

Supplementary material

Reconciling negative soil CO₂ fluxes: insights from a large-scale experimental hillslope

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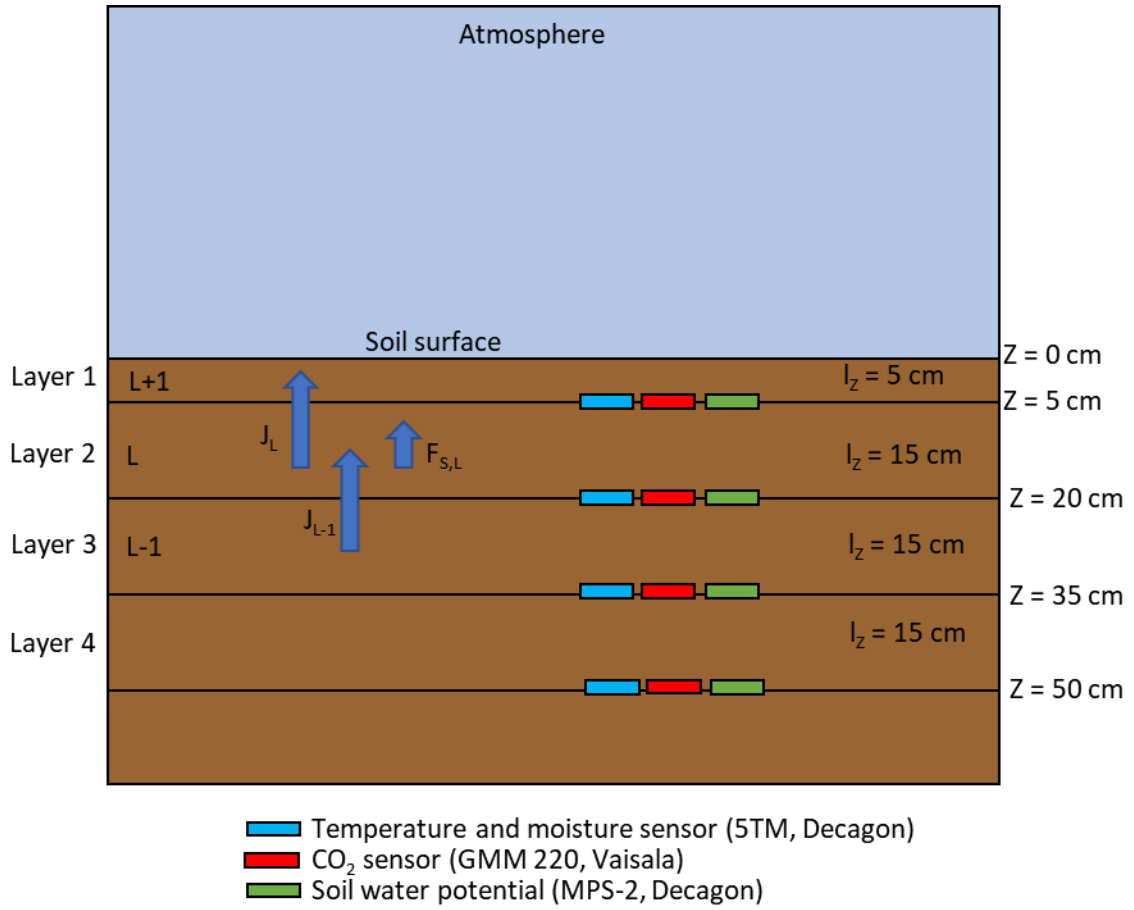
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Supplementary Table 1. Studies reporting negative CO₂ fluxes and potential carbonate weathering

