
Iridaceae			0.16±0.25 a										
Juglans				7.69±0.49 a	1.69±0.24 a								
Juniperus													
Lamiaceae													
Larix				3.87±0.60 a	4.41±0.15 a								1.55±0.32 a
Leucanthemum vulgate													
Liliaceae													
Maclura													
Mentha type(Thymus)													
Nitraria (b)													
Picea		296.00±44.00 a						1.19±0.42			4.73±0.13		0.28±0.05 a
Pinus				29.55±1.77 a	18.82±0.54 a	6.17±0.41					5.07±0.06	8.40±1.34	1.00±0.00 a
Pinus cembra													
Plantago lanceolata						3.70±0.77		1.27±0.18					
Plantago media													
Plantago montana-type													
Plantago maritima													
Poaceae		1.00 a	1.00±0.00	1.00 a	1.00 a	1.00±0.00		1.00±0.00			1.00±0.00	1.00±0.00	
Populus													0.47±0.22 a
Potentilla t			1.35±0.15										
Pterocarya (b)													
Quercus		100.00±0.00 a		5.48±0.11 a	1.75±0.31 a	1.76±0.20	4.10 a		1.00 a	1.00 a	7.39±0.20		0.38±0.03 a
Ranunculaceae				7.86±2.65 a									
Ranunculus acris-type													
Rhinantus-type													
Robinia/Sophora													
Rubiaceae													
Rumex													
Rumex (sect.) acetosa								1.56±0.09					
Rumex acetosella													
Salix						1.19±0.12			0.23 a	0.36 a	2.31±0.08 a		
Sambucus nigra-type						1.30±0.12							
Sanguisorba													
Secale (b)													0.72±0.17 b
Sinapis type													
Stellera													
Thalictrum			3.06±0.42										
Thymus praecox													
Tilia						1.36±0.26	0.70 a						0.26±0.04 a
Tilia begoniifolia													
Tilia tomentosa													
Triticum-type (b)													0.08±0.26 a
Trollius europaeus													
Tsuga (b)													
Ulmus			11.53±1.09		0.00±0.17 a								
Urtica						10.52±0.31							
Vaccinium												0.01±0.01	
Vitex negundo													
Wild Herbs (b)													0.01±0.01 b

	Country	Germany	Germany	Germany	Greenland	Norway	Norway	Norway	Norway	Norway	Poland	Russia	Scotland
	Region	North-East	North-East	northeastern	Southern	Coast	Inland	South	Dividalen	Budalen	Białowieża Forest	Khatanga region	eastern
	sample type	small lake	medium lake	lake	Moss	moss	moss	Lake	mire	mire	Moss	Moss	moss
	reference	Theuerkauf et al. 2013	Theuerkauf et al. 2013	Theuerkauf et al. 2015	Bunting et al., 2013	Hjelle 1998	Hjelle 1998	Hjelle and Sugita, 2012	Sjögren 2013	Sjögren 2013	Baker et al., 2016	Niemeyer et al., 2015	Twiddle et al. 2012
	Reference ID	24	25	26	27	28	29	30	31	32	33	34	35
	Model	LS-Model	LS-Model	LS Model	ERV-1	ERV-1	ERV-1	ERV-3	Logarithmic	Logarithmic	ERV-3	ERV-2	Ran.1000.1
Taxon	Reference Taxon	Pinus	Pinus	Pinus	Poaceae	Poaceae	Poaceae	Poaceae	Poaceae	Poaceae	Poaceae	Poaceae	Picea
Abies													
Acer													
Acer rubrum													
Acer saccharum													
Aesculus (b)													
Alnus_shrub												6.42±0.42	
Alnus_tree								3.22±0.22			15.95±0.66		
Alnus		2.99 a	3.73 a										
Ambrosia													
Apiaceae						0.26±0.01	0.21						
Artemisia				0.67±0.04 a									
Asteraceae													
Aster/Anthemis-type													
Asterac. SF. Cichor						0.06±0.00	0.05						
Avena-type													
Avena-type b (b)				0.23±0.20 b									
Avena triticum (b)				0.03±0.01 b									
Betula_shrub					1.40±0.05							1.80±0.26	
Betula_tree					3.70±0.40						13.94±0.23		
Betula		4.46 a	4.38 a						1.37	1.26			2.50 a
Brassicaceae													
Calluna						1.07±0.03							2.10 a
Calluna vulgaris								0.87±0.05					
Campanula gieseckiana					2.29±0.14								
Carpinus											4.48±0.03		
