Supplementary Material for

Comparing soil carbon loss through respiration and leaching under extreme precipitation events in arid and semi-arid grasslands

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Introduction

The supplementary material contains Table S1-S2, Figures S1-S5, and Dataset S1. Table S1 presents the major ion concentrations of the artificial rainwater used for the simulated extreme precipitation events (EPEs). Table S2 shows proportion of outgassed CO_2 in total dissolved inorganic carbon under given pH, temperature and alkaline conditions. Fig. S1 provides the locations of sample sites and their mean annual precipition (MAP) levels. Fig. S2 provides daily and monthly precipitation in Xilinhot. Fig. S3 shows soil respiration rate variation after EPEs. Fig. S4 provides information on soil carbon content in each column. Fig. S5 provides information on cumulative repiration in soils of different treatments. Dataset S1 (separate file) shows data displayed in the figures of main text and supporting information.

Table S1: Major ion concentrations (μmol L^{-1}) of the artificial rainwater used for the simulated extreme precipitation events (EPEs).

Ion	For XLHT and KQ soils	For GC soils
Ca^{2+}	113	180
Mg^{2+}	17	37
$Na^{+} + K^{+}$	41	87
HCO_3^{-}	180	12
Cl^{-}	45	75
SO_4^{2-}	161	67

Table S2: Proportion of outgassing CO2 in total dissolved inorganic carbon under given pH, temperature and alkaline conditions according to formulas shown in Ran et al. (2015).

pH[a]	T[b]	Alkaline [c] (μmol/l)	Proportion of outgassing CO_2 (%)	Partial Pressure of CO_2 (μatm)
9.0	23	300	0.2	18
8.5	23	300	0.7	59
7.5	23	300	6.8	601
9.0	23	500	0.2	29
8.5	23	500	0.7	98
7.5	23	500	6.8	1002
9.0	23	1000	0.2	58
8.5	23	1000	0.7	195
7.5	23	1000	6.8	2004
9.0	23	2000	0.2	117
8.5	23	2000	0.7	391
7.5	23	2000	6.8	4008
9.0	23	3000	0.2	175
8.5	23	3000	0.7	586
7.5	23	3000	6.8	6013

[a]: pH of the soil leachates in this study, pH_{XLHT} ~ 9, pH_{KQ} ~ 7.6, pH_{GC} ~ 8.6;

[b]: incubation temperature;

[c]: alkaline range of natural waters.

Figure S1: Map of sampling sites and their mean annual precipitation (MAP) levels.

Figure S2: Variation of the daily precipitation (a) and monthly precipitation (b) during recent two decades at Xilinhot in Inner Mongolia (data modified from http://data.cma.cn/data/index/6d1b5efbdcbf9a58.html).

Figure S3: Variations of soil respiration rate after the simulated extreme precipitation events (EPEs). Red and blue dots represent respiration in the litter-amended and non-amended soils, respectively. Mean values are shown with standard error (n = 3). Red and blue dash lines represent the stabilized respiration rate after EPEs in the litter-amended and non-amended soils, respectively. Black dash lines represent regressive lines using polynomial fitting method.

Figure S4: Cumulative respiration in the non-amended and litter-amended soils during the first 20 days after three extreme precipitation events (EPEs) relative to that estimated using basal respiration rates stabilized after EPEs. Mean values are shown with standard error (n = 3).

Figure S5: Total amount of soil organic carbon (SOC) and soil inorganic carbon (SIC) in different layers of the artificial soil columns.