Supplement of

**Improved ELMv1-ECA Simulations of Zero-Curtain Periods and
Cold-season CH₄ and CO₂ Emissions at Alaskan Arctic Tundra
Sites**

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Table S1 – Location, vegetation and mean annual temperature of ABoVE sites¹.

Site Name	Full Name	Site Location		Vegetation	Observed Mean Annual Air Temperature (°C)
		Lat.(N)	Lon. (E)		
BEO	Barrow Environmental Observatory	71.2810	203.3877	Moist acidic tundra - wet sedges, grasses, moss, and assorted lichens.	-11.3
BES/CMDL	Biocomplexity Experiment, South;	71.2809	203.4035	Moist acidic tundra - wet sedges, grasses, moss, and assorted lichens	-11.3
ATQ	Atkasuk	70.4696	202.5911	Moist-wet coastal sedge tundra and moist-tussock tundra	-10.8
IVO	Ivotuk	68.4865	204.2498	Polar tundra	-8.9

¹ https://daac.ornl.gov/ABOVE/guides/AK_North_Slope_NEE_CH4_Flux.html

Table S2 – List of tested environmental modifiers and the moisture- and temperature-functions used. All the environmental modifier includes the depth scalar which are not shown below.

	Moisture Scalar f(W)	Temperature Scalar f(T)	Envinronmental Modifier		Moisture Scalar f(W)	Temperature Scalar f(T)	Envinronmental Modifier		Moisture Scalar f(W)	Temperature Scalar f(T)	Envinronmental Modifier		Moisture Scalar f(W)	Temperature Scalar f(T)	Envinronmental Modifier
1	Standcarb	Q10=1.5(Tref=25)	f(W)*f(T)	51	ModifiedELM-S2	Q10=1.5(Tref=25)	f(W)*f(T)	101	ModifiedELM-S4	Q10=2.1(Tref=25)	f(W)*f(T)	151	ModifiedELM-S7	Daycent1	f(W)*f(T)
2	Daycent	Q10=1.5(Tref=25)	f(W)*f(T)	52	ModifiedELM-S2	Q10=1.6(Tref=25)	f(W)*f(T)	102	ModifiedELM-S4	Q10=2.2(Tref=25)	f(W)*f(T)	152	ModifiedELM-S7	Daycent2	f(W)*f(T)
3	Skopp	Q10=1.5(Tref=25)	f(W)*f(T)	53	ModifiedELM-S2	Q10=1.7(Tref=25)	f(W)*f(T)	103	ModifiedELM-S4	Q10=1.5(Tref=35)	f(W)*f(T)	153	ModifiedELM-S7	Q10=2.0(Tref=10)	f(W)*f(T)
4	Moyano	Q10=1.5(Tref=25)	f(W)*f(T)	54	ModifiedELM-S2	Q10=1.8(Tref=25)	f(W)*f(T)	104	ModifiedELM-S4	Q10=2(Tref=35)	f(W)*f(T)	154	ModifiedELM-S7	Q10=1.4(Tref=10)	f(W)*f(T)
5	Century	Q10=1.5(Tref=25)	f(W)*f(T)*f(O)	55	ModifiedELM-S2	Q10=1.9(Tref=25)	f(W)*f(T)	105	ModifiedELM-S5	Century1	f(W)*f(T)	155	ModifiedELM-S7	LloydTaylor	f(W)*f(T)
6	Candy	Q10=1.5(Tref=25)	f(W)*f(T)*f(O)	56	ModifiedELM-S2	Q10=2(Tref=25)	f(W)*f(T)	106	ModifiedELM-S5	Century2	f(W)*f(T)	156	ModifiedELM-S7	Kirschbaum	f(W)*f(T)
7	Demeter	Q10=1.5(Tref=25)	f(W)*f(T)*f(O)	57	ModifiedELM-S2	Q10=2.1(Tref=25)	f(W)*f(T)	107	ModifiedELM-S5	Daycent1	f(W)*f(T)	157	ModifiedELM-S7	Demeter	f(W)*f(T)
