Supplemental Information for the manuscript entitled:

“Spatial variability of sediment methane production and methanogen communities within a eutrophic reservoir: importance of organic matter source and quantity”

**Figure S1.** Circle of correlation from partial least square (PLS) analysis. This illustrates the correlation of predictor variables (blue lines) with methane production rates (orange line). Variables are found in Table S2.

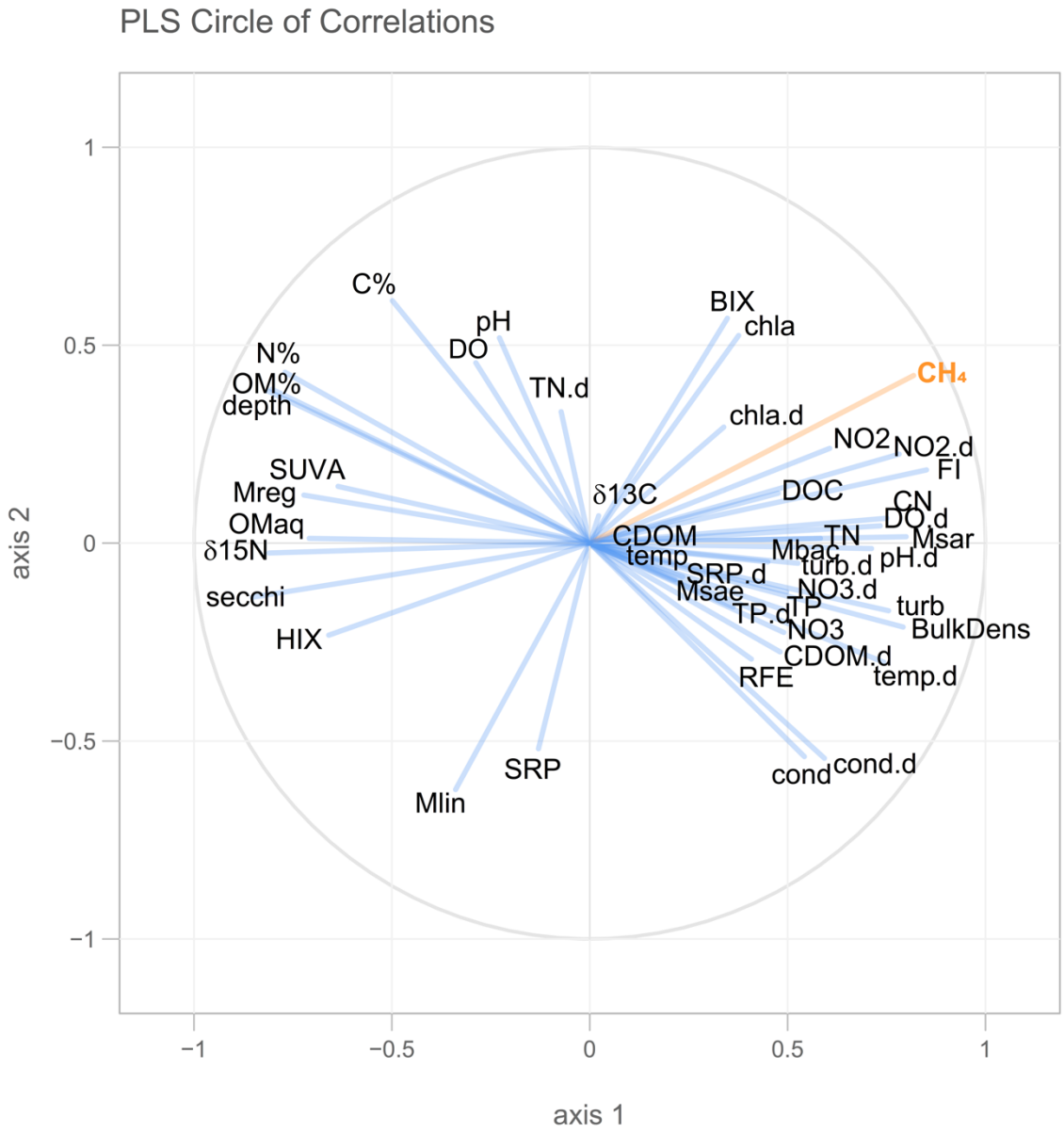

**Table S1.** Candidate predictor variables used in the mixed effects models.

| **Variable** | **Model*** |
|---|---|
| proportion autochthonous OM | source |
| $N:C_{org}$ | source |
| $\delta^{13}C_{org}$ | source |
| $\delta^{15}N$ | source |
| freshness index | source |
| BIX (biological index) | source |
| FI (fluorescence index) | source |
| RFE (relative fluorescence index) | source |
| sediment bulk density | quantity |
| % OM (dry weight) | quantity |
| OM per volume (g) | quantity |
| DOC (mg/L) | quantity |

*All listed variabes were included in the "source + quantity" model.

**Table S2.** Predictor variables included in PLS regression and the X-loads of the predictor variables.

| Variable | Description | p1 | p2 |
|---|---|---|---|
| OMaq | Proportion of aquatic-derived OM – from mixing model | -0.19139 | 0.006322 |
| BulkDens | Bulk density of sediment | 0.213799 | -0.11184 |
| DOC | Dissolved organic carbon of sediment porewater | 0.128599 | 0.066501 |
| SUVA | Specific UV absorbance at 254 nm ($SUVA_{254}$) of sediment porewater | -0.17171 | 0.075678 |
| FI | Fluorescence index of sediment porewater | 0.229746 | 0.097666 |
| BIX | Biological index of sediment porewater | 0.093926 | 0.29979 |
| RFE | Relative fluorescence efficiency of sediment porewater | 0.110267 | -0.15457 |
