

Supplementary Table S1

Sample information from 51 lakes of study area

| Lake name     | ID    | Longitude(°E) | Latitude(°N) |
|---------------|-------|---------------|--------------|
| Anggu Co      | AGC   | 85.45         | 31.39        |
| Angrenijin Co | ARJC1 | 87.19         | 29.30        |
| Angrenijin Co | ARJC2 | 87.19         | 29.31        |
| Bangong Co    | BGC   | 79.83         | 33.53        |
| Bamu Co       | BMC1  | 90.56         | 31.18        |
| Bamu Co       | BMC2  | 90.59         | 31.19        |
| Dajiamang Co  | DJMC  | 85.73         | 29.66        |
| Dawa Co       | DWC1  | 84.92         | 31.25        |
| Dawa Co       | DWC2  | 84.93         | 31.23        |
| Kunzhong Co   | KZ    | 80.38         | 33.07        |
| Lang Co       | LC    | 87.41         | 29.21        |
| Qige Co       | QGC   | 85.51         | 31.20        |
| Qixiang Co    | QXC   | 89.14         | 32.38        |
| Mandong Co    | MD    | 79.83         | 33.51        |
| Xiada Co      | XDC1  | 79.70         | 33.39        |
| Xiada Co      | XDC2  | 79.36         | 33.39        |
| Cuihu         | CH    | 103.71        | 24.58        |
| Changqiaohu   | CQH   | 103.36        | 23.44        |
| Erhai         | EH    | 100.19        | 25.75        |
| Haixihai      | HXH   | 99.96         | 26.28        |
| Lashihai      | LSH   | 100.14        | 26.88        |
| Napaihai      | NPH   | 99.64         | 27.88        |
| Qinghuahu     | QHH   | 100.60        | 25.44        |
| Fuxianhu      | FX    | 102.88        | 24.55        |
| Shenjinhu     | SJH   | 103.30        | 23.59        |
| Tianchi       | TC    | 99.28         | 25.87        |
| Wenhai        | WBH   | 100.19        | 27.06        |
| Changdanghu   | CD    | 119.08        | 31.63        |
| Chaohu        | CH    | 117.66        | 31.62        |
| Cihu          | CIH   | 115.06        | 30.21        |
| Caizihu       | CZ    | 117.38        | 30.81        |
| Bohu          | BH    | 116.36        | 30.01        |
| Donghu        | DH    | 114.38        | 30.55        |
| Dayehu        | DY    | 115.14        | 30.09        |
| Gehu          | GH    | 119.11        | 31.53        |
| Honghu        | HH    | 113.35        | 29.83        |
| Junshanhu     | JS    | 116.32        | 28.55        |
| Kunchenghu    | KC    | 120.07        | 31.58        |
| Longganhu     | LG    | 116.21        | 29.95        |
| Liangzihu     | LZ    | 114.59        | 30.20        |

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|             |    |        |       |
|-------------|----|--------|-------|
| Nanyihu     | NY | 118.15 | 31.09 |
| Poganghu    | PG | 117.17 | 30.66 |
| Qingshanhu  | QS | 115.93 | 28.71 |
| Saichenghu  | SC | 115.8  | 29.96 |
| Shijuhu     | SJ | 118.06 | 31.43 |
| Taihu       | TH | 120.16 | 31.44 |
| Tangxunhu   | TX | 114.36 | 30.43 |
| Wuchanghu   | WC | 116.67 | 30.27 |
| Wahngghu    | WH | 115.32 | 29.86 |
| Yangchenghu | YC | 120.11 | 31.58 |
| Yaohu       | YH | 116.06 | 28.69 |

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Supplememntary Table S2  
Environmental factors of 51 lakes.

