

## The ACER pollen and charcoal database: a global resource to document vegetation and fire response to abrupt climate changes during the last glacial period

**ACER Project Members\***: M.F. Sánchez Goñi<sup>1,2</sup>, S. Desprat<sup>1,2</sup>, A.-L. Daniou<sup>3</sup>, F. Bassinot<sup>4</sup>, J.M. Polanco-Martínez<sup>2,5</sup>, S.P. Harrison<sup>6,7</sup>, and ACER contributors

### Supplementary Information

Taxa defining the pollen percentages of the main biomes in South Africa, Kenya, Australia and New Zealand not included in the QSR special issue (Sánchez Goñi and Harrison, 2010).

#### Mfabeni Peatland (South Africa)

**Temperate savannah**: Anacardiaceae, Ericaceae, Euphorbiaceae, Fabaceae, Fabaceae (*Acacia*), Proteaceae.

**Warm-temperate mixed forest**: Apocynaceae, Celastraceae, Combretaceae, Cyathaceae, Erythroxylaceae, Flacourtiaceae, Moraceae, Myricaceae, Myrtaceae, Podocarpaceae, Rosaceae, Rubiaceae.

#### Rumuiku Swamp (Kenya)

**Temperate forest** : *Ilex*, *Celtis*, *Lannea*, Malvaceae, Rubiaceae, *Rhus*, *Rubus*, *Stoebe*, *Merremia*, Tiliaceae, *Oenostachys*, *Commelina*, *Abutilon*, *Clematis*, *Cissampelos*, *Cardamine*, Amaranthaceae/Chenopodiaceae, Acanthaceae, *Cleome*, *Cocculus*, *Plectranthus*, Cucurbitaceae, Caryophyllaceae, *Cuscuta*, *Kedrostis*, *Ranunculus*, *Gynandropsis*, Iridaceae, *Hygrophila*, *Heliotropium*, *Leucas*, Lamiaceae, Liliaceae, Fabaceae, *Trema*, *Valeriana*, *Ipomoea*, *Solanum*, Urticaceae, Ericaceae, Asteraceae, Brassicaceae, Apiaceae, *Artemisia*, Poaceae

**Warm temperate forest**: *Dombeya*, *Myrica*, *Nuxia*, *Olea*, Moraceae, *Podocarpus*, *Polyscias*, *Protea*, *Schefflera*, *Hagenia*, *Alchornea*, *Ilex*, *Macaranga*, *Afrocrania*, *Celtis*, *Croton*, *Juniperus*, Rubiaceae, *Rapanea*, *Lasianthus*, *Syzygium*, Capparidaceae, *Allophylus*, *Apodytes*, *Hypericum*, *Acalypha*, *Albizia*, *Antidesma*, *Acacia*, *Bosquea*, *Canthium*, *Cliffortia*, *Neoboutonia*, *Clausena*, *Combretum*, *Clerodendron*, *Cordia*, *Drypetes*, *Dracaena*, *Phyllanthus*, *Elatine*, *Ekebergia*, *Euclea*, *Faurea*, *Gunnera*, *Gnidia*, *Ziziphus*, *Lannea*, Malvaceae, *Maesa*, *Phyllanthus*, *Prunus*, *Ruelia*, Rutaceae, Rubiaceae, *Rhus*, *Rubus*, Sapindaceae, Sapotaceae, *Tapinanthus*, *Merremia*, Tiliaceae, *Oenostachys*, *Commelina*, *Abutilon*, *Clematis*, *Cissampelos*, *Cardamine*, Amaranthaceae/Chenopodiaceae, *Ricinus*, Acanthaceae, *Cleome*, *Cocculus*, *Plectranthus*, Cucurbitaceae, Caryophyllaceae, *Cuscuta*, *Chlorophytum*, *Corchorus*, *Kohautia*, *Vernonia*, *Pavetta*, *Anthospermum*, *Ranunculus*, *Galium*, *Gynandropsis*, Iridaceae, *Hyptis*, *Hygrophila*, *Leucas*, Lamiaceae, *Hypoestes*, Fabaceae, *Trema*, *Valeriana*, *Ipomoea*, *Indigofera*, *Solanum*, Urticaceae, Ericaceae, Asteraceae, Brassicaceae, Apiaceae, *Artemisia*, Poaceae.

