Additional file 1

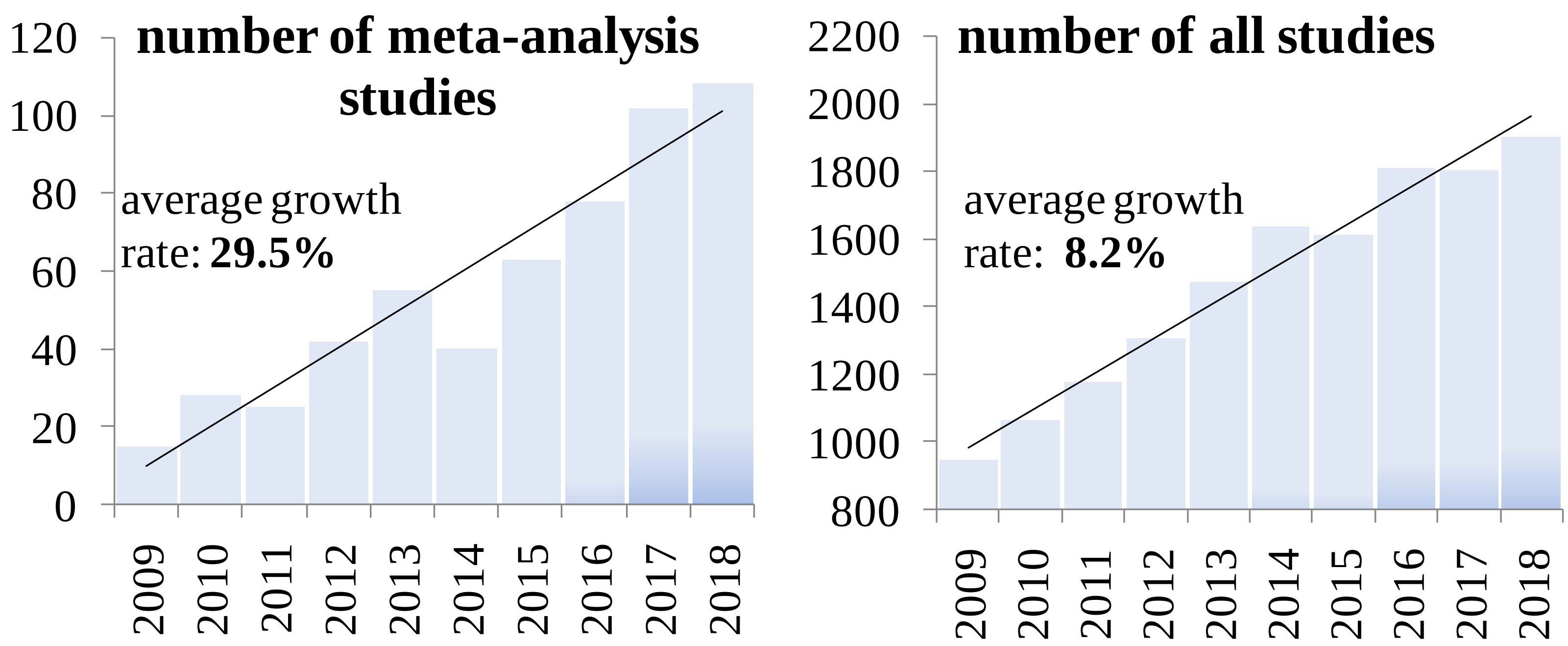

Fig. S1 The numbers of published papers with meta-analyses related to soil carbon and all studies related to soil carbon from 2009 to 2018.