8	Myers1	Q10=1.5(Tref=25)	f(W)*f(T)*f(O)	58	ModifiedELM-S2	Q10=2.2(Tref=25)	f(W)*f(T)	108	ModifiedELM-S5	Daycent2	f(W)*f(T)	158	ModifiedELM-S7	Standcarb	f(W)*f(T)
9	Myers2	Q10=1.5(Tref=25)	f(W)*f(T)*f(O)	59	ModifiedELM-S2	Q10=1.5(Tref=35)	f(W)*f(T)	109	ModifiedELM-S5	Q10=2.0(Tref=10)	f(W)*f(T)	159	ModifiedELM-S7	Q10=1.3(Tref=25)	f(W)*f(T)
10	Gompertz	Q10=1.5(Tref=25)	f(W)*f(T)*f(O)	60	ModifiedELM-S2	Q10=2(Tref=35)	f(W)*f(T)	110	ModifiedELM-S5	Q10=1.4(Tref=10)	f(W)*f(T)	160	ModifiedELM-S7	Q10=1.4(Tref=25)	f(W)*f(T)
11	Standcarb	Q10=1.5(Tref=25)	f(W)*f(T)	61	ModifiedELM-S3	Century1	f(W)*f(T)	111	ModifiedELM-S5	LloydTaylor	f(W)*f(T)	161	ModifiedELM-S7	Q10=1.5(Tref=25)	f(W)*f(T)
12	Daycent	Daycent1	f(W)*f(T)	62	ModifiedELM-S3	Century2	f(W)*f(T)	112	ModifiedELM-S5	Kirschbaum	f(W)*f(T)	162	ModifiedELM-S7	Q10=2(Tref=25)	f(W)*f(T)
13	Daycent	Daycent2	f(W)*f(T)	63	ModifiedELM-S3	Daycent1	f(W)*f(T)	113	ModifiedELM-S5	Demeter	f(W)*f(T)	163	ModifiedELM-S7	Q10=1.5(Tref=35)	f(W)*f(T)
14	Demeter	Demeter	f(W)*f(T)*f(O)	64	ModifiedELM-S3	Daycent2	f(W)*f(T)	114	ModifiedELM-S5	Standcarb	f(W)*f(T)	164	ModifiedELM-S7	Q10=2(Tref=35)	f(W)*f(T)
15	Century	Century1	f(W)*f(T)*f(O)	65	ModifiedELM-S3	Q10=2.0(Tref=10)	f(W)*f(T)	115	ModifiedELM-S5	Q10=1.3(Tref=25)	f(W)*f(T)	165	ModifiedELM-S7	Q10=1.6(Tref=25)	f(W)*f(T)
16	Century	Century2	f(W)*f(T)*f(O)	66	ModifiedELM-S3	Q10=1.4(Tref=10)	f(W)*f(T)	116	ModifiedELM-S5	Q10=1.4(Tref=25)	f(W)*f(T)	166	ModifiedELM-S7	Q10=1.7(Tref=25)	f(W)*f(T)
17	ModifiedELM-S1	Century1	f(W)*f(T)*f(O)	67	ModifiedELM-S3	LloydTaylor	f(W)*f(T)	117	ModifiedELM-S5	Q10=1.5(Tref=25)	f(W)*f(T)	167	ModifiedELM-S7	Q10=1.8(Tref=25)	f(W)*f(T)
18	ModifiedELM-S1	Century2	f(W)*f(T)*f(O)	68	ModifiedELM-S3	Kirschbaum	f(W)*f(T)	118	ModifiedELM-S5	Q10=1.6(Tref=25)	f(W)*f(T)	168	ModifiedELM-S7	Q10=1.9(Tref=25)	f(W)*f(T)
19	ModifiedELM-S1	Daycent1	f(W)*f(T)*f(O)	69	ModifiedELM-S3	Demeter	f(W)*f(T)	119	ModifiedELM-S5	Q10=1.7(Tref=25)	f(W)*f(T)	169	ModifiedELM-S7	Q10=2.1(Tref=25)	f(W)*f(T)
20	ModifiedELM-S1	Daycent2	f(W)*f(T)*f(O)	70	ModifiedELM-S3	Standcarb	f(W)*f(T)	120	ModifiedELM-S5	Q10=1.8(Tref=25)	f(W)*f(T)	170	ModifiedELM-S7	Q10=2.2(Tref=25)	f(W)*f(T)
21	ModifiedELM-S1	Q10=2.0(Tref=10)	f(W)*f(T)*f(O)	71	ModifiedELM-S3	Q10=1.3(Tref=25)	f(W)*f(T)	121	ModifiedELM-S5	Q10=1.9(Tref=25)	f(W)*f(T)	171	ModifiedELM-S8	Q10=1.3(Tref=25)	f(W)*f(T)
22	ModifiedELM-S1	Q10=1.4(Tref=10)	f(W)*f(T)*f(O)	72	ModifiedELM-S3	Q10=1.4(Tref=25)	f(W)*f(T)	122	ModifiedELM-S5	Q10=2(Tref=25)	f(W)*f(T)	172	ModifiedELM-S8	Q10=1.4(Tref=25)	f(W)*f(T)