|       | Elevation<br>m | Temp<br>°C | Salinity<br>g/L | PH    | DO<br>mg/L | TN<br>mg/L | TP<br>mg/L | Chla<br>ug/L |
|-------|----------------|------------|-----------------|-------|------------|------------|------------|--------------|
| CH_Y  | 1889           | 18.37      | 0.09            | 9.34  | 8.19       | 0.21       | 0.01       | 6.72         |
| CQH   | 1283           | 28.67      | 0.22            | 9.41  | 8.13       | 2          | 0.02       | 8.61         |
| EH    | 1971           | 22.2       | 0.13            | 8.66  | 7.49       | 0.59       | 0.03       | 7.31         |
| HXH   | 2130           | 19.23      | 0.09            | 8.76  | 7.08       | 0.03       | 0.01       | 1            |
| LSH   | 2438           | 14.57      | 0.1             | 9.44  | 9.6        | 0.11       | 0.02       | 1.23         |
| NPH   | 3266           | 25.4       | 0.11            | 7.55  | 3.99       | 1.24       | 0.11       | 1.68         |
| QHH   | 1975           | 23.27      | 0.25            | 7.97  | 6.97       | 0.65       | 0.01       | 2.67         |
| FX    | 1721           | 22.4       | 0.13            | 8.94  | 7.53       | 0.44       | 0.02       | 4.33         |
| SJH   | 1273           | 26.07      | 0.18            | 7.26  | 7.3        | 0.47       | 0.04       | 18.83        |
| TC    | 2555           | 16.63      | 0.04            | 8.01  | 5.77       | 0.19       | 0.03       | 0.05         |
| WBH   | 3078           | 21.6       | 0.08            | 9.06  | 6.47       | 0.05       | 0.02       | 0.11         |
| CD    | 4              | 25.4       | 0.2             | 8.44  | 5.29       | 1.11       | 0.04       | 15.14        |
| CH    | 21             | 32.03      | 0.1             | 9.66  | 6.59       | 0.93       | 0.04       | 10.5         |
| CIH   | 16             | 31.55      | 0.14            | 9     | 4.94       | 0.74       | 0.09       | 48.05        |
| CZ    | 9              | 32.49      | 0.05            | 9.33  | 7.39       | 0.94       | 0.03       | 16.87        |
| BH    | 13             | 28.94      | 0.13            | 8.34  | 8.3        | 0.4        | 0.09       | 18.22        |
| DH    | 10             | 31.2       | 0.12            | 9.5   | 6.56       | 1.09       | 0.13       | 64.71        |
| DY    | 16             | 29.31      | 0.17            | 8.56  | 11.21      | 0.33       | 0.08       | 22.14        |
| GH    | 3              | 24.91      | 0.21            | 8.8   | 6.32       | 1.86       | 0.11       | 42.47        |
| HH    | 25             | 30.78      | 0.12            | 9.82  | 8.62       | 1.35       | 0.08       | 73.49        |
| JC    | 14             | 30.11      | 0.1             | 7.87  | 7.1        | 1.52       | 0.14       | 53.64        |
| KC    | 10             | 25.14      | 0.28            | 8.76  | 6.29       | 1.53       | 0.15       | 5.04         |
| LG    | 15             | 32.63      | 0.08            | 9.6   | 8.93       | 0.77       | 0.04       | 15.57        |
| LZ    | 20             | 31.06      | 0.06            | 10.01 | 7.99       | 0.67       | 0.04       | 30.38        |
| NY    | 16             | 24.98      | 8.37            | 0.06  | 5.28       | 2.34       | 0.02       | 2.54         |
| PG    | 12             | 33.97      | 0.08            | 9.63  | 7.96       | 1.9        | 0.22       | 111.97       |
| QS    | 16             | 31.04      | 0.06            | 10.11 | 10.43      | 2.3        | 0.19       | 113          |
| SC    | 19             | 31.51      | 0.09            | 9.34  | 7.26       | 0.75       | 0.03       | 21.43        |
| SJ    | 9              | 26.35      | 0.09            | 7.79  | 6.44       | 1.21       | 0.01       | 5.42         |
| TH    | 3              | 27.05      | 0.2             | 9.83  | 12.89      | 1.61       | 0.04       | 67.35        |
| TX    | 10             | 30.33      | 0.12            | 9.28  | 3.14       | 1.8        | 0.09       | 46.14        |
| WC    | 18             | 32.39      | 0.04            | 9.57  | 7.27       | 0.63       | 0.03       | 14.23        |
| WH    | 20             | 31.81      | 0.12            | 9.89  | 6.7        | 1.16       | 0.27       | 56.36        |
| YC    | 6              | 25.14      | 0.23            | 8.75  | 6.78       | 3.56       | 0.26       | 24.17        |
| YH    | 9              | 29.66      | 0.09            | 7.88  | 7.07       | 1.54       | 0.17       | 73.52        |
| AGC   | 4658           | 13.86      | 1.48            | 9.25  | 5.71       | 0.89       | 0.03       | 0.44         |
| ARJC1 | 4303           | 16.46      | 5.22            | 9.91  | 5.2        | 3.19       | 0.31       | 7.07         |
| ARGC2 | 4303           | 16.28      | 5.24            | 9.91  | 5.21       | 3.3        | 0.3        | 7.38         |
| BGC1  | 4252           | 15.86      | 0.56            | 9.61  | 6.38       | 0.3        | 0.01       | 0.5          |
| BMC1  | 4555           | 13         | 0.2             | 9.75  | 6.33       | 1.21       | 0.05       | 1.09         |

