

Supplement to

**Data-mining analysis of the global distribution of soil carbon in
observational databases and Earth system models**

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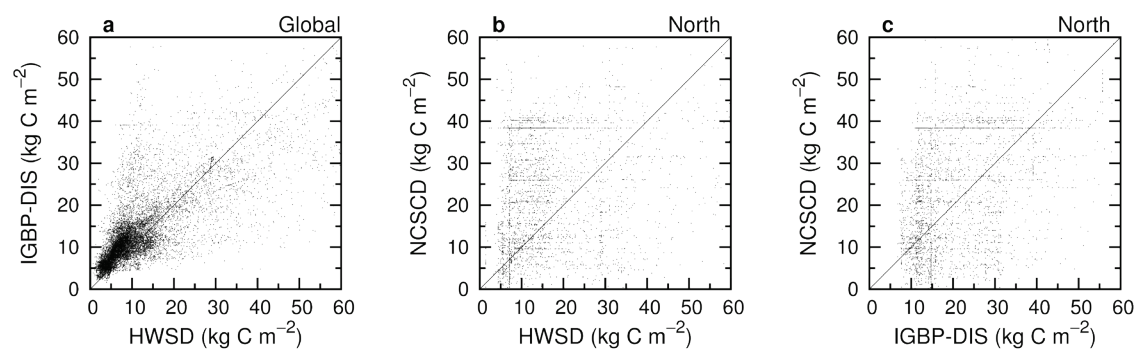


Figure S1: Grid-scale comparison (1°) of SOC databases (a: global; b and c: north).

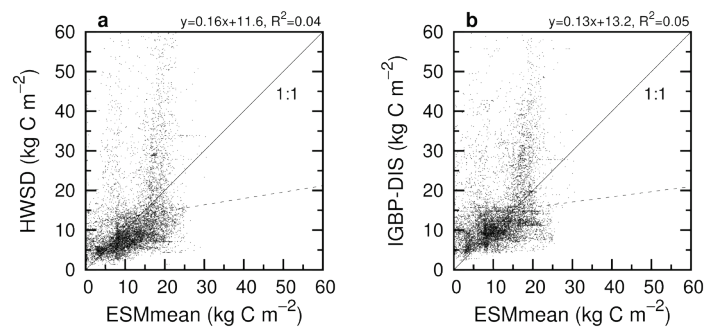


Figure S2: Relationship between ESM ensemble and observational databases at the grid scale (global, 1°).