23	ModifiedELM-S1	LloydTaylor	f(W)*f(T)*f(O)	73	ModifiedELM-S3	Q10=1.5(Tref=25)	f(W)*f(T)	123	ModifiedELM-S5	Q10=2.1(Tref=25)	f(W)*f(T)	173	ModifiedELM-S8	Q10=1.5(Tref=25)	f(W)*f(T)
24	ModifiedELM-S1	Kirschbaum	f(W)*f(T)*f(O)	74	ModifiedELM-S3	Q10=1.6(Tref=25)	f(W)*f(T)	124	ModifiedELM-S5	Q10=2.2(Tref=25)	f(W)*f(T)	174	ModifiedELM-S8	Q10=1.6(Tref=25)	f(W)*f(T)
25	ModifiedELM-S1	Demeter	f(W)*f(T)*f(O)	75	ModifiedELM-S3	Q10=1.7(Tref=25)	f(W)*f(T)	125	ModifiedELM-S5	Q10=1.5(Tref=35)	f(W)*f(T)	175	ModifiedELM-S8	Q10=1.7(Tref=25)	f(W)*f(T)
26	ModifiedELM-S1	Standcarb	f(W)*f(T)*f(O)	76	ModifiedELM-S3	Q10=1.8(Tref=25)	f(W)*f(T)	126	ModifiedELM-S5	Q10=2(Tref=35)	f(W)*f(T)	176	ModifiedELM-S8	Q10=1.8(Tref=25)	f(W)*f(T)
27	ModifiedELM-S1	Q10=1.3(Tref=25)	f(W)*f(T)*f(O)	77	ModifiedELM-S3	Q10=1.9(Tref=25)	f(W)*f(T)	127	ModifiedELM-S6	Century1	f(W)*f(T)*f(O)	177	ModifiedELM-S8	Q10=1.9(Tref=25)	f(W)*f(T)
28	ModifiedELM-S1	Q10=1.4(Tref=25)	f(W)*f(T)*f(O)	78	ModifiedELM-S3	Q10=2(Tref=25)	f(W)*f(T)	128	ModifiedELM-S6	Century2	f(W)*f(T)*f(O)	178	ModifiedELM-S8	Q10=2(Tref=25)	f(W)*f(T)
29	ModifiedELM-S1	Q10=1.5(Tref=25)	f(W)*f(T)*f(O)	79	ModifiedELM-S3	Q10=2.1(Tref=25)	f(W)*f(T)	129	ModifiedELM-S6	Daycent1	f(W)*f(T)*f(O)	179	ModifiedELM-S8	Q10=2.1(Tref=25)	f(W)*f(T)
30	ModifiedELM-S1	Q10=1.6(Tref=25)	f(W)*f(T)*f(O)	80	ModifiedELM-S3	Q10=2.2(Tref=25)	f(W)*f(T)	130	ModifiedELM-S6	Daycent2	f(W)*f(T)*f(O)	180	ModifiedELM-S8	Q10=2.2(Tref=25)	f(W)*f(T)
31	ModifiedELM-S1	Q10=1.7(Tref=25)	f(W)*f(T)*f(O)	81	ModifiedELM-S3	Q10=1.5(Tref=35)	f(W)*f(T)	131	ModifiedELM-S6	Q10=2.0(Tref=10)	f(W)*f(T)*f(O)	181	ModifiedELM-S9	Q10=1.3(Tref=25)	f(W)*f(T)
32	ModifiedELM-S1	Q10=1.8(Tref=25)	f(W)*f(T)*f(O)	82	ModifiedELM-S3	Q10=2(Tref=35)	f(W)*f(T)	132	ModifiedELM-S6	Q10=1.4(Tref=10)	f(W)*f(T)*f(O)	182	ModifiedELM-S9	Q10=1.4(Tref=25)	f(W)*f(T)
33	ModifiedELM-S1	Q10=1.9(Tref=25)	f(W)*f(T)*f(O)	83	ModifiedELM-S4	Century1	f(W)*f(T)	133	ModifiedELM-S6	LloydTaylor	f(W)*f(T)*f(O)	183	ModifiedELM-S9	Q10=1.5(Tref=25)	f(W)*f(T)
34	ModifiedELM-S1	Q10=2(Tref=25)	f(W)*f(T)*f(O)	84	ModifiedELM-S4	Century2	f(W)*f(T)	134	ModifiedELM-S6	Kirschbaum	f(W)*f(T)*f(O)	184	ModifiedELM-S9	Q10=1.6(Tref=25)	f(W)*f(T)
35	ModifiedELM-S1	Q10=2.1(Tref=25)	f(W)*f(T)*f(O)	85	ModifiedELM-S4	Daycent1	f(W)*f(T)	135	ModifiedELM-S6	Demeter	f(W)*f(T)*f(O)	185	ModifiedELM-S9	Q10=1.7(Tref=25)	f(W)*f(T)
36	ModifiedELM-S1	Q10=2.2(Tref=25)	f(W)*f(T)*f(O)	86	ModifiedELM-S4	Daycent2	f(W)*f(T)	136	ModifiedELM-S6	Standcarb	f(W)*f(T)*f(O)	186	ModifiedELM-S9	Q10=1.8(Tref=25)	f(W)*f(T)