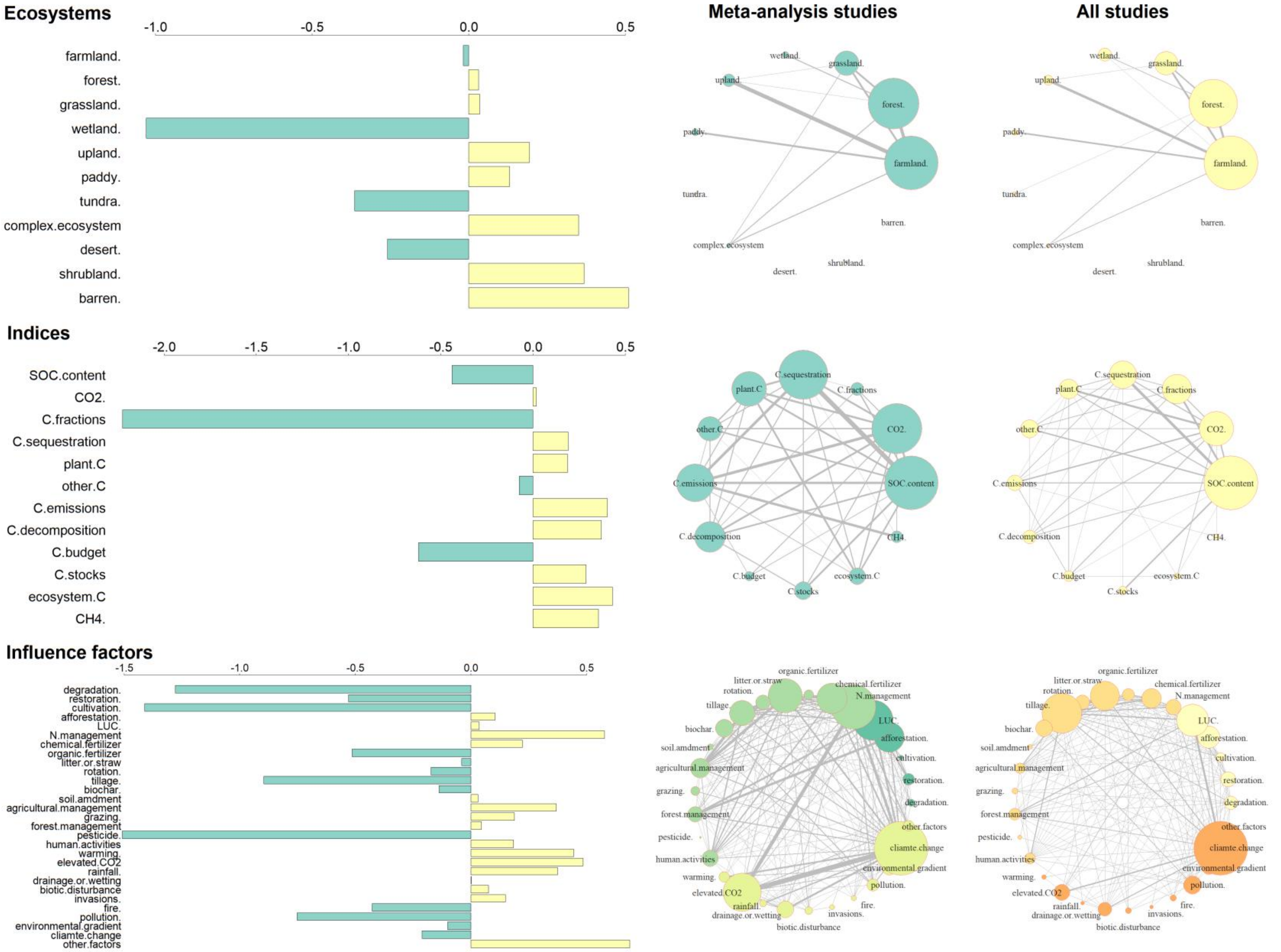
Ecosystems
Meta-analysis studies
All studies
farmland.
forest.
grassland.
wetland.
upland.
paddy.
tundra.
complex.ecosystem
desert.
shrubland.
barren.
Indices
SOC.content
CO2.
C.fractions
C.sequestration
plant.C
other.C
C.emissions
C.decomposition
C.budget
C.stocks
ecosystem.C
CH4.
Influence factors
degradation.
restoration.
cultivation.
afforestation.
LUC.
N.management
chemical.fertilizer
organic.fertilizer
litter.or.straw
rotation.
tillage.
biochar.
soil.amdment
agricultural.management
grazing.
forest.management
pesticide.
human.activities
warming.
elevated.CO2
rainfall.
drainage.or.wetting
biotic.disturbance
invasions.
fire.
pollution.
environmental.gradient
cliamte.change
other.factors

Fig. S2 Keyword distributions of meta-analyses and all studies related to soil carbon. The bar plot indicates the percentage changes in keyword distributions in the 11 ecosystems, 12 indices and 29 influencing factors between the meta-analyses and all studies related to soil carbon. The network indicates the keyword distributions in the 11 ecosystems, 12 indices and 29 influencing factors and the co-occurrence frequency of two groups; the vertex indicates the relative percentage of each group; the numerical value of the vertex of each group = 50 * keyword count of each group/ the maximum keyword count; and the edges indicate the co-occurrence frequency of two groups. The numerical value of the edge of each group = 50 * co-occurrence frequency of each pair of two groups/ the maximum co-occurrence frequency.