**Tropical forest:** *Dombeya, Myrica, Nuxia, Olea, Moraceae, Podocarpus, Polyscias, Protea, Schefflera, Hagenia, Alchornea, Ilex, Macaranga, Afrocrania, Celtis, Croton, Juniperus, Rubiaceae, Rapanea, Lasianthus, Syzygium, Capparidaceae, Allophylus, Apodytes, Hypericum, Acalypha, Albizia, Antidesma, Acacia, Bosquea, Canthium, Cliffortia, Neoboutonia, Clausena, Combretum, Clerodendron, Cordia, Drypetes, Dracaena, Phyllanthus, Elatine, Ekebergia, Euclea, Faurea, Gunnera, Gnidia, Ziziphus, Lannea, Malvaceae, Maesa, Phyllanthus, Prunus, Ruelia, Rutaceae, Rubiaceae, Rhus, Rubus, Sapindaceae, Sapotaceae, Tapinanthus, Merremia, Tiliaceae, Oenostachys, Commelina, Abutilon, Clematis, Cissampelos, Cardamine, Amaranthaceae/Chenopodiaceae, Ricinus, Acanthaceae, Cleome, Cocculus, Plectranthus, Cucurbitaceae, Caryophyllaceae, Cuscuta, Chlorophytum, Corchorus, Kohautia, Vernonia, Pavetta, Anthospermum, Galium, Gynandropsis, Iridaceae, Hyptis, Hygrophila, Lamiaceae, Hypoestes, Fabaceae, Ipomoea, Indigofera, Ericaceae, Asteraceae, Brassicaceae, Apiaceae, Poaceae.*

### **Caledonia Fen and Wagoom (Australia)**

**Warm temperate forest:** *Podocarpus, Phylloclades.*

**Savannah:** *Eucalyptus, Casuarina, Poaceae, Asteraceae, Apiaceae, Banksia, Pomaderris, Acacia, Dodonaea, Plantago.*

### **Kohuora (New Zealand)**

**Warm temperate forest:** *Agathis, Alectryon, Ascarina, Dacrydium, Dacrycarpus, Dodonaea, Elaeocarpus, Griselinia, Knightia, Laurelia, Leucopogon fasciculatus, Libocedrus plumosa, Metrosideros, Metrosideros excelesa type, Neomyrtus, Nestegis, Phyllocladus trichomanoides, Plagianthus, Podocarpus, Prumnopitys taxifolia, Prumnopitys ferruginea, Pseudopanax, Weinmannia, Cyathea dealbata type, Cyathea smithii type.*

**Temperate forest:** *Fuscospora, Griselinia, Halocarpus bidwillii, Hoheria, Lagarostrobos, Lepidothamnus, Libocedrus bidwillii, Muehlenbeckia, Nothofagus menziesii, Phyllocladus alpinus, Plagianthus, Podocarpus, Quintinia.*

Table S1 – List of the applied and selected age models for the sites included in the ACER database.

LI: Linear interpolation; LR: Linear regression; PR2: Polynomial regression-order 2; PR3: Polynomial regression-order 3; PR4: Polynomial regression-order 4; CS: Cubic spline; SS0.3: Smooth spline (smoothing 0.3); SS0.6: Smooth spline (smoothing 0.6); LW0.75: Locally weighted spline (smoothing 0.75). Green cells indicate the selected age model.

No new age model for the following sites: Bear Lake; Lago Grande di Monticchio (too many major inversions in the 14C dates); Okarito Pakihi (lack of dating information); EW9504-17PC; F2-92-P29; ODP 1234; Wonderkrater (Borehole 3); Huiñamarca (Lake Titicaca, lacking dating uncertainties for tephra and U/Th dates).