37	ModifiedELM-S1	Q10=1.5(Tref=35)	f(W)*f(T)*f(O)	87	ModifiedELM-S4	Q10=2.0(Tref=10)	f(W)*f(T)	137	ModifiedELM-S6	Q10=1.3(Tref=25)	f(W)*f(T)*f(O)	187	ModifiedELM-S9	Q10=1.9(Tref=25)	f(W)*f(T)
38	ModifiedELM-S1	Q10=2(Tref=35)	f(W)*f(T)*f(O)	88	ModifiedELM-S4	Q10=1.4(Tref=10)	f(W)*f(T)	138	ModifiedELM-S6	Q10=1.4(Tref=25)	f(W)*f(T)*f(O)	188	ModifiedELM-S9	Q10=2(Tref=25)	f(W)*f(T)
39	ModifiedELM-S2	Century1	f(W)*f(T)	89	ModifiedELM-S4	LloydTaylor	f(W)*f(T)	139	ModifiedELM-S6	Q10=1.5(Tref=25)	f(W)*f(T)*f(O)	189	ModifiedELM-S9	Q10=2.1(Tref=25)	f(W)*f(T)
40	ModifiedELM-S2	Century2	f(W)*f(T)	90	ModifiedELM-S4	Kirschbaum	f(W)*f(T)	140	ModifiedELM-S6	Q10=1.6(Tref=25)	f(W)*f(T)	190	ModifiedELM-S9	Q10=2.2(Tref=25)	f(W)*f(T)
41	ModifiedELM-S2	Daycent1	f(W)*f(T)	91	ModifiedELM-S4	Demeter	f(W)*f(T)	141	ModifiedELM-S6	Q10=1.7(Tref=25)	f(W)*f(T)	191	ModifiedELM-S10	Q10=1.3(Tref=25)	f(W)*f(T)
42	ModifiedELM-S2	Daycent2	f(W)*f(T)	92	ModifiedELM-S4	Standcarb	f(W)*f(T)	142	ModifiedELM-S6	Q10=1.8(Tref=25)	f(W)*f(T)	192	ModifiedELM-S10	Q10=1.4(Tref=25)	f(W)*f(T)
43	ModifiedELM-S2	Q10=2.0(Tref=10)	f(W)*f(T)	93	ModifiedELM-S4	Q10=1.3(Tref=25)	f(W)*f(T)	143	ModifiedELM-S6	Q10=1.9(Tref=25)	f(W)*f(T)	193	ModifiedELM-S10	Q10=1.5(Tref=25)	f(W)*f(T)
44	ModifiedELM-S2	Q10=1.4(Tref=10)	f(W)*f(T)	94	ModifiedELM-S4	Q10=1.4(Tref=25)	f(W)*f(T)	144	ModifiedELM-S6	Q10=2(Tref=25)	f(W)*f(T)*f(O)	194	ModifiedELM-S10	Q10=1.6(Tref=25)	f(W)*f(T)
45	ModifiedELM-S2	LloydTaylor	f(W)*f(T)	95	ModifiedELM-S4	Q10=1.5(Tref=25)	f(W)*f(T)	145	ModifiedELM-S6	Q10=2.1(Tref=25)	f(W)*f(T)	195	ModifiedELM-S10	Q10=1.7(Tref=25)	f(W)*f(T)
46	ModifiedELM-S2	Kirschbaum	f(W)*f(T)	96	ModifiedELM-S4	Q10=1.6(Tref=25)	f(W)*f(T)	146	ModifiedELM-S6	Q10=2.2(Tref=25)	f(W)*f(T)	196	ModifiedELM-S10	Q10=1.8(Tref=25)	f(W)*f(T)
47	ModifiedELM-S2	Demeter	f(W)*f(T)	97	ModifiedELM-S4	Q10=1.7(Tref=25)	f(W)*f(T)	147	ModifiedELM-S6	Q10=1.5(Tref=35)	f(W)*f(T)*f(O)	197	ModifiedELM-S10	Q10=1.9(Tref=25)	f(W)*f(T)
48	ModifiedELM-S2	Standcarb	f(W)*f(T)	98	ModifiedELM-S4	Q10=1.8(Tref=25)	f(W)*f(T)	148	ModifiedELM-S6	Q10=2(Tref=35)	f(W)*f(T)*f(O)	198	ModifiedELM-S10	Q10=2(Tref=25)	f(W)*f(T)
49	ModifiedELM-S2	Q10=1.3(Tref=25)	f(W)*f(T)	99	ModifiedELM-S4	Q10=1.9(Tref=25)	f(W)*f(T)	149	ModifiedELM-S7	Century1	f(W)*f(T)	199	ModifiedELM-S10	Q10=2.1(Tref=25)	f(W)*f(T)
50	ModifiedELM-S2	Q10=1.4(Tref=25)	f(W)*f(T)	100	ModifiedELM-S4	Q10=2(Tref=25)	f(W)*f(T)	150	ModifiedELM-S7	Century2	f(W)*f(T)	200	ModifiedELM-S10	Q10=2.2(Tref=25)	f(W)*f(T)