Table S1 Changes in C losses and C assimilation due to different influencing factors.

Influencing factor	Changes in C emission					Changes in C assimilation				
	Mean change	Confidence interval of 95%		Observations	Studies	Mean change	Confidence interval of 95%		Observations	Studies
degradation	-25.8%	-43.6%	-8.1%	236	2	-16.8%	-25.5%	-8.2%	133	2
forestation	37.0%	NA	NA	22	1	NA	NA	NA	NA	NA
deforestation	-4.7%	-56.7%	47.3%	379	3	NA	NA	NA	NA	NA
N addition	7.8%	-0.9%	16.5%	4836	13	19.9%	13.8%	26.0%	3233	21
chemical fertilizer	113.0%	NA	NA	10	1	35.8%	-16.2%	87.8%	410	2
organic fertilizer	44.1%	21.0%	67.2%	807	3	43.0%	NA	NA	271	1
litter input	67.1%	37.3%	96.9%	846	5	NA	NA	NA	NA	NA
unfertilized	-34.3%	-48.0%	-20.6%	2262	2	NA	NA	NA	NA	NA
no tillage	-21.2%	-38.1%	-4.3%	669	5	15.4%	NA	NA	22	1
tillage	21.0%	NA	NA	174	1	NA	NA	NA	NA	NA
soil amendment	-0.3%	-19.4%	18.7%	2389	11	9.6%	-55.7%	74.9%	1204	4
combined agricultural managements	18.5%	-60.0%	97.0%	67	3	NA	NA	NA	NA	NA
reduced grazing	NA	NA	NA	NA	NA	55.1%	-321.0%	431.2%	117	1
grazing	5.0%	-48.0%	58.1%	128	3	-29.0%	-49.4%	-8.6%	476	5
forest harvesting	29.4%	NA	NA	217	1	-33.6%	-158.7%	91.6%	191	2
other management	-24.1%	-32.5%	-15.8%	120	2	NA	NA	NA	NA	NA
warming	16.1%	4.8%	27.5%	1880	16	11.3%	5.3%	17.3%	1902	9
elevated CO_2	21.1%	10.7%	31.5%	671	8	25.7%	19.8%	31.5%	4631	15
rainfall increased	26.1%	-22.4%	74.6%	371	7	5.1%	-16.8%	27.0%	135	4
rainfall reduction	-14.4%	-23.1%	-5.6%	200	6	-10.3%	-34.4%	13.7%	127	3

wetting	27.9%	-202.8%	258.5%	118	2	26.3%	13.5%	39.2%	179	1
drying	-41.7%	-60.3%	-23.0%	840	6	-24.7%	-31.0%	-18.4%	519	2
biotic disturbance	6.3%	NA	NA	15	1	4.6%	-14.9%	24.0%	863	2
plant invasion	116.8%	NA	NA	58	1	96.5%	-6.0%	199.0%	273	3
fire	-13.5%	NA	NA	139	1	NA	NA	NA	NA	NA
pollution	-7.1%	NA	NA	67	1	-45.7%	-79.7%	-11.8%	139	1
other environmental and climatic change	1.4%	-12.3%	15.1%	512	5	-6.6%	-36.8%	23.7%	47	2

The C losses include CO_2 emissions, CH_4 emissions and carbon decomposition. C assimilation includes underground biomass, aboveground biomass, plant biomass, net primary production and so on. NA means that no data were reported in the studies or that there were not enough data for the t-tests.

Table S2 List of the references that the meta-analysis results were collected.

References related to soil C changes		References related to soil C emission	References related to soil C assimilation
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[2] Abdalla, M. 2018	[71] Lu, M. et al. 2013	[2] Abdalla, M. 2016	[2] Bejarano-Castillo, M. et al. 2015
[3] Achat, D. L. 2015 et al.	[72] Lu, Y. H. et al. 2008	[3] Aerts, R. 2006	[3] Biederman, L. A.and Harpole, W. S.2013
[4] Aguilera, E. et al. 2013	[73] Luo, G. W. et al. 2018	[4] Amani, M. et al. 2019	[4] Bouskill, N. J.et al. 2014
[5] Alvarez, R. et al. 2017	[74] Luo, Y. Q. et al. 2006	[5] Awad, Y. M.et al. 2018	[5] Davidson, I. C. et al. 2018
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[7] Barcena, T. G.et al. 2014	[76] Ma, D. D. et al. 2018	[7] Bouskill, N. J.et al. 2014	[7] de Graaff, M. A. et al. 2006
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