Supplement figure captions

Fig. S1 Correlation of total DNA content to organic carbon (a), total N (b) and labile

carbon (c) of the size fractions of soil aggregates.

Fig. S2 Correlation between SOC and fungal gene abundance of soil aggregates in

different size fractions.

Fig. S3 Correlation of normalized enzyme activity with organic carbon content in size

fractions of soil aggregates of the studied chronosequence.

Fig. S4 Correlation of soil respiration quotient with total DNA (a) and labile carbon

content of size fractions of soil aggregates over the chronosequence. (▲: the

samples from tidal marsh soil. ●: the samples from rice soils)

Supplementary Material:Supplement Figures

Fig. S1.

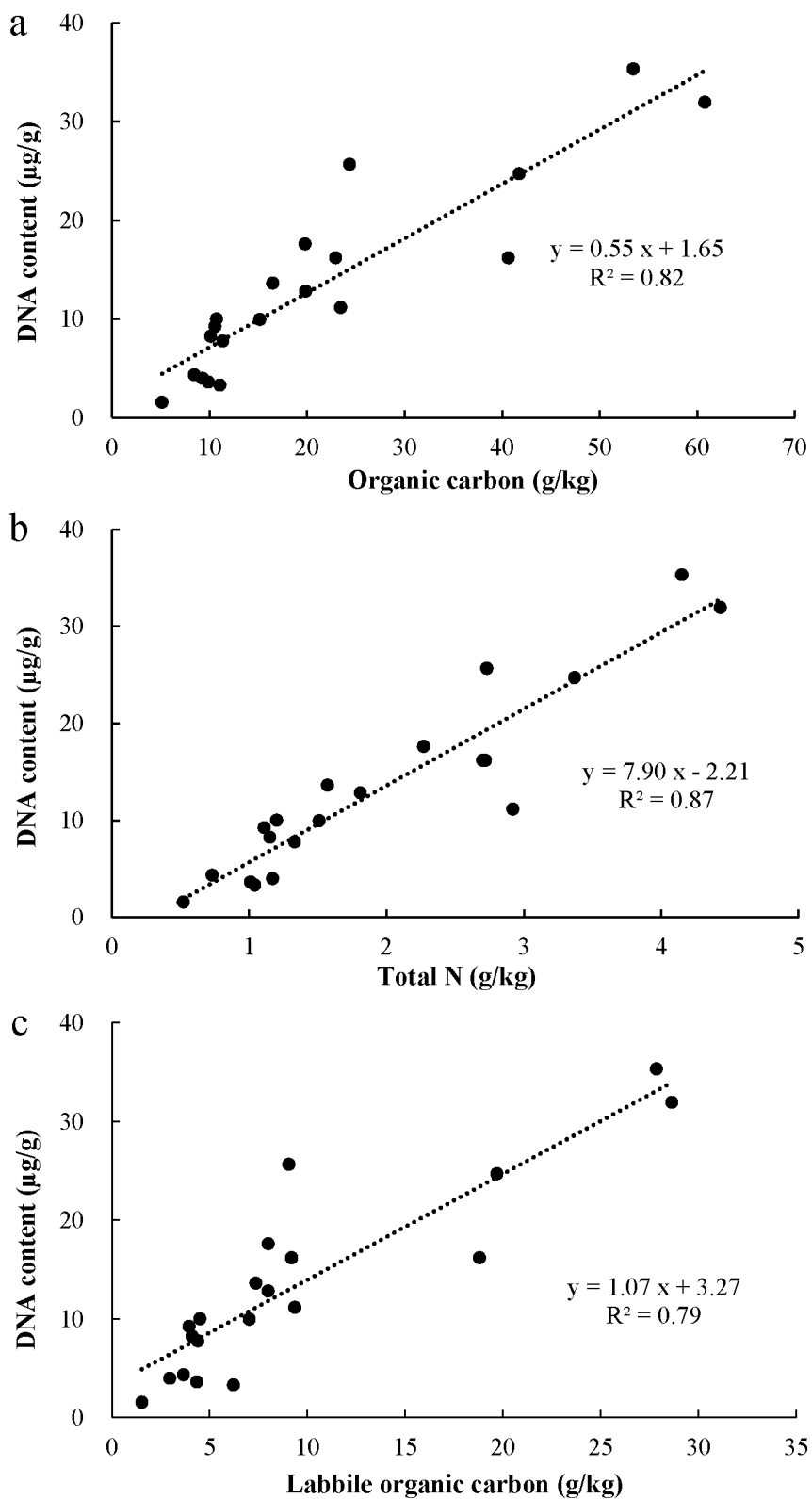



Fig. S2.

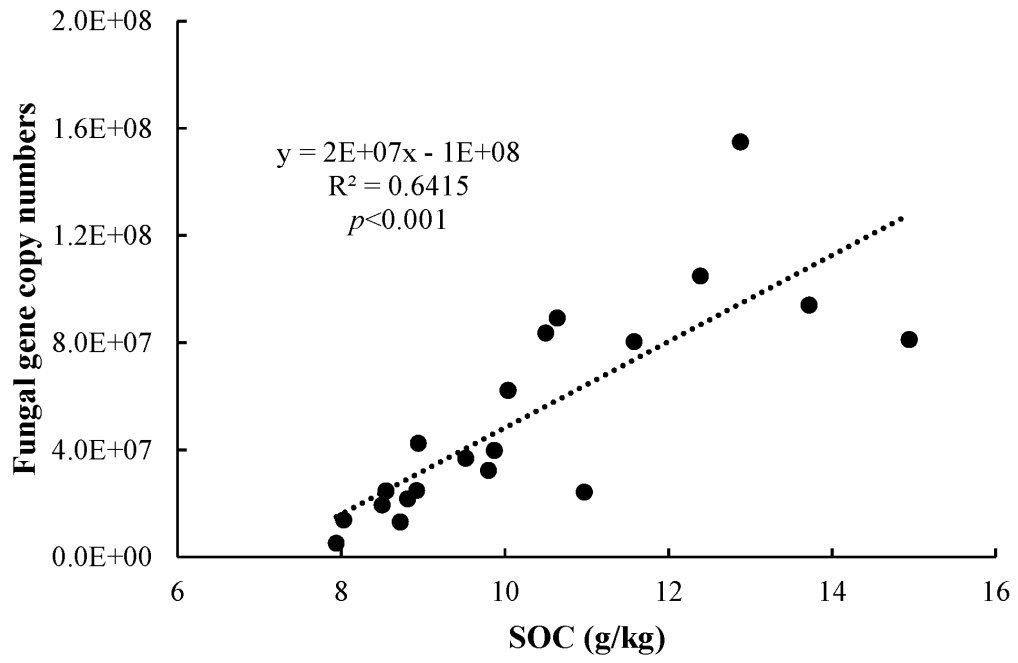



Fig. S3.

