

## Figure captions

**Fig. 1** CH<sub>4</sub> (A), H<sub>2</sub>S (B) and CS<sub>2</sub> fluxes from Meiliang Bay in Lake Taihu and a relationship between CH<sub>4</sub> and H<sub>2</sub>S fluxes.

**Fig. 2** CH<sub>4</sub> oxidation potential (A), organic matter content (B), the regression analysis of the organic <sup>13</sup>C content with the <sup>13</sup>CH<sub>4</sub> consumption (C), the conversion efficiency of CH<sub>4</sub>-derived carbon into total carbon (CE<sub>TC</sub>) (D) and into CO<sub>2</sub> (CE<sub>CO2</sub>) (E) in the groups with CH<sub>4</sub> (M) or CH<sub>4</sub> and CS<sub>2</sub> (MS). Dashed lines denote the gas exchange and CH<sub>4</sub> reinjection to the initial concentration during the incubation. The blue triangle represents the sediment sampling point. \*\* represents  $P < 0.01$ .

**Fig. 3** The contents of ECPS (A) and ECP (B) of sediments in the MS and M groups at different CH<sub>4</sub> consumptions. \* represents  $P < 0.05$ .

**Fig. 4** The contents of TS (A), AVS (B), SO<sub>4</sub><sup>2-</sup>-S (C) and percent of SO<sub>4</sub><sup>2-</sup>-S increment to CS<sub>2</sub>-S (D) of sediment in the MS and M groups at different CH<sub>4</sub> consumptions. Different lowercase letters mean significant difference at  $P < 0.05$ .

**Fig. 5** Gene abundances of 16S rRNA gene (A), *pmoA* (B), *mmoX* (C), and *mxnF* (D) in the sediments of the MS and M groups at different CH<sub>4</sub> consumptions. \* represents  $P < 0.05$ , \*\* represents  $P < 0.01$ .

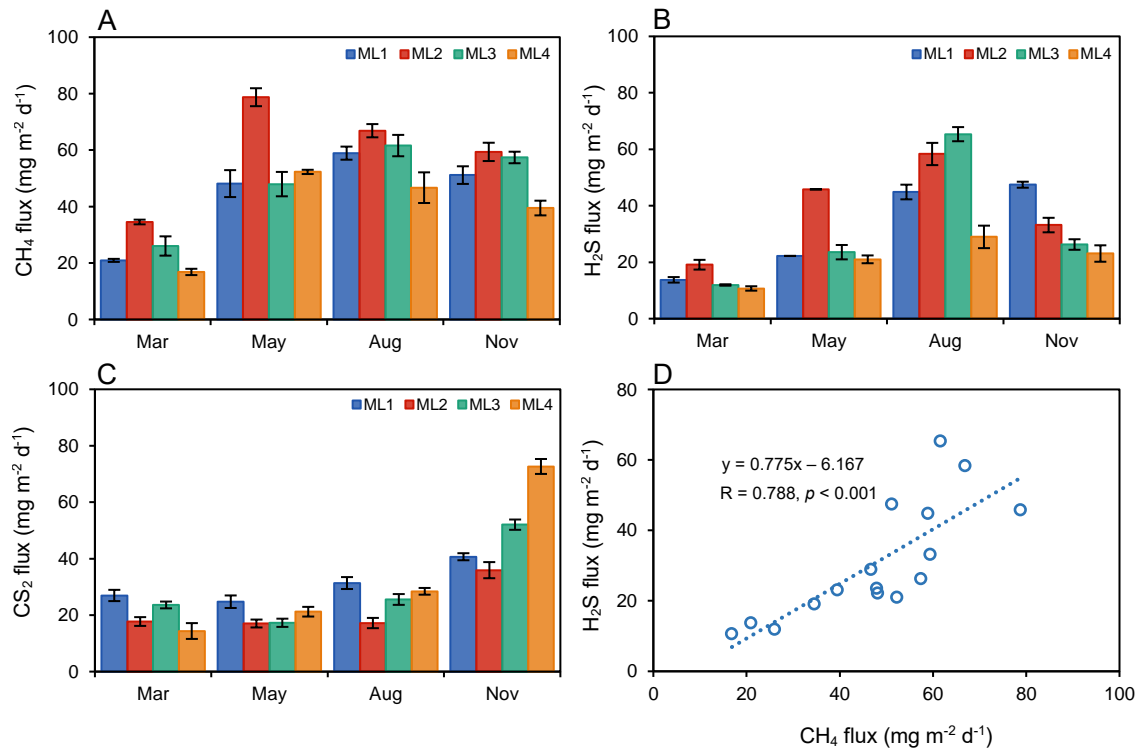
**Fig. 6** The Chao index based on operational taxonomic unit (OTU) level and the relative abundance of bacteria at the phylum level in total DNA (A and C) and <sup>13</sup>C-DNA (B and D) from the sediments in the MS and M groups at different CH<sub>4</sub> consumptions. \* represents  $P < 0.05$ , \*\* represents  $P < 0.01$ .