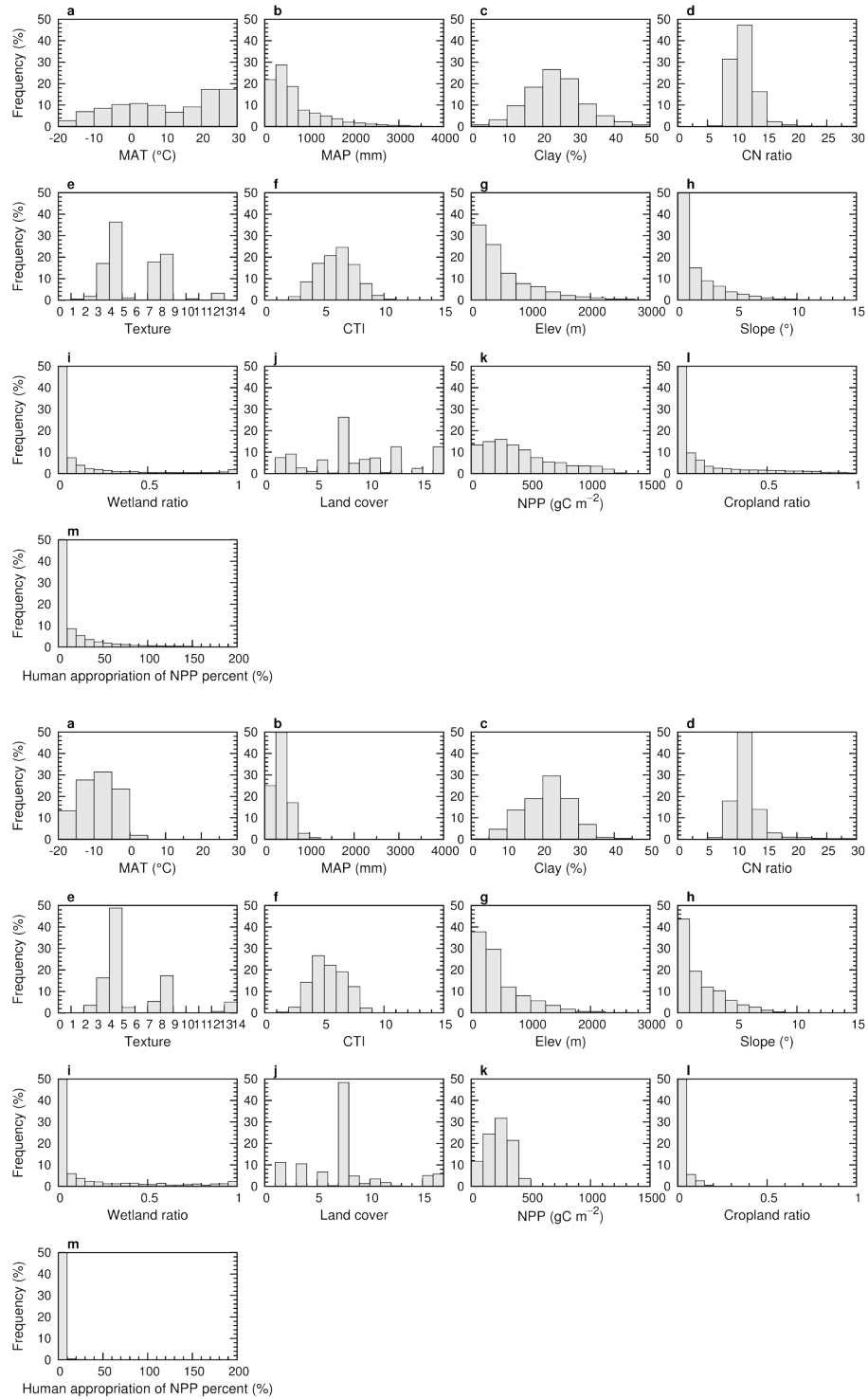


Figure S3: Histogram of variables for global (top) and northern (bottom) databases.

Table S1: Model name and modelling centre of ESMs.

ESM output name	Model name	Modelling centre (or group)
BCC-ensemble	BCC-CSM1.1 BCC-CSM1.1(m)	Beijing Climate Center, China Meteorological Administration
BNU-ESM	BNU-ESM	College of Global Change and Earth System Science, Beijing Normal University
CanESM2	CanESM2	Canadian Centre for Climate Modelling and Analysis
CCSM4	CCSM4	National Center for Atmospheric Research
CESM1-ensemble	CESM1(BGC) CESM1(CAM5) CESM1(FASTCHEM) CESM1(WACCM)	Community Earth System Model Contributors
CMCC-CESM	CMCC-CESM	Centro Euro-Mediterraneo per I Cambiamenti Climatici
GFDL-ESM2M	GFDL-ESM2M	NOAA Geophysical Fluid Dynamics Laboratory
GISS-ensemble	GISS-E2-H GISS-E2-H-CC GISS-E2-R GISS-E2-R-CC	NASA Goddard Institute for Space Studies
HadGEM2-CC	HadGEM2-CC	Met Office Hadley Centre (additional HadGEM2-ES realizations contributed by Instituto Nacional de Pesquisas Espaciais)
INM-CM4	INM-CM4	Institute for Numerical Mathematics
IPSL-ensemble	IPSL-CM5A-LR IPSL-CM5A-MR IPSL-CM5B-LR	Institut Pierre-Simon Laplace
MIROC-ensemble	MIROC-ESM MIROC-ESM-CHEM	Japan Agency for Marine-Earth Science and Technology, Atmosphere and Ocean Research Institute (The University of Tokyo), and National Institute for Environmental Studies
MPI-ensemble	MPI-ESM-MR MPI-ESM-LR	Max-Planck-Institut für Meteorologie (Max Planck Institute for Meteorology)
MRI-ESM1	MRI-ESM1	Meteorological Research Institute
NorESM1-ensemble	NorESM1-M NorESM1-ME	Norwegian Climate Centre