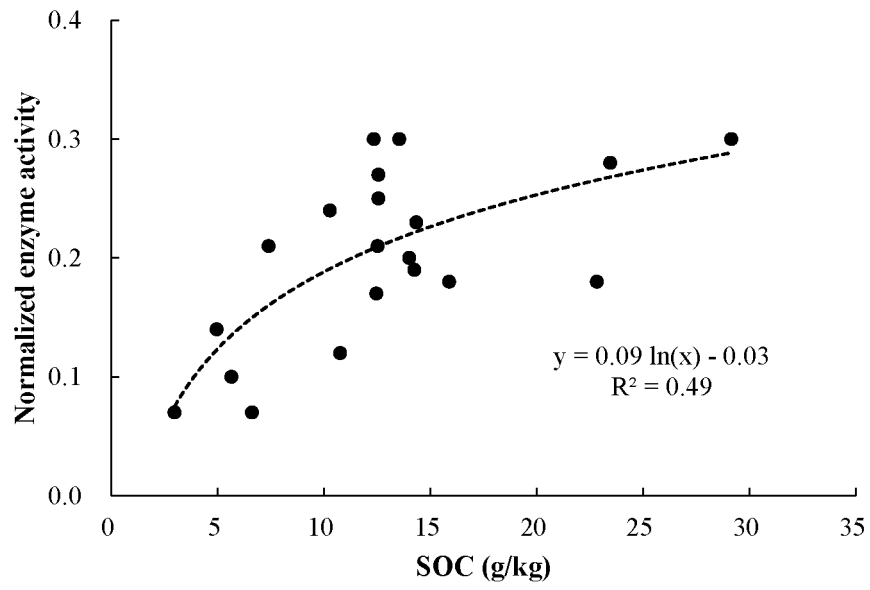
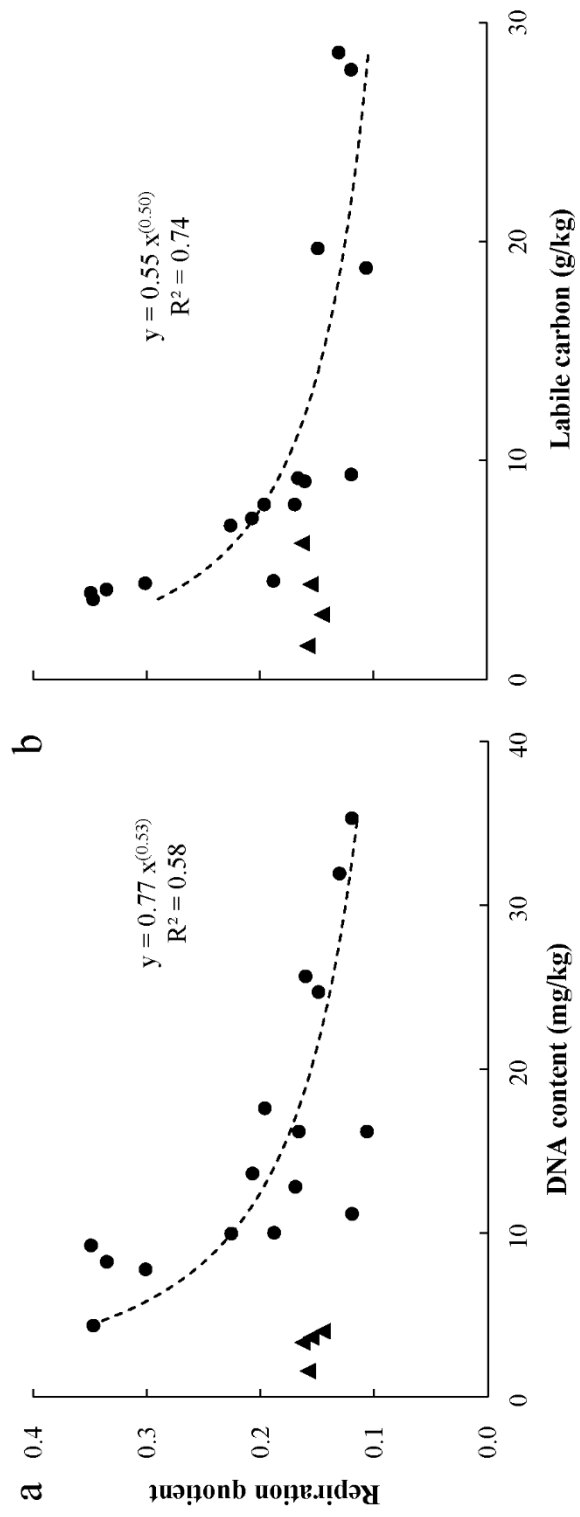



Fig. S4.

1 **Supplement Tables**

2 **Table S1**. Shannon diversity index of bacterial (BD), fungal (FD) and archaeal (ArD)

3 of soil size fraction of the studied chronosequence. Different capital and low case

4 letters in a single column indicate a significant (p<0.05) difference respectively

5 between fractions of a single soil, and between soils for a single fraction.