site_id	site_name	Linear interpolation	Linear regression	Polynomial regression-order 2	Polynomial regression-order 3	Polynomial regression-order 4	Cubic spline	Smooth spline (default smoothing 0.3)	Smooth spline (smoothing 0.6)	Locally weighted spline (loess, default smoothing 0.75)	Outliers (depth cm)	Dating control	Comments
1	Abric Romani				x	x			x	x			linear interpolation was ok graphically but CLAM warned about too many age reversals
79	Azzano Decimo	x									3233, 3342, 3464		3 outliers
6	Bear Lake (BL00-1E)												NO NEW AGE MODEL
60	Caco	x			x			x			1676.5, 304, 305		3 outliers
52	Caledonia Fen				x				x				
81	Cambara do Sul	x											
41	Carnet Lake	x											
42	Carp Lake			x		x			x		1400, 1630		2 outliers
61	Colonia	x					x	x					
75	Core Trident 163 318							x					
58	EW504-13 PC												NO NEW AGE MODEL
59	F2-92-P29												NO NEW AGE MODEL
53	F2-92-P3	x						x					
7	Fargher Lake			x	x				x		866.5		1 outlier
66	Fundo Weena	x						x					
43	Furquene	x				x							
8	Furramoos	x					x						
67	GeoB1023	x				x		x		x			
44	GeoB3104	x					x	x					
45	GeoB3510-2	x					x	x					
54	Hanging Lake				x	x				x			no original age model (no calibration at this time)
82	Hay Lake	x						x					
93	Huámarca (Lake Titicaca)												NO NEW AGE MODEL (lacking dating uncertainties for tephra and U/Th dates)
92	Icannina	x											
9	Iwaya	x						x					
10	Joe Lake								x				
74	Kalaloch								x	x			
11	Kamychi Basin (KY01)	x			x			x		x			
12	Kashiru Bog	x					x	x			86.25, 162.25, 333.815, 518.5		5 outliers
13	Kembuchi Basin	x						x					
14	Khoze	x						x					
15	Kohuora	x									40, 100, 200, 300, 950, 444, 480, 871		8 outliers
16	Kurota Lowland								x				
17	KW31				x				x				
62	La Laguna	x						x					
76	Lac du Bouchet								x	x	1064		1 outlier
18	Lagaccione									x	2090		1 outlier
37	Lago Grande di Monticchio	x			x	x							NO NEW AGE MODEL
83	Laguna Bella Vista		x								148		1 hiatus (135 cm), 1 outlier
84	Laguna Chaplin	x						x			285.5, 296.5		2 outliers
19	Lake Barryches				x	x			x				
84	Lake Bibvakh	x									842		1 outlier
26	Lake Biwa (BIW95-4)						x	x					
85	Lake Consuelo	x						x		x	790		1 outlier
20	Lake Malawi			x			x				660		1 outlier
21	Lake Masoko												
86	Lake Nojiri	x				x		x					
23	Lake Tanganyika	x						x		x			
24	Lake Tulane						x	x		x	1644, 1684, 1707		outlier 1644, 1684, 1707
51	Lake Wangoom LW87 core		x	x				x	x				
25	Lake Xinias	x						x					
73	Les Echets G - DIGI								x		350		outlier 350
27	Little Lake			x	x						1813		outlier 1813
28	Lyncht Crater				x	x				x			
29	MD01-2421					x			x				
96	MD02-2579				x						249		1 outlier
30	MD03-2622 Carliaco Basin								x				
31	MD04-2845									x			
64	MD84-629	x		x				x	x				
32	MD95-2039	x				x		x		x			
33	MD95-2042				x		x		x	x			
34	MD95-2043	x						x					
35	MD99-2331									x			
36	Megall Limn							x		x			
87	Milabeni Peatland	x											
88	Nakafurano	x							x				
89	Native Companion Lagoon									x	162.3		1 outlier
46	Navarrés								x				
68	ODP 1233 C	x			x	x	x	x		x			
69	ODP 1234												NO NEW AGE MODEL
95	ODP 820	x											
48	ODP site 976							x					
55	ODP1019							x					
88	ODP1078C									x			
47	ODP893A			x						x			
50	Okarito Pakihi												NO NEW AGE MODEL (lack of dating information)
80	Pacucha	x						x			1124, 1182		2 outliers
39	Potato Lake	x											
90	Rice Lake (Rice Lake 79)	x											
77	Rumukui Swamp	x									1465		1 outlier
49	Siberia					x		x					no original age model (no calibration at this time)
40	Stracciaccappa	x						x					
63	Tagua Tagua - DIGI				x					x			
70	Takuenno												
4	Trousing Basin	x						x		x			
71	Tswaing Crater	x						x					
56	Tyrrendara Swamp	x									303		1 outlier
3	Valle di Castellone				x				x				
57	W8709-13 PC				x				x				
91	W8709-8 PC			x					x				
2	Walker Lake	x			x	x		x					continuous sequence up to 39 ka (hiatuses after)
72	Wonderkrater (Borehole 3)												NO NEW AGE MODEL
97	Wonderkrater (Borehole 4)	x						x			705		1 outlier
98	Rice Lake (Rice Lake 81)	x						x					
69	SU 81-18				x				x		551, 691		2 outliers

Green cells indicate the selected age model

Table S2 – Goodness-of-fit for the selected age models. Green cells indicate the selected age model.  
Inf: infinite; NA: no available

