SUPPLEMENTAL MATERIAL

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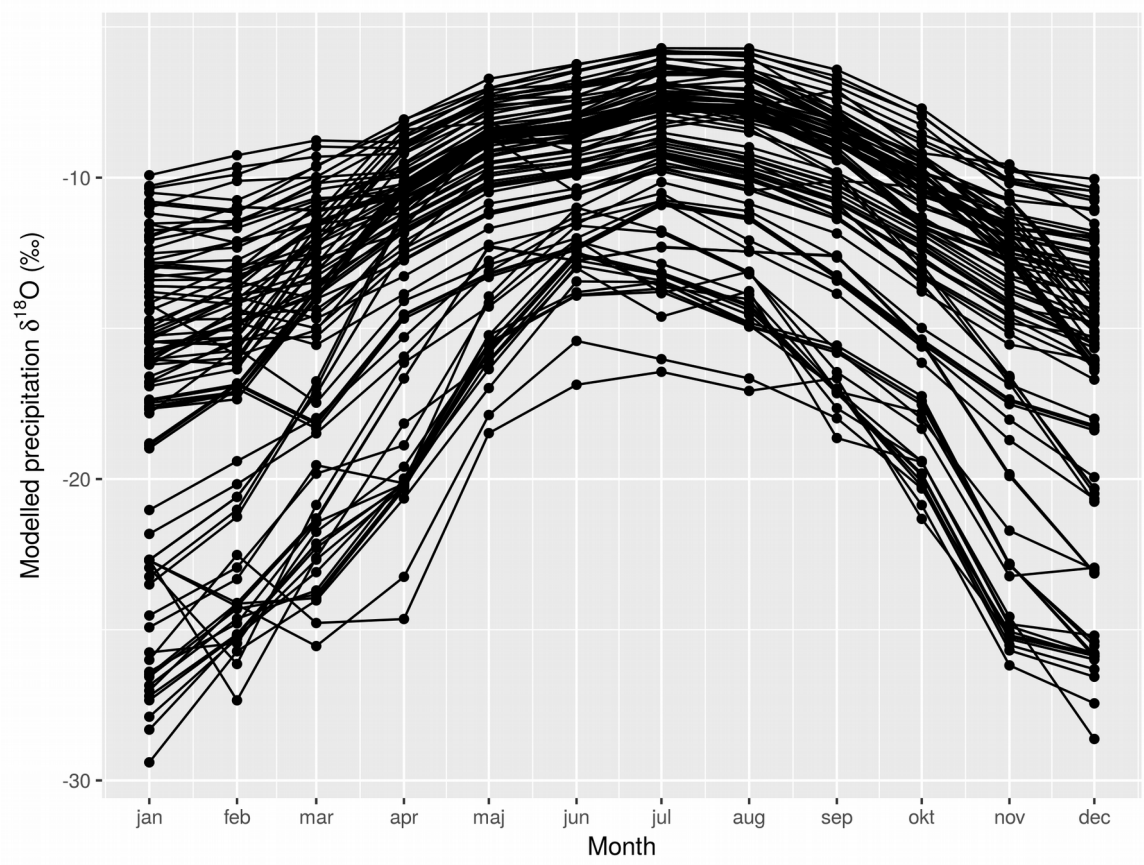

Figure S1. Annual variation in modelled $\delta^{18}O_{precip}$ at the sample sites (one line per site).

Table S1. List of sampled sites, their location and sampling year.

Region	Site	Latitude (wgs84)	Longitude (wgs84)	Elevation (m asl)	Year
Bulgaria, Central Rhodopes Mts	Chairski lakes	41.590646	24.446419	1377	2013
Bulgaria, Vitosha Mts	Kapaklivets	42.593977	23.280245	1829	2013
Bulgaria, Western Rodopi Mts	Shiroka Polyana	41.756378	24.144839	1544	2013
Bulgaria, Western Stara planina Mts	Petrohan pass	43.117778	23.1225	1376	2013
Canada, AB	208UB	56.1157	-115.7024	660	2013
Canada, AB	BC35	55.87	-115.1	653	2013
Canada, AB	Wandering River_Control	55.353942	-112.517692	566	2014
Canada, NT (S)	Scotty Creek	61.308833	-121.305166	282	2013
Canada, ON (E)	Mer Bleue	45.40944166	-75.518708	68	2013
Canada, ON (N)	MOE BOG	52.693756	-83.945183	125.5	2014
Canada, ON (N)	MOE MOSS	52.696969	-83.950642	88	2014
Canada, ON (NW)	Raith	48.85354	-89.95639	472	2013
Canada, ON (NW)	Savanne	48.954	-90.23306	458	2013
Canada, ON (S)	Parry_Sound	45.4597765	-80.15097025	222.75	2013
Canada, ON (S)	Puslinch_bog	43.40805675	-80.26402575	307	2013
Canada, QC	Coteau road	47.7668	-64.5940825	4.5	2013
Canada, QC	Goulet	47.71879	-64.684885	2.5	2013
Canada, QC	Grande-Plee Bleue	46.7798775	-71.0570275	92.5	2013
Canada, QC	Jifi (Haut-Shippagan)	47.7399825	-64.7446675	2	2013
Canada, QC	Miscou #5	48.0095125	-64.5060325	5	2013
Canada, QC	Saint-Charles	46.7882475	-70.9727375	99	2013
Canada, QC	Sainte-Catherine	46.8725	-71.585795	169.5	2013
Canada, QC	Saint-Etienne	46.6534425	-71.31894	98	2013
Canada, QC	Wilson	47.939865	-64.52368	4	2013
Canada, QC	Chute Panet	46.8693675	-71.8403475	153.5	2013
China	Hani	42.22584028	126.5189861	851.25	2014
China	Mangui	52.28330556	122.4387153	741.75	2014
Czech Republic	Jizerka	50.82724306	15.32870833	864.25	2013
Czech Republic	Mrtvý luh	48.87025	13.87161111	739.75	2013
Czech Republic	Velký Močálbog	50.39621528	12.63510417	925.75	2013
Estonia (central)	Männikjärve bog	58.87583333	26.24722222	81	2013
Estonia (central)	Parika bog	58.475	25.77041667	52	2013
Estonia (NE)	Seli bog	59.17055556	27.27388889	58	2013
Estonia (SW)	Tolkuse bog	58.13888889	24.51972222	10	2013
Finland (N)	Kaamanen	69.140792	27.2712	165	2013
Finland (N)	Salmisuo	62.78477	30.947475	116	2013
Finland (N)	Siikajoki	64.731505	24.719083	46.75	2013
Finland (N)	Siikaneva	61.83722	24.169767	131.5	2013
Finland (S)	Tervalamminsuo	60.3874	23.5844175	78	2013