**Fig. 7** The redundancy analysis (RDA) of environmental factors and microbial community based on operational taxonomic unit (OTU) in total DNA and <sup>13</sup>C-DNA at 97% similarity level in the MS and M groups.

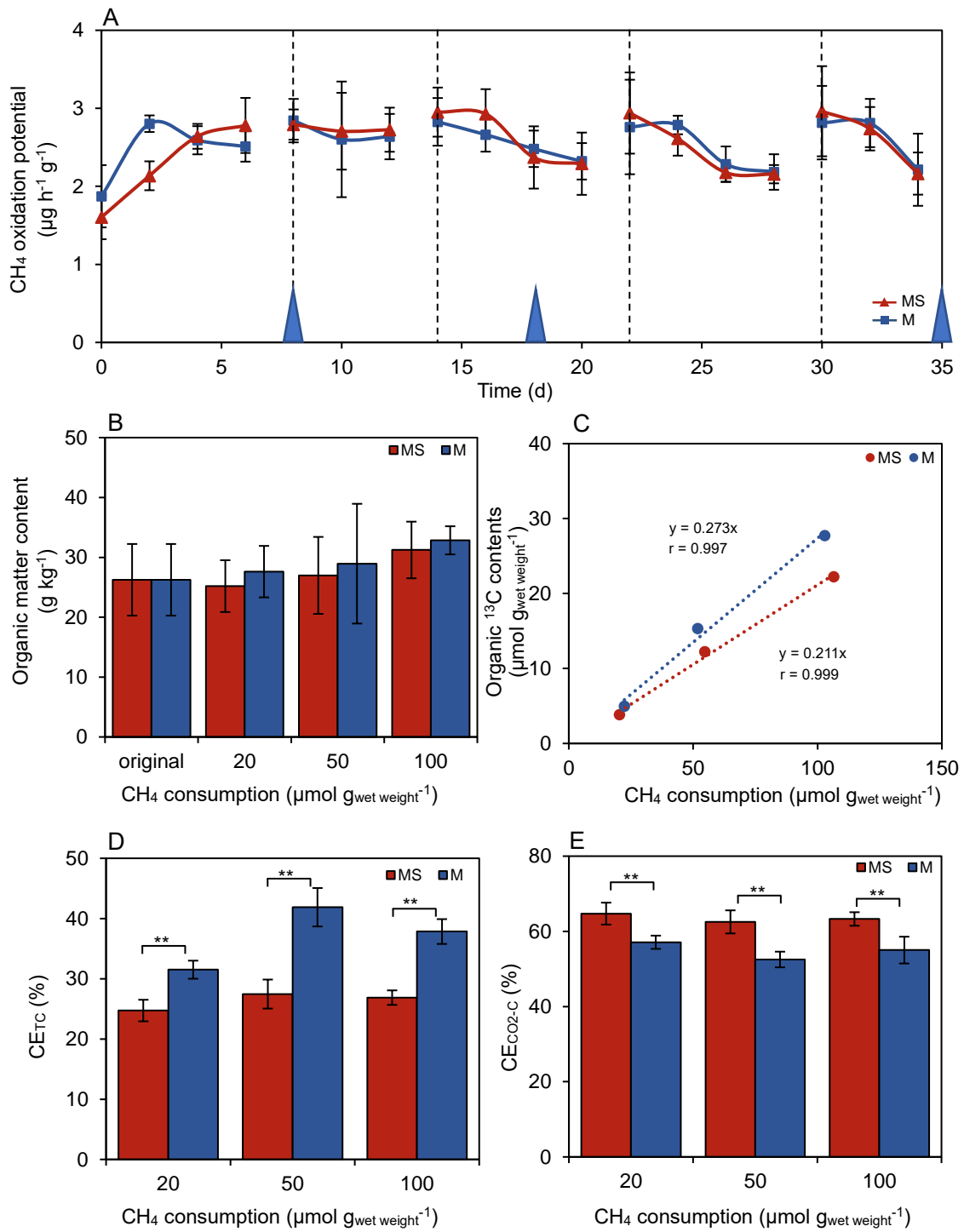
**Fig. 8** Relative abundance of methanotrophs (A), methylotrophs (B), sulfur oxidizers