Reference	Location	Ecosystem Type	Experiment type	Technique	Fs	MAP	MAT	pH
[1]	Lucky Hills, AZ, USA	Shrubland	Field	Bowen ratio		356	17	
[2]	McMurdo Dry Valleys, Antarctica	Cold desert	Field	Chamber	-0.1			9.14
[3]	Mojave Desert, USA	Desert	Field/FACE	Dome		150	20	
[3]	Baja California Peninsula, Mexico	Desert	Field	Eddy covariance		174	23.8	
[4]	Mojave Desert, USA	Desert	Field	Eddy covariance		149	15.4	
[5]	McMurdo Dry Valleys, Antarctica	Cold desert	Field/Lab	Chambers	-0.1	<100*		10.30
[6]	Gubantunggut Desert, China	Desert	Field	Chamber	-3.0	160	6.6	8.50
[7]	Junggar Basin, China	Desert	Field	Chamber	-0.24	105.3	8	8.40
[8]	Junngar basin, China	Shrubland	Field	Chamber	-0.1	105.3	8	8.52
[9]	Gurbantunggut Desert, China	Desert	Field	Chamber	-0.025	160	7	8.50
[10]	McMurdo Dry Valleys, Antarctica	Cold desert	Field	Chamber	-0.05	<50*		10
[11]	Gurbantunggut Desert, China	Desert	Lab		-0.5			6.00
[12]	Lucky Hills, AZ, USA	Shrubland	Field	Gradient method	-1.59	280		8.26
[13]	Gurbantunggut Desert, China	Desert	Field/Lab	Chamber	-0.42	160	7	8.2
[14]	McMurdo Dry Valleys, Antarctica	Cold desert	Field	Chamber	-0.08			
[15]	Railroad Valley, Nevada, USA	Desert	Field/Lab	Spectroscopy	-17.1	248	7.2	10.15
[16]	Ellesmere Island, Canada	Tundra	Field	Chamber	-0.03			8.2
[17]	Tarim, Manas, and Sangong river basins, China	Desert	Lab	Chamber	-1.9			
[18]	Gurbantunggut Desert, China	Desert	Field	Chamber	-1.2	144.7		10
[19]	Gurbantunggut Desert, China	Desert	Field/Lab	Chamber/Eddy Covariance		160	7	8.2

[20]	Makgadikgadi Basin, Botswana	Salt pan	Field	Chamber	-0.11	545		10.00
[23]	Mu Us Desert, China	Desert	Field	Chamber	-0.21	287	7.6	8.95
[24]	Mu Us Desert, China	Desert	Field	Chamber	-0.09	287	7	8.80
[25]	Qinghai-Tibet Plateau, China	Alpine meadow	Field	Chamber	-0.05	270	-5.3	
[26]	Mu Us Desert, China	Desert	Lab	Isotopes, chamber	-0.20	275	7.6	8.60
[27]	Mu Us Desert, China	Desert	Field	Chamber	-0.20	275	7.6	8.95
[28]	Keller Peninsula, Antarctica	Marine terrace	Field	Chamber	-0.21	400	-1	6.17
[29]	Gubantunggut Desert, China	Desert	Field	Chamber	-3.0	160	6.6	
[30]	Songnen Plain, China	Meadow steppe	Field	Chamber	-1.55	413.7	4	10.60
[31]	Gurbantunggut Desert, China	Desert	Lab	Chamber	-0.67	167	7	8.60
[32]	Mu Us Desert, China	Desert	Field	Chamber	-0.31	275	7.6	8.90
[33]	Gansu, China	Grassland	Field	Chamber	-0.04	382	6.7	8.60
[34]	Baja California Peninsula, Mexico	Desert	Field	Chamber	-0.06	156.6	23	7.45

Fs = maximum soil CO₂ efflux ($\mu\text{mol CO}_2 \text{ m}^{-2} \text{ s}^{-1}$) found in the study; MAP = mean annual precipitation (mm); MAT = mean annual temperature (°C); FACE Free Air Concentration Enrichment experiment; *Reported as mm water equivalent.



Supplementary Figure 1. Schematic representation of Equation 9. J_L represents the gas transport between soil layers L and $L+1$, and J_{L-1} is the gas transport between soil layers $L-1$ and L , l_z represents the thickness of the layer, $F_{S,L}$ is the individual soil layer gas flux, Z is (sensor) depth. This is a simple schematic representation and does not represent the actual installation of the sensors at the Landscape Evolution Observatory.

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