|      |      |       |       |       |      |      |      |      |
|------|------|-------|-------|-------|------|------|------|------|
| BMC2 | 4555 | 13.1  | 0.35  | 9.74  | 6.4  | 1.23 | 0.04 | 0.48 |
| DJMC | 5069 | 10.1  | 0.14  | 10.14 | 6.73 | 0.27 | 0.01 | 0.16 |
| DWC1 | 4628 | 13.9  | 18.18 | 9.46  | 5.65 | 0.88 | 0.02 | 1.05 |
| DWC2 | 4628 | 13.9  | 18.77 | 9.52  | 5.3  | 1.28 | 0.03 | 0.77 |
| KZC  | 4348 | 17.09 | 2.35  | 9.71  | 5.3  | 2.76 | 0.04 | 4.07 |
| LC   | 4296 | 15.2  | 0.01  | 9.6   | 6.16 | 0.94 | 0.03 | 0.67 |
| QGC  | 4667 | 11.29 | 1.25  | 9.66  | 7.78 | 0.81 | 0.1  | 0.38 |
| QXC1 | 4620 | 12.37 | 30.08 | 10.19 | 5.46 | 1.15 | 0.03 | 0.21 |
| MDC  | 4305 | 17.22 | 2.16  | 9.68  | 6.12 | 2.71 | 0.21 | 0.51 |
| XDC1 | 4368 | 16.54 | 2.22  | 9.88  | 6.24 | 2.88 | 0.22 | 0.46 |
| XDC2 | 4366 | 16.91 | 2.24  | 9.87  | 6.31 | 2.86 | 0.24 | 0.44 |

Supplementary Table S3

Calculation method for metabolic potential of carbon, nitrogen and sulfur

| Cycle    | Metabolic                                             | K                                      | formula                                             |
|----------|-------------------------------------------------------|----------------------------------------|-----------------------------------------------------|
| CARBON   | Aerobic C fixation(Calvin cycle)                      | K00855,K01602                          | $(K00855+K01602)/2$                                 |
| CARBON   | Aerobic CH <sub>4</sub> oxidation                     | K08684                                 | K08684                                              |
| CARBON   | Aerobic respiration                                   | K02256, K02262, K02274, K02276         | $(K02256+K02262)/2+(K02274+K02276)/2$               |
| CARBON   | Anaerobic C fixation                                  | K00174, K00175, K01648, K00197         | $(K00174+K00175+K00244+K01648)/4+(K00194+K00197)/2$ |
| CARBON   | CO oxidation                                          | K03518, K03519, K03520                 | $(K03518+K03519+K03520)/3$                          |
| CARBON   | Fermentation                                          | K00016                                 | K00016                                              |
| CARBON   | Methanogenesis                                        | K00400, K00401                         | $(K00400+K00401)/2$                                 |
| NITROGEN | Ammonification                                        | K03385, K05904                         | $(K03385+K05904)/2$                                 |
| NITROGEN | Anammox                                               | K10535                                 | K10535                                              |
| NITROGEN | Denitrification                                       | K00376, K02305, K04561                 | $(K00376+K02305+K04561)/3$                          |
| NITROGEN | Nitrate reduction+Nitrite oxidation                   | K00370, K00371                         | $(K00370+K00371)/2$                                 |
| NITROGEN | Nitrate reduction                                     | K02567, K02568                         | $(K02567+K02568)/2$                                 |
| NITROGEN | Nitrification                                         | K10944, K10945, K10946                 | $(K10944+K10945+K10946)/3$                          |
| NITROGEN | Nitrification assimilation                            | K00265, K00284, K00360, K00367, K01915 | $(K00265+K00284+K00360+K00367+K01915)/3$            |
| NITROGEN | Nitrogen fixation                                     | K00531, K02586, K02588, K02591         | $(K00531+K02586+K02588+K02591)/4$                   |
| NITROGEN | Nitrogen Mineralization                               | K00260, K00261, K00262                 | $K00260+K00261+K00262$                              |
| SULFUR   | Assimilatory sulfate reduction                        | K00860, K00956, K00957                 | $(K00860+K00956+K00957)/3$                          |
| SULFUR   | Dissimilatory sulfate reduction and sulfide oxidation | K00394, K00395, K11180                 | $(K00394+K00395+K11180)/3$                          |
| SULFUR   | Sulfur Mineralization                                 | K00456, K01011                         | $K00456+K01011$                                     |
| SULFUR   | Polysulfide reduction                                 | K08352                                 | K08352                                              |