| HIX | Humification index of sediment porewater | -0.17808 | -0.12273 |
| $\delta$15N | $\delta^{15}$N of the bulk sediment | -0.21874 | -0.01315 |
| $\delta$13C | $\delta^{13}$C of the organic C in the bulk sediment | 0.006094 | 0.036496 |
| N% | % N in bulk sediment | -0.20791 | 0.227854 |
| C% | % organic C in bulk sediment | -0.13466 | 0.32326 |
| CN | C:N ratio | 0.202822 | 0.033288 |
| OM% | % OM (dry weight) of bulk sediment | -0.21953 | 0.202721 |
| chla | In vivo chlorophyll *a* - surface | 0.101579 | 0.276821 |
| depth | Water column depth | -0.21686 | 0.205219 |
| secchi | Secchi depth | -0.23028 | -0.07209 |
| temp | Water temperature - surface | 0.022542 | -0.01986 |
| DO | Water dissolved oxygen - surface | -0.07774 | 0.240422 |
| cond | Water conductivity - surface | 0.146415 | -0.2846 |
| pH | Water pH - surface | -0.06162 | 0.273667 |
| turb | Water turbidity - surface | 0.203871 | -0.09014 |
| CDOM | Chromophoric dissolved organic matter - surface | 0.013004 | -0.00042 |
| SRP | Reactive phosphorus - surface | -0.03498 | -0.27409 |
| NO3 | Total nitrate - surface | 0.132347 | -0.11904 |
| NO2 | Total nitrite - surface | 0.163739 | 0.126374 |
| TN | Total nitrogen - surface | 0.157377 | 0.006372 |
| TP | Total phosphorus - surface | 0.131994 | -0.08865 |
| temp.d | Water temperature - deep | 0.200731 | -0.15888 |
| DO.d | Water dissolved oxygen - deep | 0.198185 | 0.023058 |
| cond.d | Water conductivity - deep | 0.160107 | -0.28681 |
| pH.d | Water pH - deep | 0.192263 | -0.00723 |
| chla.d | In vivo chlorophyll *a* - deep | 0.091426 | 0.154689 |
| turb.d | Water turbidity - deep | 0.142062 | -0.02679 |
| CDOM.d | Chromophoric dissolved organic matter - deep | 0.129891 | -0.14501 |
| SRP.d | Reactive phosphorus - deep | 0.063418 | -0.04476 |
| NO3.d | Total nitrate - deep | 0.134363 | -0.06501 |