	A	B	C	D	E	F	G	H	I	J
1	sitename	Fit -linear	Fit -reg.lin	Fit -pol.reg2	Fit -pol.reg3	Fit -pol.reg4	Fit -cubic	-smooth.spl0	-smooth.spl0	Fit -loess
2	Abriç Romani	NA	9.7	9.7	9.7	9.7	NA	NA	9.7	9.7
3	Azzano Decimo	7.94	Inf	NA	NA	NA	NA	NA	NA	NA
4	Caco	NA	127.36	95.9	110.38	123.66	NA	75.1	146.24	NA
5	Caledonia Fen	NA	311.52	104.57	170.58	NA	NA	28.76	76.86	NA
6	Cambara do Sul	2	226.95	NA	2.02	NA	2.05	6.97	175.94	2.02
7	Camel Lake	5.03	136.84	124.25	NA	NA	NA	NA	75.29	NA
8	Carp Lake	NA	109.94	62.27	55.42	50.09	NA	NA	53.84	NA
9	Colonia	7.21	1002.47	437.39	113.01	NA	7.15	20.37	574.57	43.97
10	Core Trident 163 31B	NA	40.23	33.32	33.9	31.06	NA	15.82	29.03	31.28
11	F2-92-P3	NA	25.03	19.94	19.54	20.83	NA	13.96	18.54	20.22
12	Fargher Lake	NA	264.77	79.58	123.18	NA	NA	NA	74.12	NA
13	Fundo Nueva	2.72	67.9	19.7	23.07	NA	NA	15.08	58.39	NA
14	Fuquene	NA	215.7	203.56	208.83	169.95	NA	NA	192.66	NA
15	Furamoos	6.99	14.99	7.25	NA	NA	7.28	NA	NA	6.94
16	GeoB1023	3.89	44	44.22	18.68	5.72	3.97	8.59	43.54	5.84
17	GeoB3104	5.67	35.78	32.12	40.89	NA	5.9	14.77	31.36	23.79
18	GeoB3910-2	7.03	38.78	49.75	34.15	7	6.95	8	39	5.06
19	Hanging Lake	NA	233.16	NA	60.1	NA	NA	NA	58.15	NA
20	Hay Lake	1.81	19.88	16.43	21.75	NA	NA	15.04	19.39	NA
21	Ioannina	5.92	54.56	226.59	NA	NA	NA	73.89	83.3	NA
22	Iwaya	2.34	19.67	27.97	2.68	NA	2.65	6.3	19.24	2.37
23	Joe Lake	NA	1417.94	NA	NA	NA	NA	NA	709.3	NA
24	Kalaloch - DIGI	NA	115.39	58.58	NA	NA	NA	NA	18.08	19.44
25	Kamiyoshi Basin (KY01)	5.06	10.29	3.62	4.16	NA	NA	4.47	7.49	NA
26	Kashiru Bog	5.83	199.12	NA	NA	NA	6.68	31.33	159.02	NA
27	Kenbuchi Basin	2.24	84.98	43.67	NA	NA	2.68	9.44	57.41	NA
28	Khoe	2.45	159.64	214.92	NA	NA	NA	11.95	165.05	NA
29	Kohuora	6.05	Inf	NA	144.92	NA	NA	NA	309.92	NA
30	Kurota Lowland	NA	40.04	125.5	17.75	NA	NA	5.84	44.41	NA
31	KW31	NA	110.16	89.64	140.93	NA	NA	NA	98.54	NA
32	La Laguna	3.63	320.79	NA	117.21	NA	NA	56.39	233.54	NA
33	Lac du Bouchet - DIGI	NA	24.51	24.14	25.16	23.04	NA	NA	19.09	17.46
34	Lagaccione	8.35	79.33	66.41	30.7	28.2	NA	NA	37.4	31.82
35	Laguna Chaplin	5.52	223.01	NA	NA	NA	5.69	17.71	171.54	NA
36	Lake Banyoles	5.55	5.6	5.61	5.53	5.53	NA	NA	5.55	NA
37	Lake Billyakh	6.64	1253.57	1073.72	NA	NA	NA	NA	616.92	NA
38	Lake Biwa (BIW95-4)	NA	55.06	37.86	19.08	20.07	NA	16.7	32.23	22.41
39	Lake Consuelo	NA	291.67	25.17	23.27	25.76	NA	15.88	42.83	23.48
40	Lake Malawi	7.87	43.24	16.84	NA	NA	8.48	NA	NA	NA
41	Lake Masoko	NA	70	60.07	58.08	NA	NA	31.42	53.02	NA
42	Lake Nojiri	3.98	515.46	168.25	12.43	12.81	NA	12.98	18.65	NA
43	Lake Tanganyika	4.08	40.83	NA	7.49	5.01	3.58	4.41	20.66	3.76
44	Lake Tulane	NA	Inf	Inf	Inf	Inf	NA	NA	Inf	NA
45	Lake Wangoom LW87 core	NA	12.89	12.74	5	7.53	NA	11.34	12.74	NA