|                          |              |        |        |        |        |        |              |        |        |
|--------------------------|--------------|--------|--------|--------|--------|--------|--------------|--------|--------|
| Sulfur                   | 82.731       | 101.85 | 73.596 | 68.542 | 128.10 | 82.124 | 184.58       | 142.13 | 210.22 |
| Mineralizati<br>on       | 7            | 23     | 44     | 8      | 17     | 14     | 4            | 92     | 58     |
| Polysulfide<br>reduction | 1.1829<br>12 | 0      | 0      | 0      | 0      | 0      | 1.1829<br>12 | 0      | 0      |

Supplementary Table S5

The indicator value and P value for every phylum

| phylum          | TL1          | TL2         | TL3          | P     |
|-----------------|--------------|-------------|--------------|-------|
| Actinobacteria  | 0.5012025170 | 0.123348598 | 0.3754488848 | 0.001 |
| Proteobacteria  | 0.3092797114 | 0.645223743 | 0.0436008565 | 0.001 |
| Bacteroidetes   | 0.4436728131 | 0.380965413 | 0.1753617735 | 0.02  |
| Cyanobacteria   | 0.1940123010 | 0.290488094 | 0.2285507546 | 0.80  |
| Verrucomicrobia | 0.8149803284 | 0.089571735 | 0.0006272095 | 0.001 |
| Planctomycetes  | 0.2299408784 | 0.009213759 | 0.6596283784 | 0.001 |
| Firmicutes      | 0.0009879451 | 0.348366307 | 0.2087125446 | 0.29  |
| others          | 0.0578412222 | 0.021309048 | 0.8893927238 | 0.001 |