| | | | |
|---|---|---|---|
| NO2.d | Total nitrite - deep | 0.203368 | 0.126206 |
| TN.d | Total nitrogen - deep | -0.01953 | 0.175195 |
| TP.d | Total phosphorus - deep | 0.094895 | -0.08357 |
| Mreg | Relative abundance of methanogen genus *Methanoregula* | -0.19502 | 0.064047 |
| Msae | Relative abundance of methanogen genus *Methanosaeta* | 0.058128 | -0.0488 |
| Mbac | Relative abundance of methanogen genus *Methanobacterium* | 0.121463 | -0.0251 |
| Mlin | Relative abundance of methanogen genus *Methanolinea* | -0.09152 | -0.32851 |
| Msar | Relative abundance of methanogen genus *Methanosarcina* | 0.215856 | 0.008566 |

**Table S3.** Y-scores of the response variable (methane production rates) from PLS regression.

| | Sample ID | u1 | u2 |
|---|---|---|---|
| 1 | H001 | -6.66359 | -2.69026 |
| 2 | H002 | -6.76378 | -2.85746 |
| 3 | H003 | -4.8426 | -1.25821 |
| 4 | H004 | -2.38122 | 1.893072 |
| 5 | H005 | 1.224765 | 4.748481 |
| 6 | H006 | -2.18534 | 1.010416 |
| 7 | H007 | -2.01338 | 2.036547 |
| 8 | H008 | 2.918627 | 2.871186 |
| 9 | H009 | 4.351854 | 4.092862 |
| 10 | H010 | 0.415394 | -0.16231 |
| 11 | H011 | 3.632654 | -2.10957 |
| 12 | H014 | 4.191512 | -1.62031 |
| 13 | H017 | 4.765734 | -1.50742 |
| 14 | H020 | -2.72372 | -0.60188 |
| 15 | H021 | -2.63896 | -0.8051 |
| 16 | H022 | -2.40187 | -0.41753 |
| 17 | H023 | -4.23027 | -1.10138 |
| 18 | H024 | -0.31038 | 2.654451 |
| 19 | H025 | 0.852354 | 3.721584 |
| 20 | H026 | -7.38348 | -5.71533 |
| 21 | H027 | -6.03833 | -4.64908 |
| 22 | H028 | -6.014 | -4.05811 |
| 23 | H029 | -7.1835 | -5.72539 |
| 24 | H030 | -4.52245 | -3.78724 |
| 25 | H031 | -2.79683 | -1.84667 |
| 26 | H032 | -2.89181 | -3.0493 |
| 27 | H033 | -1.23625 | -1.50077 |
| 28 | H034 | 0.985233 | 0.758667 |
| 29 | H035 | 5.462682 | 0.622663 |
| 30 | H036 | 11.76109 | 2.495365 |
| 31 | H037 | 5.151851 | -1.07809 |
| 32 | H038 | -4.81557 | -0.4571 |
| 33 | H039 | -3.10852 | 0.002465 |
| 34 | H040 | -0.17053 | 3.716277 |
| 35 | H041 | 0.154251 | 2.490216 |
| 36 | H042 | -1.33214 | 0.086105 |
| 37 | H043 | -0.30425 | 1.318983 |
| 38 | H044 | 1.851198 | 3.389362 |

| | | | |
|---|---|---|---|
| 39 | H045 | -0.19907 | 1.018912 |
| 40 | H046 | 2.145883 | 2.62776 |
| 41 | H047 | 5.239329 | 1.067576 |
| 42 | H048 | 4.70376 | 0.482509 |
| 43 | H049 | 4.808936 | 0.719381 |
| 44 | H050 | 7.969674 | 1.977681 |
| 45 | H051 | 5.397364 | -0.5496 |
| 46 | H052 | 7.1677 | 1.745612 |

**Table S4.** Loadings (Y-loads) of the response variable (methane production rates) from PLS regression.

| c1 | c2 | c3 |
|---|---|---|
| 0.2209543 | 0.2234818 | 0.1034347 |