(C) and sulfate-reducing bacteria (D) in total DNA and  $^{13}\text{C}$  DNA from the sediments in the MS and M groups at different  $\text{CH}_4$  consumptions. \* represents  $P < 0.05$ , \*\* represents  $P < 0.01$ ).

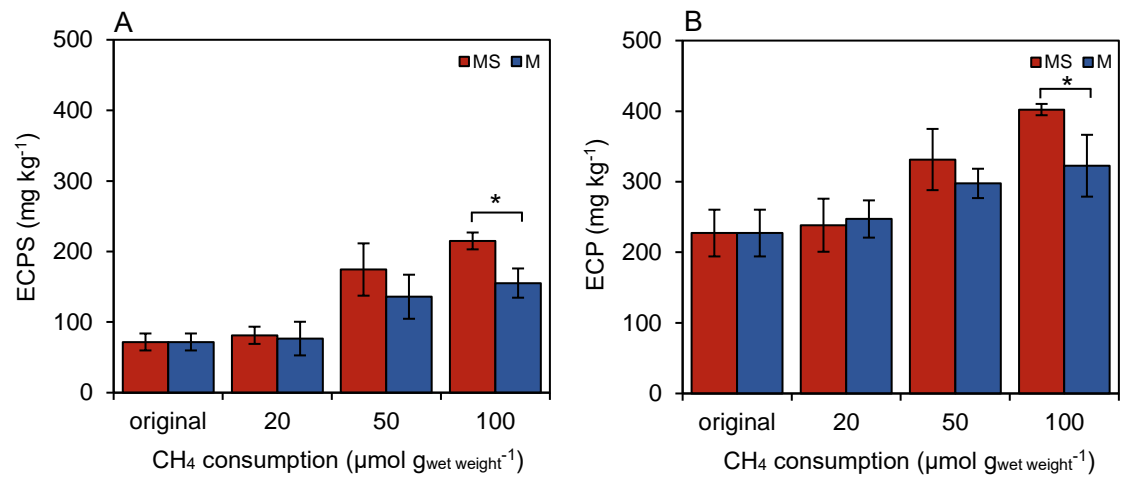