Caryophyllaceae					0.60±0.05								
Castanea													
Cerealia													
Cercis													
Chenopodiaceae				0.11±0.01 a									
Compositae													
Convolvulaceae													
Cornus													
Corylus								0.08±0.12 a			1.35±0.05		
Cupressaceae													
Cyperaceae					0.95±0.05	0.29±0.01	0.13	1.37±0.21				0.53±0.06	
Elaeagnaceae (b)													
Empetrum													
Ephedra													
Equisetum					0.09±0.02								
Ericaceae												0.33±0.03	
Fabaceae													
Fagus		0.54 a	0.49 a					0.80±0.09					
Filipendula													
Fraxinus		0.48 a	0.30 a										
Galium-type						0.42±0.01	0.13						
Graminae													
Hippophae													
Hordeum-type (b)				0.04±0.04 a									
Humulus													
Iridaceae													
Juglans													
Juniperus								0.79±0.21					
Lamiaceae													
Larix												0.00±0.10a	
Leucanthemum vulgate						0.10±0.08	0.09						
Liliaceae													
Maclura													
Mentha type(Thymus)													
Nitraria (b)													
Picea		0.30 a	0.33 a					1.20±0.04					
Pinus		1.00 a	1.00 a	1.00 a				5.73±0.07	5.82	8.94	23.12±0.24		3.10 a
Pinus cembra													
Plantago lanceolata				0.23±0.05 a		1.99±0.04	0.48						
Plantago media													
Plantago montana-type													
Plantago maritima					5.96±0.31								
Poaceae					1.00±0.00	1.00	1.00	1.00±0.00	1.00	1.00	1.00±0.00	1.00±0.00	
Populus													
Potentilla t					0.35±0.03	0.14±0.05	0.18						
Pterocarya (b)													
Quercus		2.84 a	2.34 a					1.30±0.10			18.47±0.10 a		
Ranunculaceae					1.95±0.10								
Ranunculus acris-type						0.07±0.04	0.08						
Rhinantus-type					0.33±0.04								
Robinia/Sophora													
Rubiaceae													
Rumex								0.39±0.10					
Rumex (sect.) acetosa				0.60±0.15 a	3.53±0.30	0.13±0.00	0.04						
Rumex acetosella					2.05±0.17								
Salix					0.80±0.00			0.62±0.11				0.03±0.03	
Sambucus nigra-type													
Sanguisorba													
Secale (b)				0.23±0.07 b									
Sinapis type				0.17±0.05 a									
Stellera													
Thalictrum					4.65±0.30								
Thymus praecox					0.72±0.08								
Tilia											0.98±0.03		
Tilia begoniifolia													
Tilia tomentosa													
Triticum-type (b)				0.04±0.02 b									
Trollius europaeus													
Tsuga (b)													
Ulmus													
Urtica													
Vaccinium													
Vitex negundo													
Wild Herbs (b)													

	Country	Sweden	Sweden	Sweden	Switzerland	Switzerland	Switzerland	Switzerland	USA	USA	USA	USA	USA	USA
	Region	Southern Sweden	Southern Sweden	west-central	Alps	Swiss Plateau	Jura Mountains	Alps	Sylvania	Wisconsin	Kansas	Alaska (Denali, mountain tundra)	Alaska (Boreal Forest)	upper Great Lakes region
	sample type	Moss	Moss	Moss	Trap	Lake	Moss	pollen trap	hollows	hollows	lake	moss	moss	hollows
	reference	Broström et al., 2004	Sugita et al., 1999	von Stedingk et al., 2008	Sjögren et al. 2008a	Soepboer et al., 2007	Mazier et al., 2008	Sjögren et al. 2008b	Calcote 1995	Calcote 1995	Commerford et al. 2013	Hopla 2017	Hopla 2017	Sugita et al. 2006
	Reference ID	36	37	38	39	40	41	42	43	44	45	46	47	48
	Model	ERV-3	ERV-3	ERV-3	-	ERV-3	ERV-1	0	Dispersal function	Dispersal function	ERV-3	ERV-3 (1/d)	ERV-3 (Sutton-Prentice)	ERV-2
Taxon	Reference Taxon	Poaceae	Juniperus	Poaceae	Picea	Poaceae	Poaceae	Poaceae	Acer saccharum	Acer saccharum	Poaceae	Poaceae	Poaceae	Acer
Abies						9.92±2.86	3.83±0.37							
Acer			0.61 a				0.32±0.09							1.00 a