Supplementary Table S6

Statistics of bin information

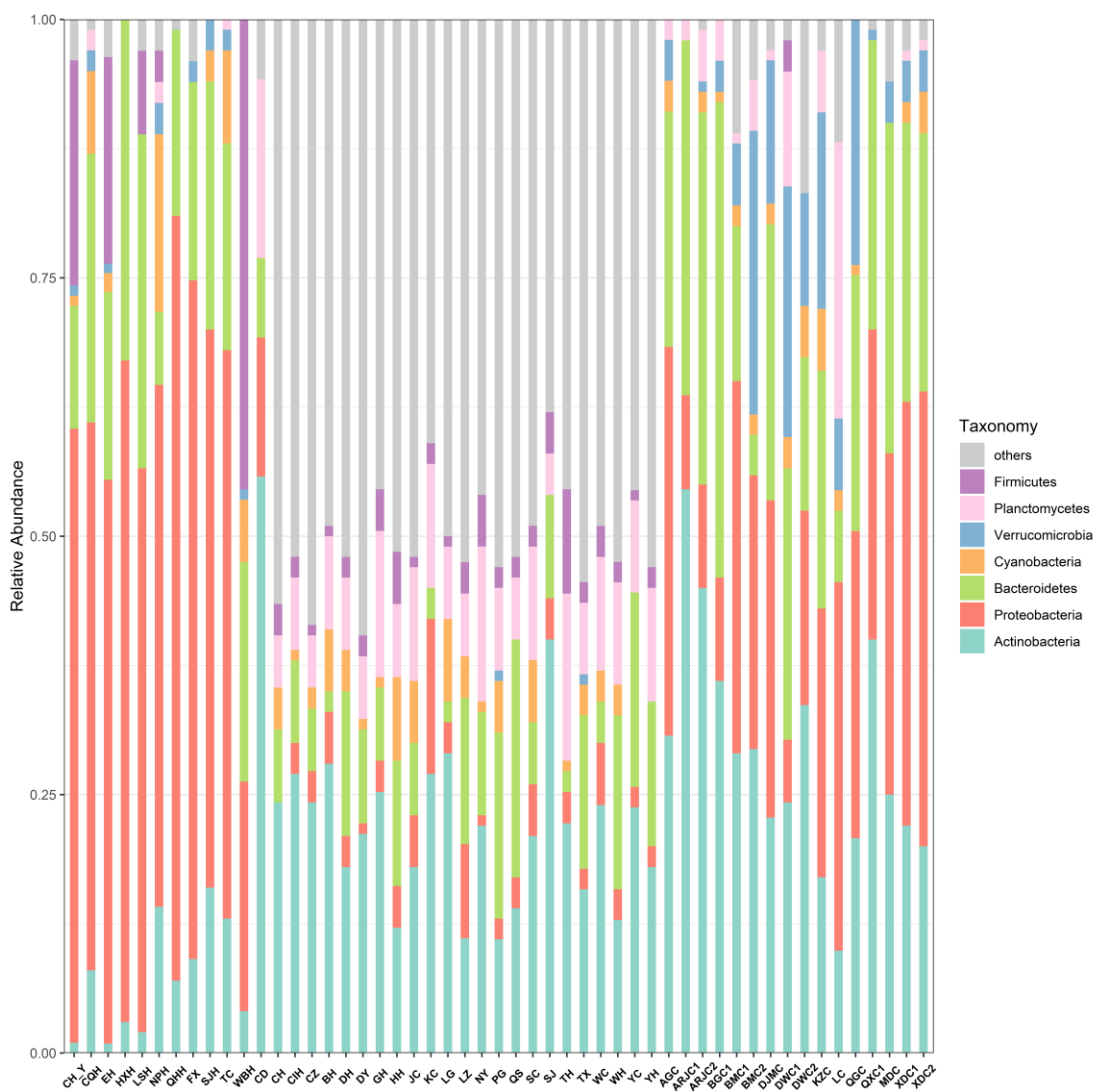
| Bin  | Genome_size | GC_content | Class               | Bin   | Genome_size | GC_content | Class               |
|------|-------------|------------|---------------------|-------|-------------|------------|---------------------|
| M_56 | 3732159     | 0.68       | Actinobacteria      | E_102 | 3812410     | 0.54       | NA                  |
| M_67 | 2357821     | 0.59       | Acidimicrobiia      | E_104 | 4713103     | 0.62       | Verrucomicrobiae    |
| M_52 | 4492154     | 0.65       | NA                  | E_107 | 2826326     | 0.57       | Spartobacteria      |
| M_33 | 6909154     | 0.56       | Planctomycetia      | E_114 | 5789015     | 0.66       | NA                  |
| M_80 | 4224529     | 0.61       | Verrucomicrobiae    | E_12  | 2836140     | 0.50       | NA                  |
| M_29 | 2448579     | 0.66       | NA                  | E_125 | 1748696     | 0.48       | Alphaproteobacteria |
| M_68 | 5006173     | 0.69       | Acidimicrobiia      | E_157 | 1282348     | 0.37       | Alphaproteobacteria |
| M_73 | 3328696     | 0.65       | Alphaproteobacteria | E_162 | 5429445     | 0.62       | NA                  |
| M_50 | 1558124     | 0.61       | Actinobacteria      | E_186 | 1694770     | 0.39       | Betaproteobacteria  |
| M_8  | 1638306     | 0.57       | Nitriliruptoria     | E_201 | 1758329     | 0.46       | Alphaproteobacteria |
| M_62 | 2713783     | 0.62       | Spartobacteria      | E_205 | 2407339     | 0.61       | Alphaproteobacteria |
| M_47 | 1958412     | 0.62       | Cyanophyceae        | E_235 | 1759201     | 0.64       | Phycisphaerae       |
| M_7  | 2244668     | 0.60       | Acidimicrobiia      | E_240 | 3493415     | 0.64       | Alphaproteobacteria |
| M_20 | 1966406     | 0.57       | Actinobacteria      | E_259 | 1256402     | 0.41       | Alphaproteobacteria |
| M_66 | 3002341     | 0.61       | Verrucomicrobiae    | E_27  | 3668365     | 0.62       | Caldilineae         |
| M_71 | 2505526     | 0.65       | Acidimicrobiia      | E_3   | 4505585     | 0.57       | NA                  |
| M_46 | 5467541     | 0.60       | Planctomycetia      | E_300 | 2891007     | 0.35       | NA                  |
| M_43 | 1943577     | 0.60       | Acidimicrobiia      | E_302 | 2200508     | 0.64       | Actinobacteria      |
| M_42 | 1675351     | 0.52       | Acidimicrobiia      | E_304 | 2875557     | 0.55       | Betaproteobacteria  |