**Fig. 1**



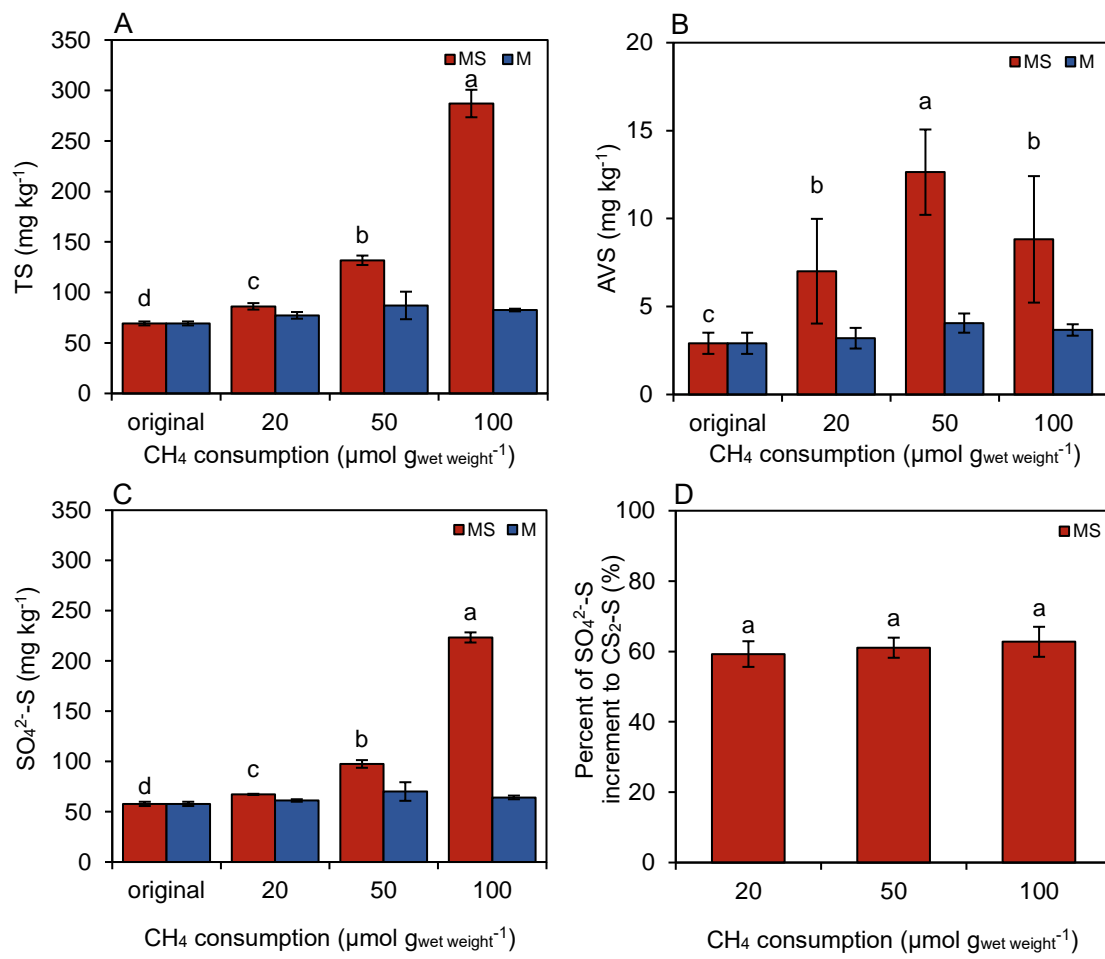
**Fig. 2**



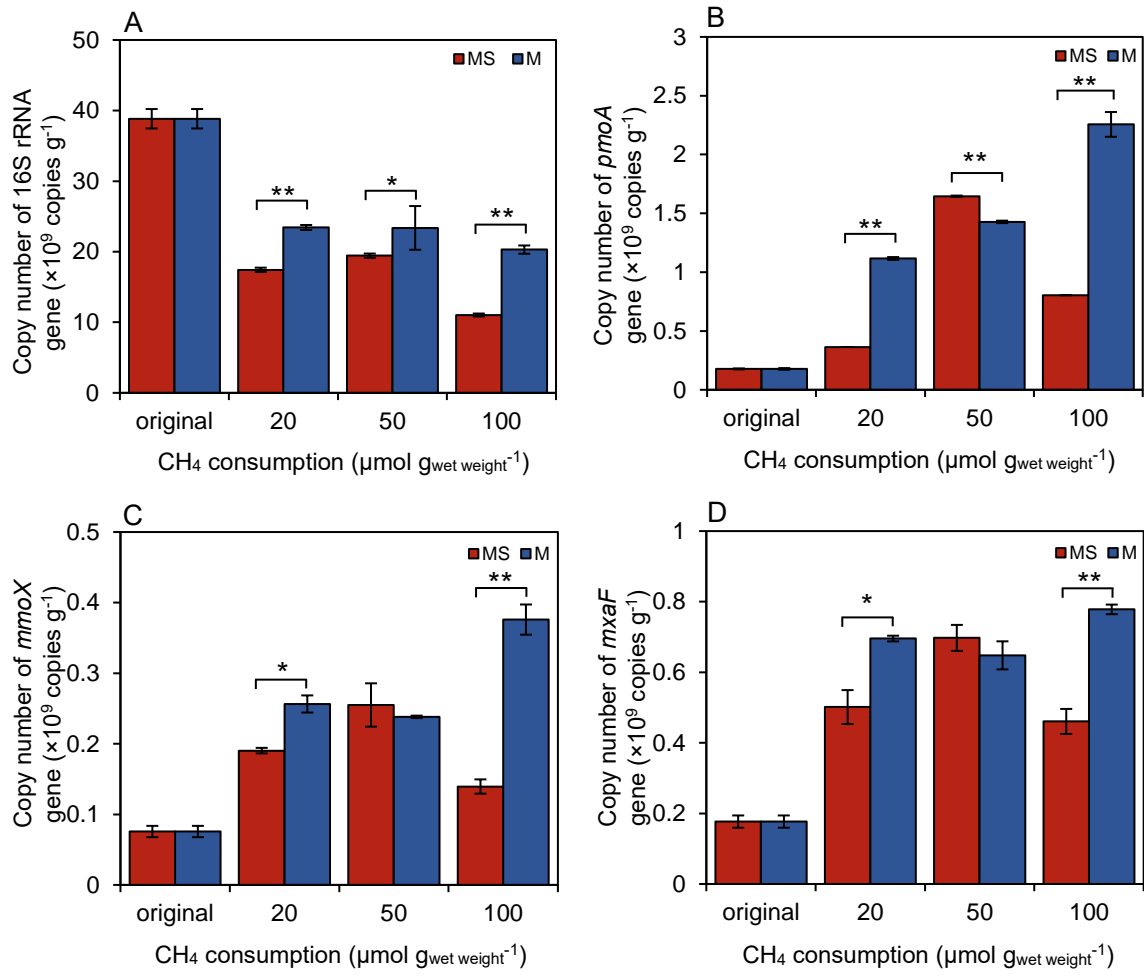
**Fig. 3**