Size fraction	Soil	BD	FD	ArD
Coarse sand	P0	2.06±0.36 Abb	1.90±0.12 Ad	1.24±0.07Ab
	P50	2.12±0.19 ABb	2.84±0.29 Aa	1.47±0.04Aa
	P100	2.76±0.02 Aa	2.58±0.04 Aab	1.52±0.12Aa
	P300	2.55±0.28 Aab	2.57±0.14 Aab	1.48±0.06Aa
	P700	2.35±0.23 Ab	2.33±0.08 Abc	1.48±0.07Aa
Fine sand	P0	1.09±0.42 Cd	1.97±0.21 Aa	1.29±0.02Ac
	P50	2.27±0.60 ABabc	1.93±0.20 Ba	1.23±0.02Bc
	P100	2.74±0.23 Aa	1.99±0.14 Ba	1.62±0.04Aa
	P300	2.10±0.09 Bb	1.72±0.21Bac	1.41±0.03Ab
	P700	1.75±0.12 Bc	1.80±0.06 Ba	1.43±0.02Ab
Silt	P0	1.76±0.07 Bd	1.02±0.16 Bcd	1.21±0.03Ab
	P50	1.94±0.18 Bcd	2.05±0.20 Ba	1.40±0.03Aa
	P100	2.54±0.14 Aa	1.12±0.24 Ccd	1.50±0.05Aa
	P300	1.98±0.11 Bc	1.60±0.17 Bb	1.42±0.03Aa
	P700	2.25±0.12 Ab	1.29±0.29 Cabc	1.47±0.02Aa
Clay	P0	1.93±0.06 Ac	0.64±0.01 Cb	1.39±0.12Aa
	P50	2.44±0.10 Aab	1.31±0.48 Ca	1.44±0.06Aa
	P100	2.65±0.15 Aa	1.34±0.63 BCa	1.53±0.11Aa
	P300	2.33±0.11 Ab	1.54±0.25 Ba	1.58±0.12Aa
	P700	2.57±0.22 Aab	1.13±0.15 Cab	1.48±0.06Aa

Table S2 Activity of invertase, urease, acid phosphatase, β-glucosidase, β-cellobiosidase and peroxidase in particle size fractions of soils over

 the chronosequence

Size fraction	Soil	Invertase	Urease	Acid phosphatase	β-glucosidase	β-cellobiosidase	Peroxidase
Coarse sand	P0	66.01 ±1.97	0.34 ±0.19	0.0546 ±0.0020	12.16±2.70	2.28±1.46	1.22 ±0.43
	P50	141.47 ±1.48	0.90 ±0.18	0.1689 ±0.0030	262.12±12.90	48.78±5.45	1.47 ±0.28
	P100	97.83 ±1.68	0.68 ±0.20	0.0873 ±0.0014	151.19±18.81	41.88±5.36	2.90 ±0.52
	P300	113.29 ±2.57	0.58 ±0.01	0.0735 ±0.0007	170.24±25.41	30.49±5.87	3.81 ±0.74
	P700	127.55 ±2.96	1.06 ±0.05	0.1414 ±0.0130	370.78±28.84	113.52±9.93	5.12 ±0.98
Fine sand	P0	4.87 ±0.20	0.55 ±0.01	0.0238 ±0.0012	26.13±3.40	2.29±0.59	1.15 ±0.34
	P50	7.47 ±1.42	0.67 ±0.02	0.0268 ±0.0009	29.32±4.49	2.12±0.70	1.92 ±0.32
	P100	7.44 ±2.25	0.71 ±0.11	0.0492 ±0.0045	68.57±11.04	10.65±0.86	2.68 ± 0.44
	P300	15.61 ± 2.37	1.11 ±0.05	0.0522 ±0.0087	80.07±10.16	12.84±1.12	2.79 ± 0.51
	P700	18.78 ±0.96	1.73 ±0.02	0.0355 ±0.0001	103.15±7.49	10.47±0.56	2.77 ±0.40
Silt	P0	3.48 ±0.02	0.44 ±0.01	0.0140 ±0.0003	2.05±0.35	1.75±0.45	0.99 ±0.28
	P50	7.31 ±0.19	0.51 ±0.20	0.0300 ±0.0007	59.15±3.96	4.97±0.99	2.07 ±0.3
	P100	7.31 ±0.02	0.75 ±0.01	0.0300 ±0.0013	20.66±3.20	0.49±0.41	1.49 ±0.14
	P300	6.14 ±0.02	0.92 ±0.05	0.0522 ±0.0139	56.28±5.23	4.69±0.58	3.38 ±0.42
	P700	8.66 ±0.97	1.38 ±0.05	0.0326 ±0.0009	61.476±2.84	4.90±1.05	4.94 ±0.25
Clay	P0	23.46 ±0.64	0.98 ±0.06	0.0362 ±0.0040	6.06±0.49	0.19±0.06	1.46 ±0.34
	P50	14.13 ±2.67	1.31 ±0.04	0.0582 ±0.0004	31.14±3.29	1.84±0.37	2.50 ±0.30
	P100	13.01 ± 0.99	0.61 ±0.14	0.0730 ±0.0032	30.29±2.98	1.46±0.55	2.22 ±0.37
	P300	13.88 ±0.35	1.12 ±0.07	0.1023 ±0.0058	37.63±4.37	4.48±0.72	2.89 ±0.59
	P700	12.94 ±3.36	1.88 ±0.18	0.0653 ±0.0018	32.64±2.71	2.58±0.36	3.82 ±0.65