Italy (N)	Lupicino	46.42944444	11.41222222	1288	2013
Japan (NE)	East Ochiishi Mire	43.20111	145.51981	176.75	2013
Netherlands	Bargerveen	52.68564	7.024459	18	2014
Norway (central)	Bjornmyra	63.33613	10.4056925	135.25	2013
Norway (central)	Hemne	63.2146975	9.0210675	60	2013
Norway (central)	Tydal	63.066745	11.3981125	482.25	2013
Poland (N)	Linkowo	52.9544943	15.9308732	46	2013
Poland (N)	Tuchola (BT)	53.8296014	17.5632897	127	2013
Poland (SE)	Puścizna Wielka bog	49.4529375	19.75760417	650.75	2013
Poland (SE)	Tarnawa Niżna	49.11193056	22.82725	670.5	2013
Poland (SE)	Zakole bog	49.21551389	22.7415625	564	2014
Romania, Apuseni Mts	Molhașul Mare de la Izbuc	46.58972222	22.76111111	1208	2013
Romania, Ciomatu Mts	Tinovul Mohoș bog	46.13638889	25.90277778	1048	2013
Romania, Gutâi Mts	Tăul lui Dumitru bog	47.82472222	23.69833333	1142	2014
Romania, Maramureș Mts	Tăul Obcioarei bog	47.68486111	24.53666667	1043	2013
Romania, Obcina Mestecanisului Mts	Găina-Lucina	47.65944444	25.18222222	1212	2013
Russia, Komi Republic	Kuzobnjur	61.838269	53.297717	117	2013
Russia, Komi Republic	Ust-pozheg	61.94259	50.273818	86	2013
Russia, Middle of West Siberia	Kondinskie Lakes	60.85347	63.520245	69.5	2013
Russia, Middle of West Siberia	Mukhrino	60.89942	68.68825333	34	2013 & 2014
Russia, Middle of West Siberia	Kogalym	62.230191	74.13096	75	2013
Russia, Middle of West Siberia	Niznevartovsk	60.916	76.8116	44	2013
Russia, Middle of West Siberia	Pogranichnoe	62.9707	75.18102	103	2013
Russia, North of West Siberia	Gupkinskoe	64.55025	76.95076	40	2013
Russia, North of West Siberia	Hanimey	63.78	75.55	66	2014
Russia, North of West Siberia	Pangody	65.87059	74.95099	62	2013
Russia, North of West Siberia	Tetu-Mamontotay	63.221	75.7112	118	2013
Russia, South of West Siberia	Nikolaevka	55.1316	79.0316	119	2013
Russia, South of West Siberia	Plotnikovo	56.85009	82.8311	118	2013
Russia, St-Petersburg region	Bolshoe	60.0642	30.65478	33	2013
Russia, St-Petersburg region	Nizhne-Svirsky State Natural Reserve	60.6667	33.0378	6	2013
Russia, St-Petersburg region	Ozernoe	60.3518	29.55455	55	2013
Russia, St-Petersburg region	Stroganovo	59.28565	30.00917	113	2013
Sweden (N)	Abisko mire	68.35916	18.81038	356	2013
Sweden (N)	Stordalen	68.3528	19.03689	378	2013
Sweden (N)	Storflaket	68.34711	18.97589	387	2013

Sweden (S)	Kulflyten	59.90254	15.83353	137	2013
Sweden (S)	Store mosse	57.29919	13.94138	163	2013
Sweden (S)	Tranerödsmosse	56.04455	13.18672	168	2013
Switzerland, Jura	Etang de la Gruere	47.239622	7.049483	1003	2014
Switzerland, Jura	Le Cachot	47.005658	6.665169	1052	2014
UK, England	Fenns and Whixall Mosses	52.915	-2.773	90	2013
UK, Scotland	Flanders Moss	56.151	-4.207	19	2013
UK, Scotland	Forsinard Flows	58.382	-3.828	182	2013
UK, Scotland	Moidach More	57.453	-3.629	274	2013
UK,Wales	Cors Fochno	52.502	-4.011	4	2013
USA, Interior Alaska, Healy	CiPEHR	63.88202	-149.2269	671	2014
USA, Maine	Great Waas Island	44.472147	-67.582071	15	2013
USA, Maine	Orono Bog	44.869721	-68.727243	42	2013
USA, Maine	Saco Heath	43.545971	-70.47155	43	2013
USA, New York	Bloomindale Bog	44.383778	-74.140796	474	2013
USA, New York	Greenwoods Conservancy	42.71707	-75.0990505	545	2013
USA, New York	Lake Desolation	43.162063	-73.977556	514	2013
USA, New York	Silver Lake	44.511166	-73.885986	449	2013