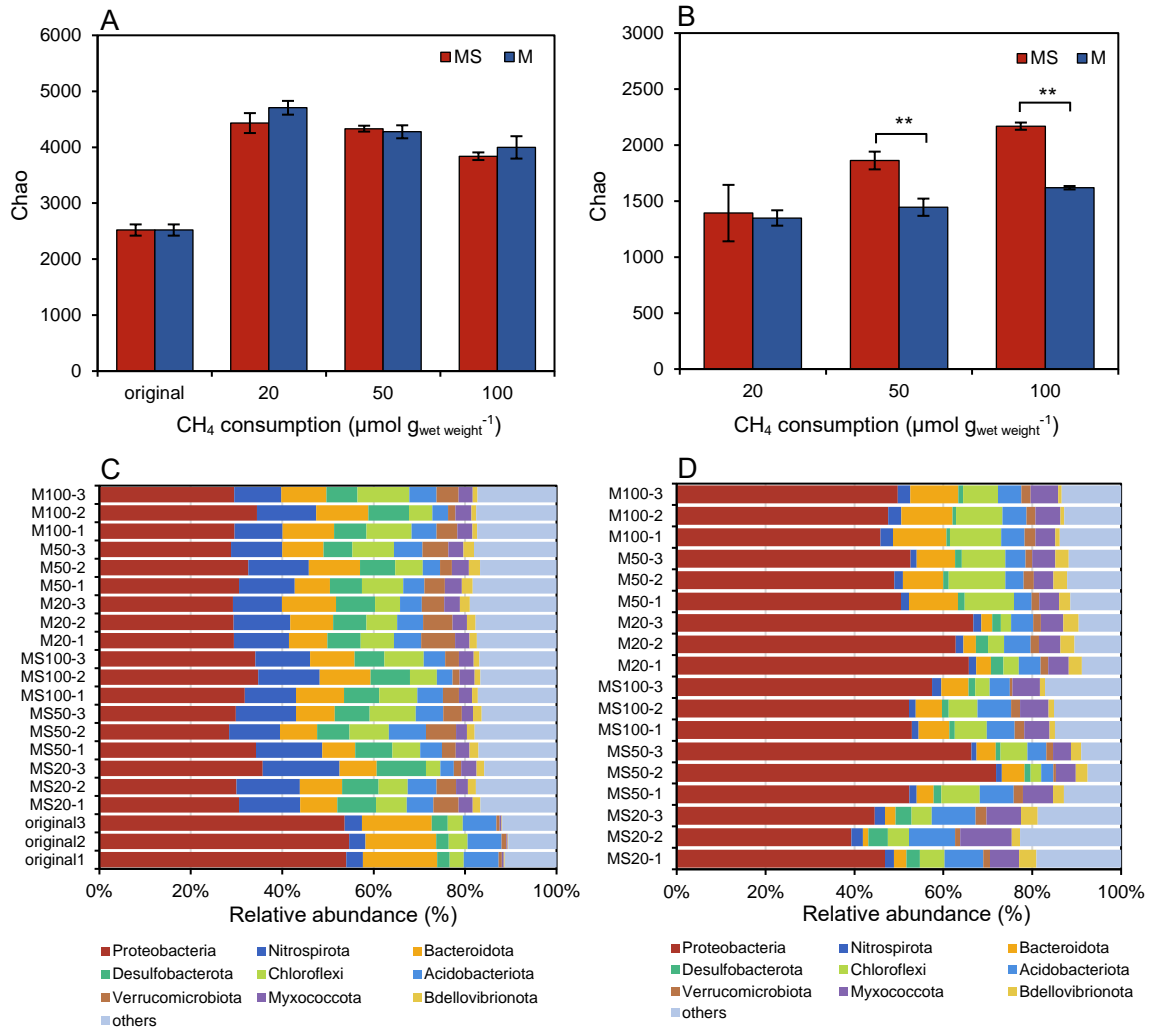
**Fig. 4**



**Fig. 5**

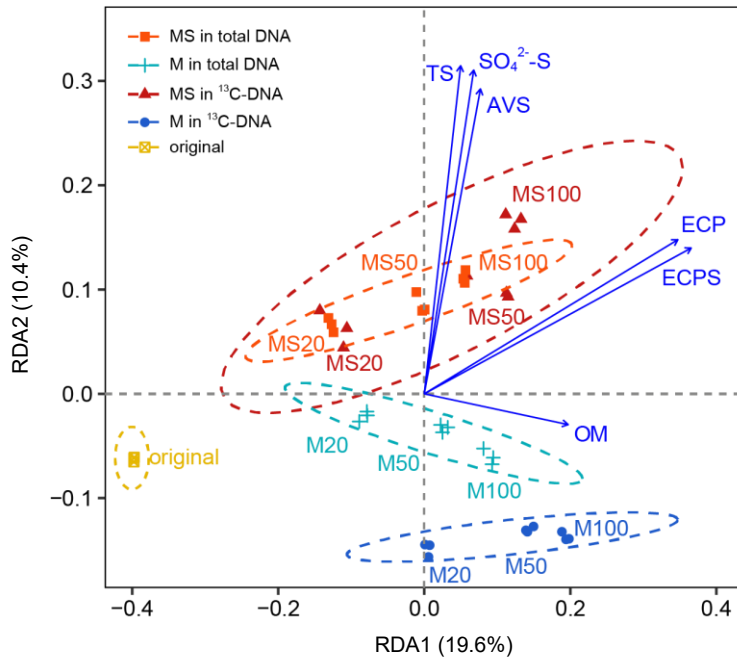


**Fig. 6**





**Fig. 7**



**Fig. 8**