Acer rubrum									1.60±0.10 a	1.20±0.20 a				
Acer saccharum									1.00±0.10 a	1.00±0.10 a				
Aesculus (b)														
Alnus_shrub														
Alnus_tree			2.03 a											
Alnus					10.00 a								2.70±0.12	
Ambrosia											1.36±0.36			
Apiaceae														
Artemisia											1.35±0.24			
Asteraceae		0.24±0.06				0.17±0.03					0.37±0.16			
Aster/Anthemis-type														
Asterac. SF. Cichor														
Avena-type														
Avena-type b (b)														
Avena triticum (b)														
Betula_shrub														
Betula_tree			4.29 a	2.24±0.20		2.42±0.39								
Betula									9.40±0.70 a	7.50±0.70 a		10.95±0.02	8.70±0.44	10.00 a
Brassicaceae														
Calluna				0.30±0.03										
Calluna vulgaris		4.69±0.70 a												
Campanula gieseckiana														
Carpinus			1.23 a			4.56±0.85								
Caryophyllaceae														
Castanea														
Cerealia		3.23±1.14				0.00±0.00								
Cercis														
Chenopodiaceae											0.52±1.17 a			
Compositae														
Convolvulaceae														
Cornus											1.72±0.14			
Corylus			0.68 a			2.58±0.25								
Cupressaceae														
Cyperaceae		1.00±0.16	0.32 a	0.89±0.03			0.72±0.07	1.45				1.00±0.00		
Elaeagnaceae (b)														
Empetrum				0.11±0.03										
Ephedra														
Equisetum														
Ericaceae				0.07±0.04								0.53±0.00		
Fabaceae											0.02±0.02			
Fagus			3.23 a			0.76±0.17	1.20±0.16							
Filipendula		2.46±0.85												
Fraxinus			0.32 a			1.39±0.21								
Galium-type														
Graminae			0.48 a											
Hippophae														
Hordeum-type (b)														
Humulus														
Iridaceae														
Juglans														
Juniperus		7.94±1.28	1.00 a	0.11±0.45 a							20.67±1.54			
Lamiaceae														
Larix					0.70 a			0.52						
Leucanthemum vulgate														
Liliaceae														
Maclura											1.10±0.55			
Mentha type(Thymus)														
Nitraria (b)														
Picea			0.85 a	2.78±0.21	1.00 a	0.57±0.16	8.50±0.30 a	2.76					2.80±0.00	
Pinus			2.74 a	21.58±2.87	4.50 a	1.35±0.45			11.90±0.80 a	12.80±0.90 a				6.00 a
Pinus cembra								1.65						
Plantago lanceolata		12.83±1.85 a				0.24±0.15								
Plantago media							1.29±0.18							
Plantago montana-type							0.74±0.14							
Plantago maritima														
Poaceae		1.00±0.00		1.00±0.00		1.00±0.00	1.00±0.00	1.00			1.00±0.00	1.00±0.07	1.00±0.18	
Populus											1.23±0.17		0.11±0.00	
Potentilla t		2.45±0.40					0.97±0.12							
Pterocarya (b)														
Quercus			3.65 a			2.56±0.39			14.60±8.10 a	3.70±0.00 a	2.08±0.43			
Ranunculaceae		3.91±0.72												
Ranunculus acris-type														
Rhinantus-type														
Robinia/Sophora														
Rubiaceae		3.95±0.59					3.50±0.35							
Rumex		4.74±0.83												
Rumex (sect.) acetosa														
Rumex acetosella														
Salix			0.61 a	0.09±0.03							6.02±0.75 a	0.58±0.00	0.67±0.04	
Sambucus nigra-type														
Sanguisorba														
Secale (b)			1.46 b											
Sinapis type														
Stellera														
Thalictrum														
Thymus praecox														
Tilia			0.39 a						1.10±0.10 a	0.80±0.10 a				
Tilia begoniifolia														
Tilia tomentosa														
Triticum-type (b)														
Trollius europaeus							2.31±0.35							
Tsuga (b)									3.40±0.00 b	5.40±0.50 b				3.00 b
Ulmus			0.61 a											
Urtica														
Vaccinium														
Vitex negundo														
Wild Herbs (b)														