|       |             |      |                         |           |         |      |                     |
|-------|-------------|------|-------------------------|-----------|---------|------|---------------------|
| M_31  | 14584<br>46 | 0.71 | Nitriliruptoria         | E_31<br>1 | 3738161 | 0.43 | NA                  |
| M_83  | 17611<br>33 | 0.52 | Actinobacteria          | E_32<br>3 | 6241803 | 0.38 | NA                  |
| M_55  | 12916<br>28 | 0.58 | Actinobacteria          | E_33      | 6331695 | 0.54 | Verrucomicrobiae    |
| K_55  | 40136<br>34 | 0.72 | Alphaproteobact<br>eria | E_33<br>4 | 3706230 | 0.67 | Chloroflexia        |
| K_54  | 29912<br>36 | 0.64 | Alphaproteobact<br>eria | E_35<br>1 | 3173093 | 0.61 | Betaproteobacteria  |
| K_60  | 54947<br>50 | 0.60 | Planctomycetaci<br>a    | E_35<br>4 | 4777784 | 0.53 | Planctomycetacia    |
| K_106 | 35925<br>84 | 0.68 | Betaproteobacte<br>ria  | E_35<br>7 | 2168252 | 0.41 | Gammaproteobacteria |
| K_110 | 26749<br>15 | 0.62 | Spartobacteria          | E_49      | 5030652 | 0.52 | Planctomycetacia    |
| K_104 | 24904<br>84 | 0.65 | Alphaproteobact<br>eria | E_56      | 2007811 | 0.69 | NA                  |
| K_74  | 31463<br>83 | 0.62 | Alphaproteobact<br>eria | E_70      | 3936815 | 0.40 | NA                  |
| K_36  | 27065<br>55 | 0.67 | NA                      | E_8       | 1136161 | 0.37 | Alphaproteobacteria |
| K_44  | 27326<br>51 | 0.59 | NA                      | F_11<br>1 | 3023759 | 0.72 | Actinobacteria      |
| K_25  | 32302<br>15 | 0.64 | Alphaproteobact<br>eria | F_11<br>2 | 2770472 | 0.39 | Bacteroidia         |
| K_67  | 68602<br>20 | 0.56 | Planctomycetaci<br>a    | F_11<br>7 | 6709632 | 0.63 | Planctomycetia      |
| K_77  | 22373<br>77 | 0.66 | NA                      | F_13<br>1 | 5225011 | 0.59 | Verrucomicrobiae    |
| K_98  | 30381<br>90 | 0.66 | Phycisphaerae           | F_13<br>4 | 3918261 | 0.43 | NA                  |
| K_14  | 58191<br>65 | 0.53 | Planctomycetaci<br>a    | F_14<br>9 | 3464912 | 0.69 | NA                  |
| K_96  | 17732<br>22 | 0.70 | NA                      | F_15      | 2258017 | 0.54 | NA                  |
| K_93  | 38562<br>93 | 0.67 | Actinobacteria          | F_16      | 3786011 | 0.70 | Planctomycetacia    |
| K_61  | 47228<br>31 | 0.63 | Alphaproteobact<br>eria | F_16<br>1 | 2119966 | 0.63 | NA                  |
| K_45  | 46972<br>94 | 0.72 | NA                      | F_16<br>2 | 3051887 | 0.67 | Alphaproteobacteria |
| K_80  | 44252<br>58 | 0.67 | Alphaproteobact<br>eria | F_16<br>7 | 3174900 | 0.36 | NA                  |