Table S3 – RMSE (-) of simulated soil liquid water content ($Sf_{liq} = \theta_{liq}/\theta_{sat}$) with the original phase-change (PC) scheme and newly resized PC scheme.

	BES&CMDL		BEO		ATQ		IVO	
	Ori_PC	New_PC	Ori_PC	New_PC	Ori_PC	New_PC	Ori_PC	New_PC
Layer 1	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN
Layer 2	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN
Layer 3	NaN	NaN	NaN	NaN	0.27	0.26	0.35	0.32
Layer 4	0.24	0.24	NaN	NaN	0.23	0.15	0.31	0.27
Layer 5	0.21	0.17	NaN	NaN	0.27	0.16	0.18	0.18
Layer 6	NaN	NaN	NaN	NaN	0.37	0.28	0.24	0.20
Layer 7	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN
Layer 8	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN
Layer 9	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN
Layer 10	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN

Table S4 – The identified optimal scheme giving the best performance for each site, and the four common schemes of environmental modifier ($f_{total} = f_T f_W f_D$) used by the simulations with satisfactory performance. The Euclidean distance, calculated as $\sqrt{\sum_{i=1}^n d_i^2}$ where n is number of site and d_i is the distance between (NSE_CO2, NSE_CH4) and (1,1), evaluate the overall performance for the three sites. The generic decomposition scheme that provides overall the best performance for all the sites is highlighted in yellow.