46	Lake Xinias	4.8	82.42	17.86	5.54	NA	5.35	11.51	68.71	5.07
47	Les Echets G - DIGI	NA	70.38	NA	NA	NA	NA	16.61	45.19	NA
48	Little Lake	NA	Inf	291.3	294.58	291.33	NA	NA	269.11	NA
49	Lynchs Crater	NA	381.48	214.42	177.09	182.27	NA	NA	178.26	168.91
50	MD01-2421	NA	318.93	612.84	359.84	69.38	NA	23.74	238.3	NA
51	MD02-2579	NA	1364.41	NA	127.39	NA	NA	NA	191.41	NA
52	MD03-2622 Cariaco Basin	NA	11.82	11.84	11.78	11.79	NA	11.78	11.8	11.78
53	MD04-2845	NA	Inf	52.49	28.35	29.47	NA	NA	22.24	26.94
54	MD84-629	2.77	2.91	2.9	2.77	NA	2.77	2.82	2.91	2.77
55	MD95-2039	10.4	10.38	10.4	10.4	10.4	NA	10.4	10.4	10.4
56	MD95-2042	NA	520.87	103.03	49.83	53.79	NA	NA	49.08	52.89
57	MD95-2043	12.73	Inf	234.84	82.02	NA	NA	14.63	81.69	55.53
58	MD99-2331	NA	613.51	169.98	113.75	111.31	NA	NA	NA	114.26
59	Megali Limni	NA	12.24	10.74	11.65	11.74	NA	5.87	9.88	NA
60	Mfabeni Peatland	3.08	145.52	150.1	NA	NA	NA	59.33	138.83	2.92
61	Nakafurano	3.3	278.83	348.19	NA	NA	NA	20.9	278.61	NA
62	Native Companion Lagoon	NA	72.74	32.09	48.52	NA	NA	NA	24.87	NA
63	Navarres	NA	548.05	615.85	NA	NA	NA	47	323.64	151.78
64	ODP 1233 C	11.56	22.5	26.55	25.91	18.58	NA	12.59	17.4	18.45
65	ODP 820	4.46	22.27	NA	5.66	NA	NA	NA	2.78	NA
66	ODP site 976	NA	216.2	133.71	136.6	112.46	NA	48.06	115.98	112.16
67	ODP1019	7.97	418.97	36.02	31.25	31.26	NA	26.66	31.78	32
68	ODP1078C	NA	957.42	345.83	NA	NA	NA	NA	237.79	262.05
69	ODP893A	NA	122.22	28.51	24.11	23.68	NA	16.86	22.07	24.27
70	Pacuca	4.91	135.24	234.58	86.2	156.76	NA	42.77	140.32	NA
71	Potato Lake	2.81	31.59	32.73	NA	NA	NA	NA	29.77	NA
72	Rice Lake (Rice Lake 79)	1.57	1.58	NA	NA	NA	1.58	NA	NA	NA
73	Rice Lake (Rice Lake 81)	3.74	Inf	NA	NA	NA	NA	83.89	Inf	NA
74	Rumuiiku Swamp	5.49	440.75	275.57	128.09	NA	6.02	66.3	434.58	NA
75	Siberia	6.67	305.02	197.77	122.46	119.85	NA	134.57	146.06	NA
76	Stracciacappa	3.27	41.6	37.87	47.99	32.3	NA	25.56	33.46	37.96
77	SU81-18	NA	21.32	20.24	20.82	NA	NA	NA	18.38	NA
78	Tagua Tagua - DIGI	5.18	19.39	9.82	8.92	8.02	NA	NA	8.03	7.74

	A	B	C	D	E	F	G	H	I	J
79	Taiquemo	NA	889.16	452.44	232.04	245.97	NA	NA	116.87	182.74
80	Toushe Basin	14.55	132.02	170.44	170.5	78.18	NA	26.45	46.22	43.61
81	Tswaing Crater	2.08	175.16	112.94	NA	NA	NA	42.41	157.45	2.13
82	Tyrrendara Swamp	2.46	2.56	2.34	NA	NA	2.35	NA	NA	2.5
83	Valle di Castiglione	NA	64.92	44.71	15.46	NA	NA	8.18	17.67	7.72
84	Walker Lake	6.39	25.91	19.25	9.97	NA	NA	8.93	19.94	NA
85	W8709-13 PC	NA	94	72.59	81.3	62.6	NA	NA	61.9	NA
86	W8709-8 PC	NA	410.82	381.61	277.11	NA	NA	48.82	178.73	NA
87	Wonderkrater (borehole 4)	13.97	513.41	NA	NA	NA	14.38	40.7	348.38	NA
88	Laguna Bella Vista	NA	2.88	NA	NA	NA	NA	NA	NA	NA