Table S1. Important studies included in the review

Main studies	**Main aim of the study (of our interest)**	**Location of the experiment/dataset**	**doi/Links to refer**
Dalal et al. [2]	Effect of land use on SOC fractions	Australia	https://doi.org/10.1016/j.agee.2021.107326.
Ahmad et al. [4]	C dynamics from carbonate dissolution in croplands	Australia	https://doi.org/10.1071/sr14060.
Lu et al. [5]	Effect of intensive cropping and salinization on PIC	North China Plain	https://doi.org/10.1016/j.agee.2020.106820.
Hirmas et al. [9]	Effect of increasing CO_2 concentration on SIC distribution	Southern Fry Mountains, USA	https://doi.org/10.1016/j.geoderma.2009.05.005
Díaz-Hernández [15]	C contents in deep soil profiles	Spain	https://doi.org/10.1016/j.chemosphere.2010.04.038
Stone et al. [17]	C sink in deserts	China	https://doi.org/10.1126/science.320.5882.1409.
Gao et al. [18]	Effect of vegetation rehabilitation on SOC and SIC content	Northwest China	https://doi.org/10.1002/ldr.2832.
Gao et al. [18]	SIC changes along a chronosequence of afforestation	China	https://doi.org/10.3389/fpls.2017.01282
Chai et al. [20]	C emissions in arid croplands	China	https://doi.org/10.1007/s13593-013-0161-x
Ewing et al. [21]	Soil factors in arid to hyperarid transitions	Atacama Desert, Northern Chile	https://doi.org/10.1016/j.gca.2006.08.020
Schlesinger et al. [25]	C sequestration in deserts		https://doi.org/10.1111/j.1365-2486.2008.01763.x
Nyachoti et al. [29]	Factors affecting PIC formation	USA	https://doi.org/10.1016/j.chemgeo.2017.10.014.
Monger et al. [32]	Biotic process of PIC formation	New Mexico, USA	https://doi.org/10.1130/0091-7613(1991)019%3C0997:MPOPC%3E2.3.CO;2
Marion et al. [34]	Develop and validate a regional model for $CaCO_3$ deposition in desert soils	Southwestern United States	https://doi.org/10.1097/00010694-198505000-00014
Zhang et al. [37]	Role of SOM in PIC formation in desert soils	Inner Mongolia, China	https://doi.org/10.1016/S1002-0160(10)60010-0

Sanderman [44]	Effect of agricultural managemernt on soil carbonate status	Australia	https://doi.org/10.1016/j.agee.2012.04.015.
Lal [45]	SIC sequestration rate under different climates		https://doi.org/10.1002/ldr.934
Emmerich [46]	CO_2 fluxes in high carbonate soils	Southeastern Arizona	https://doi.org/10.1016/S0168-1923(02)00231-9
Entry et al. [47]	Effect of irrigation on SIC content	Snake River Plain, Idaho, USA	https://doi.org/10.1007/s00267-003-9140-3
Khokhlova et al. [50]	Effect of irrigation on the soil carbonate status	Russia	https://doi.org/10.1016/s0933-3630(96)00134-1.
Wohlfahrt et al. [52]	quantify the uncertainty of eddy covariance measurements of NEE	Mojave desert, California	https://doi.org/10.1111/j.1365-2486.2008.01593.x
Kim et al. [54]	Effects of long-term cultivation of dryland soils on SIC content	Southern Great Plains, USA and Pampas grasslands, Argentina	https://doi.org/10.1111/gcb.15207
Raheb et al. [55]	SIC and SOC stock in arid soils	Iran	https://doi.org/10.1016/j.catena.2017.01.035.
Wu et al. [57]	SIC content under different land-use types	China	https://doi.org/10.1016/j.agee.2008.10.020.
Mi et al. [58]	SIC storage	China	https://doi.org/10.1111/j.1365-2486.2008.01642.x
Tan et al. [59]	SIC stock under different soil types	The Loess Plateau region of China	https://doi.org/10.1023/A:1017557712431
Feng et al. [60]	SIC and SOC content in deserts	Northern People's Republic of China	https://doi.org/10.1023/A:1017557712431
Deng et al. [61]	Soil C sequestration under different land uses	China	https://doi.org/10.1111/gcb.12508
Hombegowda et al. [62]	SOC stocks along a forest–agriculture–agroforestry trajectory	South India	https://doi.org/10.5194/soil-2-13-2016
Chang et al. [63]	Effects of afforestation on SOC and SIC content	China	https://doi.org/10.1016/j.catena.2012.02.012.
Jin et al. [64]	Effect of fertilizer induced soil acidification on SOC and SIC dynamics	China	https://doi.org/10.1007/s40333-018-0066-2
Rasmussen [66]	SOC and SIC in different soil taxa	Arizona, USA	https://doi.org/10.2136/sssaj2005.0118.