Table S2: BRT model performance for observational databases.

	Database	Slope	Y-intercept	P	R^2	RMSE	N
Global	HWSD	1.03	−0.38	<0.001	0.96	2.35	13854
	IGBP-DIS	1.02	−0.27	<0.001	0.98	1.47	13854
North	HWSD	1.02	−0.39	<0.001	0.98	2.08	3176
	IGBP-DIS	1.01	−0.24	<0.001	0.99	0.96	3176
	NCSCD	1.18	−4.46	<0.001	0.65	9.38	3176

Table S3: Performance of BRTs for ESM output.

	ESM	Slope	Y-intercept	P	R^2	RMSE	N
Global	BCC-ensemble	1.02	-0.16	<0.001	0.97	0.82	13805
	BNU-ESM	1.03	-0.14	<0.001	0.97	0.72	13175
	CanESM2	1.03	-0.37	<0.001	0.96	2.00	13813
	CCSM4	1.03	-0.12	<0.001	0.96	0.64	13112
	CESM1-ensemble	1.03	-0.10	<0.001	0.96	0.58	13147
	CMCC-CESM	1.01	-0.27	<0.001	0.99	3.13	10382
	GFDL-ESM2M	1.01	-0.11	<0.001	0.99	1.66	13854
	GISS-ensemble	1.02	-0.42	<0.001	0.97	3.74	13164
	HadGEM2-CC	1.03	-0.26	<0.001	0.96	1.25	13357
	INM-CM4	1.04	-0.47	<0.001	0.96	1.81	12161
	IPSL-ensemble	1.01	-0.11	<0.001	0.98	0.90	13728
	MIROC-ensemble	1.01	-0.28	<0.001	0.98	1.88	10698
	MPI-ensemble	1.03	-0.64	<0.001	0.97	2.39	11861
	MRI-ESM1	1.03	-0.38	<0.001	0.96	1.77	12780
	NorESM1-ensemble	1.03	-0.12	<0.001	0.96	0.64	13530
North	BCC-ensemble	1.02	-0.18	<0.001	0.99	0.50	3170
	BNU-ESM	1.02	-0.10	<0.001	0.99	0.37	3134
	CanESM2	1.02	-0.33	<0.001	0.99	1.37	3174
	CCSM4	1.02	-0.06	<0.001	0.98	0.35	3145
	CESM1-ensemble	1.02	-0.04	<0.001	0.99	0.33	3130
	CMCC-CESM	1.09	-4.75	<0.001	0.84	14.52	2600
	GFDL-ESM2M	1.02	-0.69	<0.001	0.99	1.30	3176
	GISS-ensemble	1.02	-0.61	<0.001	0.99	2.04	3108
	HadGEM2-CC	1.01	-0.09	<0.001	0.99	0.45	3091
	INM-CM4	1.01	-0.15	<0.001	0.99	0.63	2848
	IPSL-ensemble	1.02	-0.29	<0.001	0.99	0.41	3167
	MIROC-ensemble	1.01	-0.51	<0.001	0.99	0.92	2620
	MPI-ensemble	1.01	-0.16	<0.001	0.99	0.79	2834
	MRI-ESM1	1.02	-0.18	<0.001	0.99	0.64	3176
	NorESM1-ensemble	1.01	-0.04	<0.001	0.99	0.26	3176