	Moisture Scalar	Temperature Scalar	BES			BEO			ATQ			Euclidean Distance
	f(W)	f(T)	NSE_CH4	NSE_CO2	Dist	NSE_CH4	NSE_CO2	Dist	NSE_CH4	NSE_CO2	Dist	
Site-specific Optimal Scheme	ModifiedELM-S5	Q10=1.8(Tref=25)	0.76	0.88	0.27							0.27
	ModifiedELM-S5	Q10=1.7(Tref=25)				0.86	0.83	0.22				0.22
	ModifiedELM-S7	Q10=2.1(Tref=25)							0.71	0.65	0.45	0.45
Common schemes within the good-performance zone	ModifiedELM-S2	Q10=2(Tref=25)	0.62	0.80	0.43	0.72	0.73	0.39	0.51	0.59	0.63	0.86
	ModifiedELM-S2	Q10=2.1(Tref=25)	0.58	0.79	0.47	0.63	0.72	0.46	0.55	0.61	0.60	0.89
	ModifiedELM-S2	Q10=2.2(Tref=25)	0.51	0.79	0.54	0.51	0.72	0.57	0.62	0.63	0.53	0.94
	ModifiedELM-S3	Q10=2.1(Tref=25)	0.59	0.78	0.46	0.65	0.70	0.46	0.54	0.60	0.61	0.89

Figure S1 – (a) ELM’s original moisture scalar predicts zero respiration in subfreezing soils; (b) One of the modified moisture scalar which prevents zero respiration when soil becomes subfreezing during winter time, and also incorporates the oxygen stress to account for the inhibition of decomposition in the wet anoxic conditions. Other moisture and temperature functions documented in (Sierra et al., 2015) are shown in (c) and (d), respectively.

Figure S2 – Daily soil temperature from observations and simulations at IVO. **a)** Both simulations use the original organic matter density, driven by CRUJRA forcing (“ELM_CRUJRA”), or with the top layer prescribed to observed temperature (“ELM_ImposeTopTp”); **b)** Simulations driven by CRUJRA with the original and the newly revised phase-change scheme (denoted by “OriPC” and “NewPC”), and with original and the newly derived organic matter density (denoted by “OriOrgM” and “NewOrgM”). Summer overestimation with the original organic matter density is largely improved by using the newly derived organic matter density.

Figure S3 – Deriving the organic matter density at IVO assuming the observed maximum volumetric water content is porosity based on the Equation 3 in Lawrence and Slater (2008). To preserve the shape of original profile, the newly constructed profile, $OrgM_{new}(z) = OrgM_{ori}(z) \times \frac{\sum_{i=1}^n EstOrgM(i)}{\sum_{i=1}^n OrgM(i)}$, where $EstOrgM(i)$ is the estimated organic matter density at the i th layer and n is the total number of soil layers with available volumetric water content.

Figure S4 – Comparison of multi-year (2013 - 2017) averaged daily soil temperatures observed (Ts_Obs , red) and simulated with the default (Ts_OriPC , cyan) and improved (Ts_NewPC , blue) phase-change schemes at BEO (a) and ATQ (b). Simulated moisture saturation with the original (Sf_OriPC ; green) and improved (Sf_NewPC ; magenta) schemes are shown on the right hand axes. The horizontal axes indicates days from July to June, with ticks represent the first day of each month. Hatched areas represent durations of zero-curtain periods observed (ZCP_Obs , orange) and simulated (ZCP_OriPC , green; ZCP_NewPC , blue). No baseline ZCP is shown in the 6th layer for BES/CMDL and the 7th layer for IVO because the maximum annual temperature is below $0^{\circ}C$.

Figure S5 – Observed and ELM-simulated daily soil temperature and liquid water content with the original and new phase-change scheme at IVO as an example.

Figure S6 – Observed and ELM-simulated daily soil temperature and liquid water content with the original and new phase-change scheme at ATQ as an example.

Figure S7 – Monthly CH_4 and CO_2 net flux simulated for 200 ensemble members (gray lines). Red open circles are observed monthly averages with the number of daily observations less than 10 days, which are not used for the computation of NSE. See Table 2 for the configuration for each experiment.

Reference

- Lawrence, D. M., and Slater, A. G.: Incorporating organic soil into a global climate model, *Clim Dynam*, 30, 145-160, 10.1007/s00382-007-0278-1, 2008.
- Sierra, C. A., Trumbore, S. E., Davidson, E. A., Vicca, S., and Janssens, I.: Sensitivity of decomposition rates of soil organic matter with respect to simultaneous changes in temperature and moisture, *J Adv Model Earth Sy*, 7, 335-356, 2015.