Table S3 SOC and total DNA content scaled CO2 production in particle size fractions

of the chronosequence rice soils

Soil	Coarse sand	Fine sand	Silt	Clay
CP/SOC (mgCO$_2$-C g^{-1}SOC)				
P0	0.16±0.02Aa	0.16±0.04Abc	0.16±0.02Ac	0.15±0.01Aa
P50	0.12±0.04Ba	0.35±0.04Aa	0.19±0.06Bc	0.20±0.06Ba
P100	0.15±0.03Ca	0.21±0.01Bb	0.34±0.01Aa	0.17±0.03BCa
P300	0.15±0.03Ca	0.23±0.01Bb	0.31±0.01Ab	0.12±0.02Ca
P700	0.13±0.01Ca	0.17±0.02Bc	0.35±0.02Aa	0.16±0.02BCa
CP/DNA (mgCO$_2$ μg^{-1}DNA)				
P0	2.00±0.21Aa	1.56±0.45Ab	1.92±0.43Aa	1.36±0.57Aa
P50	0.66±0.23Bb	2.48±0.33Aa	0.76±0.28Bb	0.81±0.25Bab
P100	0.93±0.25Bb	0.94±0.18Bbc	1.51±0.08Aa	0.86±0.17Bab
P300	0.98±0.19Bb	1.26±0.09Bb	1.61±0.12Aa	0.92±0.20Ba
P700	0.91±0.05Bb	0.96±0.11Bc	1.46±0.06Aa	0.56±0.07Bb

Table S4 Concentration of C4 (g kg^{-1}) in particles and proportion of C4 in particle

size fractions to total C4 (%) of the chronosequence paddy soils after incubation with

maize carbon amendment

Soil	Coarse sand	Fine sand	Silt	Clay
		Concentration of C4		
P0	7.37±0.45a	1.27±0.11b	1.00±0.06b	3.98±0.54ab
P50	3.49±0.34b	1.11±0.39b	1.26±0.15b	2.56±0.24c
P100	2.96±0.22c	1.55±0.20b	2.11±0.28a	3.07±0.22c
P300	2.53±0.41c	2.89±0.19a	2.05±0.13a	3.64±0.17b
P700	2.41±0.18c	2.56±0.29a	1.79±0.27a	4.69±0.38a
		Proportion of C4		
P0	10.59	48.85	16.42	24.13
P50	27.55	32.93	23.35	16.18
P100	21.85	34.80	30.08	13.28
P300	20.81	48.73	19.95	10.52
P700	23.56	44.55	18.98	12.91