|       |         |      |                     |       |         |      |                     |
|-------|---------|------|---------------------|-------|---------|------|---------------------|
| K_85  | 2971236 | 0.55 | Betaproteobacteria  | F_173 | 1188866 | 0.31 | Alphaproteobacteria |
| K_62  | 2511887 | 0.67 | NA                  | F_178 | 1905290 | 0.69 | NA                  |
| K_33  | 1934947 | 0.54 | Actinobacteria      | F_189 | 2181182 | 0.55 | Alphaproteobacteria |
| K_48  | 2323457 | 0.65 | Actinobacteria      | F_195 | 4354162 | 0.70 | Planctomycetacia    |
| K_87  | 1301654 | 0.60 | Actinobacteria      | F_20  | 3782531 | 0.48 | Gammaproteobacteria |
| K_105 | 3506208 | 0.51 | NA                  | F_202 | 2685781 | 0.49 | NA                  |
| K_24  | 2300144 | 0.60 | Actinobacteria      | F_212 | 2464233 | 0.62 | Betaproteobacteria  |
| K_91  | 2648913 | 0.62 | Actinobacteria      | F_218 | 2106098 | 0.69 | NA                  |
| K_28  | 1899302 | 0.62 | Cyanophyceae        | F_219 | 3165257 | 0.69 | Planctomycetacia    |
| B_11  | 2187585 | 0.48 | Alphaproteobacteria | F_82  | 4542943 | 0.42 | NA                  |
| B_115 | 3667365 | 0.51 | NA                  | F_226 | 4283393 | 0.62 | Caldilineae         |
| B_14  | 2106241 | 0.47 | Bacteroidetes       | F_31  | 3032856 | 0.48 | NA                  |
| B_147 | 2930500 | 0.61 | Betaproteobacteria  | F_49  | 1738765 | 0.57 | Betaproteobacteria  |
| B_157 | 4514718 | 0.54 | Synechococcales     | F_53  | 5654990 | 0.54 | Planctomycetacia    |
| B_168 | 1625898 | 0.59 | Betaproteobacteria  | F_61  | 2458462 | 0.59 | Spartobacteria      |
| B_176 | 1625500 | 0.54 | Betaproteobacteria  | F_77  | 2524655 | 0.57 | NA                  |
| B_193 | 3668797 | 0.67 | Chloroflexi         | F_84  | 1360730 | 0.70 | Deinococci          |
| B_194 | 1620038 | 0.60 | Actinobacteria      | F_85  | 2527225 | 0.39 | Chitinophagia       |
| B_21  | 954594  | 0.30 | Alphaproteobacteria | F_88  | 2829991 | 0.71 | Alphaproteobacteria |
| B_55  | 1715527 | 0.67 | NA                  | F_97  | 5264107 | 0.52 | Planctomycetacia    |
| B_63  | 3779741 | 0.63 | NA                  | D_1   | 2480755 | 0.68 | Actinobacteria      |
| B_9   | 3190419 | 0.72 | Actinobacteria      | D_105 | 3585282 | 0.72 | Actinobacteria      |