Bughio et al. [68]	Effect of agrcultural practices on SIC and SOC; partitioning SIC into LIC and PIC; identifying pathways of PIC formation	China	https://doi.org/10.1016/j.geoderma.2015.08.003
Zhao et al. [70]	Effect of different vegetation cover on SIC and SOC content	China	https://doi.org/10.1016/j.catena.2016.01.003.
Woodbury et al. [72]	Soil C dynamics under different land-use types	United States of America	https://doi.org/0886-6236/07/2007GB002950$12.00
Su et al. [74]	Effects of desert rehabilitation on SOC and SIC content	Northwest China	https://doi.org/10.1016/j.jenvman.2009.12.014
Lu et al. [75]	SIC and SOC dynamics in croplands	The Loess Plateau, China	http://dx.doi.org/10.21203/rs.3.rs-55467/v1
Mikhailova et al. [76]	Land-use effects on SIC content	Kursk, Russia	https://doi.org/10.2134/jeq2005.0151.
Sartori et al. [78]	SIC along a chronosequence of poplar plantation	Oregon, USA	https://doi.org/10.1016/j.agee.2007.01.026
Wang et al. [79]	SOC and SIC in croplands	Inner Mongolia	https://doi.org/10.1016/j.catena.2013.04.008
Wang et al. [80]	Impacts of land use change on PIC dynamics	Northwest China	https://doi.org/10.1038/srep11439
Wang et al. [81]	Effect of organic amendments on carbonate content in arid croplands	Northern China	https://doi.org/10.1007/s11104-014-2077-x
Zhang et al. [82]	Vertical distribution of SIC and SOC	Lanzhou, China	https://doi.org/10.1016/j.catena.2014.10.031
Denef et al. [85]	C sequestration under centre-pivot irrigation compared to rainfed conditions	The Central Great Plains, USA	https://doi.org/10.1016/j.geoderma.2008.03.002
Halvorson et al. [86]	Soil C under limited irrigation	The Central Great Plains, USA	https://doi.org/10.2134/agronj2012.0113
Gocke et al. [87]	Depth-related distribution of secondary carbonate	Germany	https://doi.org/10.1029/2010GB003871
Raza et al. [91]	SIC loss due to N-fertilizer induced soil acidification	China	https://doi.org/10.1111/gcb.15101
Ramnarine et al. [94]	Contributions of carbonates to soil CO_2 emissions	southern Ontario, Canada	https://doi.org/10.4141/CJSS2011-025
Shi et al. [98]	SIC and SOC in the op soils of grasslands	Inner Mongolia and the Tibetian Plateau	https://doi.org/10.5194/bg-9-2287-2012

Jin et al. [100]	Effects of tree plantation on SOC and SIC sequestration	China	https://doi.org/10.1016/j.scitotenv.2014.03.105
Buysse et al. [105]	Effect of long-term residue management on SOC	Belgium	http://dx.doi.org/10.1016/j.agee.2013.01.006
Jobbágy et al. [108]	Depth-wise SOC distribution and its relationship with climate and vegetation	Global dataset	https://doi.org/10.1890/1051-0761(2000)010[0423:TVDOSO]2.0.CO;2
Xie et al. [109]	CO_2 absorption by alkaline soils	Gubantonggut Desert, China	https://doi.org/10.1007/s00254-008-1197-0
Huang et al. [115]	Effect of phosphorus fertilization on soil C dynamics	Adana-Turkey	https://doi.org/10.1080/00103624.2020.1822381
Zeng et al. [116]	Effect of long-term fertilization on SIC and SOC content	Lanzhou Gansu, China	http://en.cnki.com.cn/Article_en/CJFDTotal-TRFL200802004.htm
Zhang et al. [119]	Relationship between soil C and other soil parameters; effect of hydrological processes on soil C dynamics	The North China Plain	https://doi.org/10.1016/j.agee.2020.106886
Shi et al. [121]	Spatial distribution of SIC and its relationship with other soil parameters	North China Plain	https://doi.org/10.1007/s11104-017-3310-1
Evans et al. [122]	Terrestrial C accumulation in desert due to following long term exposure to elevated atmospheric CO_2	Mojave desert, California	https://doi.org/10.1038/nclimate2184
Ma et al. [123]	Identifying DIC as a hidden carbon sink in desert	Gurbantunggut Desert, China	https://doi.org/10.5194/bg-11-6251-2014
Li et al. [124]	14C dating of soil organic/inorganic carbon in desert	Lanzhou, China	https://doi.org/10.1002/2015GL064222
Mielnick et al. [132]	Soil CO_2 flux in a desert grassland	North America	https://doi.org/ 10.1016/j.jaridenv.2004.06.001.
Inglima et al. [133]	Contribution of SIC to soil CO_2 efflux	Pianosa, Italy	https://doi.org/10.1111/j.1365-2486.2008.01793.x
Xie et al. [134]	CO_2 absorption by alkaline soils	China	https://doi.org/10.1007/s00254-008r-r1197-0
Hamerlynck et al. [135]	Relationship with nocturnal soil CO_2 uptake and subsurface soil C dynamics	USA	https://doi.org/2169-8953/13/10.1002/2013JG002495
Ball et al. [136]	Factors affecting CO_2 flux in dry valley soils	Antarctica	https://doi.org/10.1016/j.soilbio.2009.04.011

Roland et al. [137]	Ventilation-driven CO_2 outgassing in carbonate weathering	Spain	https://doi.org/10.5194/bg-10-5009-2013
Breecker et al. [138]	Seasonal bias in PIC formation	New Mexico, USA	https://doi.org/10.1130/B26413.1
Roby et al. [139]	Effect of gross ecosystem photosynthesis, soil moisture and soil temperature on soil CO_2 flux	Arizona, USA	https://doi.org/10.3390/soilsystems3010006
Soper et al. [140]	Soil CO_2 emissions from Mojave desert	Nevada, USA	https://doi.org/10.1002/2016GL071198.
Kowalski et al. [141]	CO_2 exchange between atmosphere, ecosystems and carbonate substrates	Spain	https://doi.org/10.1016/j.agrformet.2008.02.004
Parsons et al. [142]	Soil CO_2 flux in McMurdo Dry Valleys	Antarctica	https://doi.org/ 10.1007/s10021-003-0132-1
Plestenjak et al. [143]	Estimation of the contribution of various sources that influence soil CO_2 in calcareous grassland	Slovenia, Central Europe	https://doi/org/10.1007/s11368-012-0564-3

*LIC: lithogenic carbonate, PIC: pedogenic carbonate