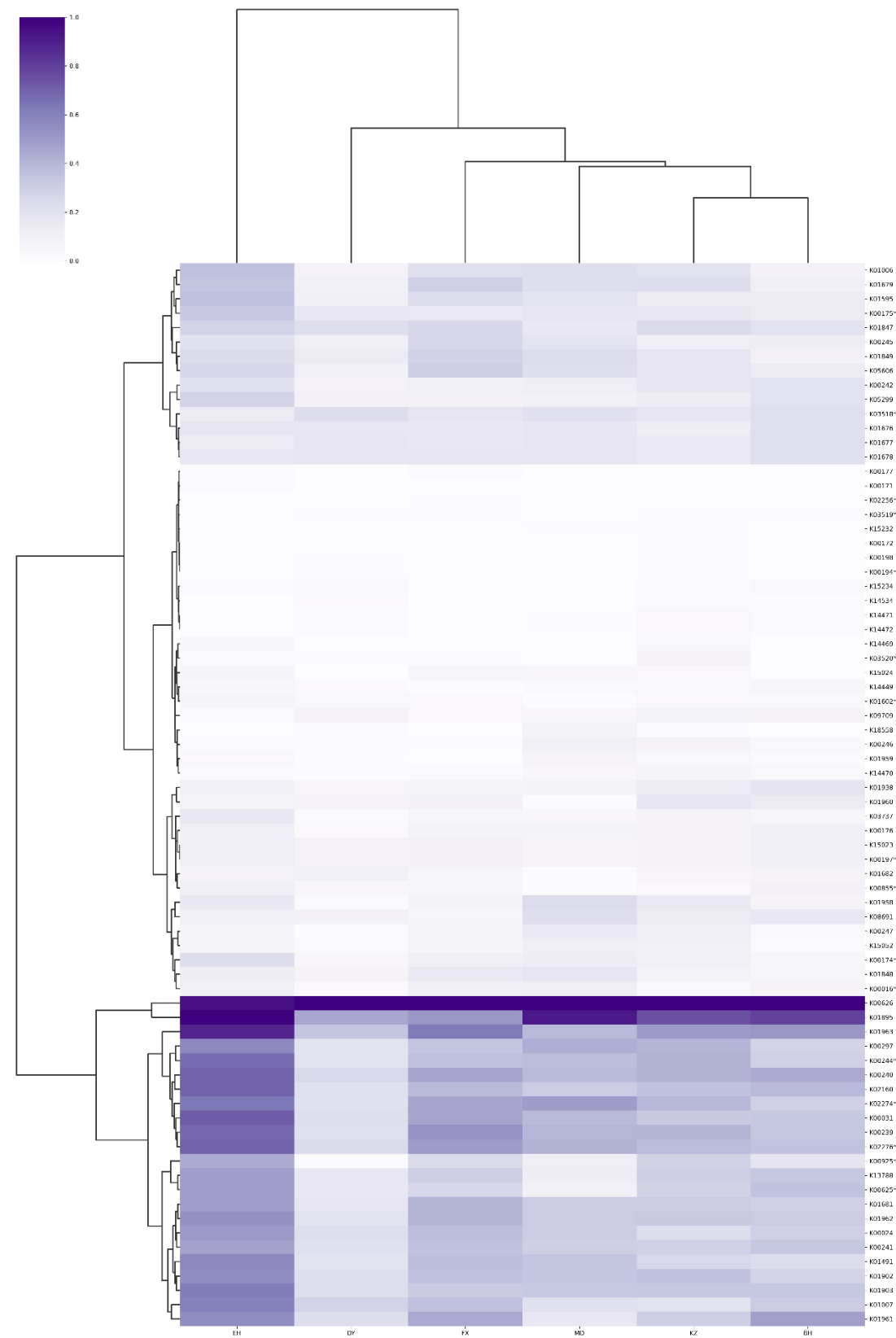
|      |         |      |                    |       |         |      |                    |
|------|---------|------|--------------------|-------|---------|------|--------------------|
| B_90 | 2670580 | 0.48 | Betaproteobacteria | D_114 | 2429707 | 0.50 | Betaproteobacteria |
| B_99 | 3213910 | 0.60 | Betaproteobacteria | D_119 | 4533735 | 0.66 | NA                 |
| D_22 | 2072540 | 0.38 | Sphingobacteriia   | D_120 | 2780829 | 0.45 | NA                 |
| D_32 | 2518462 | 0.66 | Actinobacteria     | D_125 | 2538593 | 0.55 | Betaproteobacteria |
| D_35 | 3596791 | 0.67 | NA                 | D_126 | 2660111 | 0.65 | Betaproteobacteria |
| D_38 | 2171675 | 0.46 | Bacteroidetes      | D_138 | 2898332 | 0.57 | Betaproteobacteria |
| D_66 | 2385347 | 0.68 | Opitutae           | D_139 | 3035479 | 0.65 | Betaproteobacteria |
| D_68 | 2401721 | 0.54 | Betaproteobacteria | D_146 | 2150111 | 0.44 | Flavobacteriia     |
| D_78 | 3521551 | 0.62 | Betaproteobacteria | D_154 | 1914403 | 0.54 | Actinobacteria     |
| D_92 | 1966380 | 0.72 | Actinobacteria     | D_18  | 2239086 | 0.40 | NA                 |

Supplementary Figure S1



S1 | Bar chart of microbial abundance groups for 51 lakes

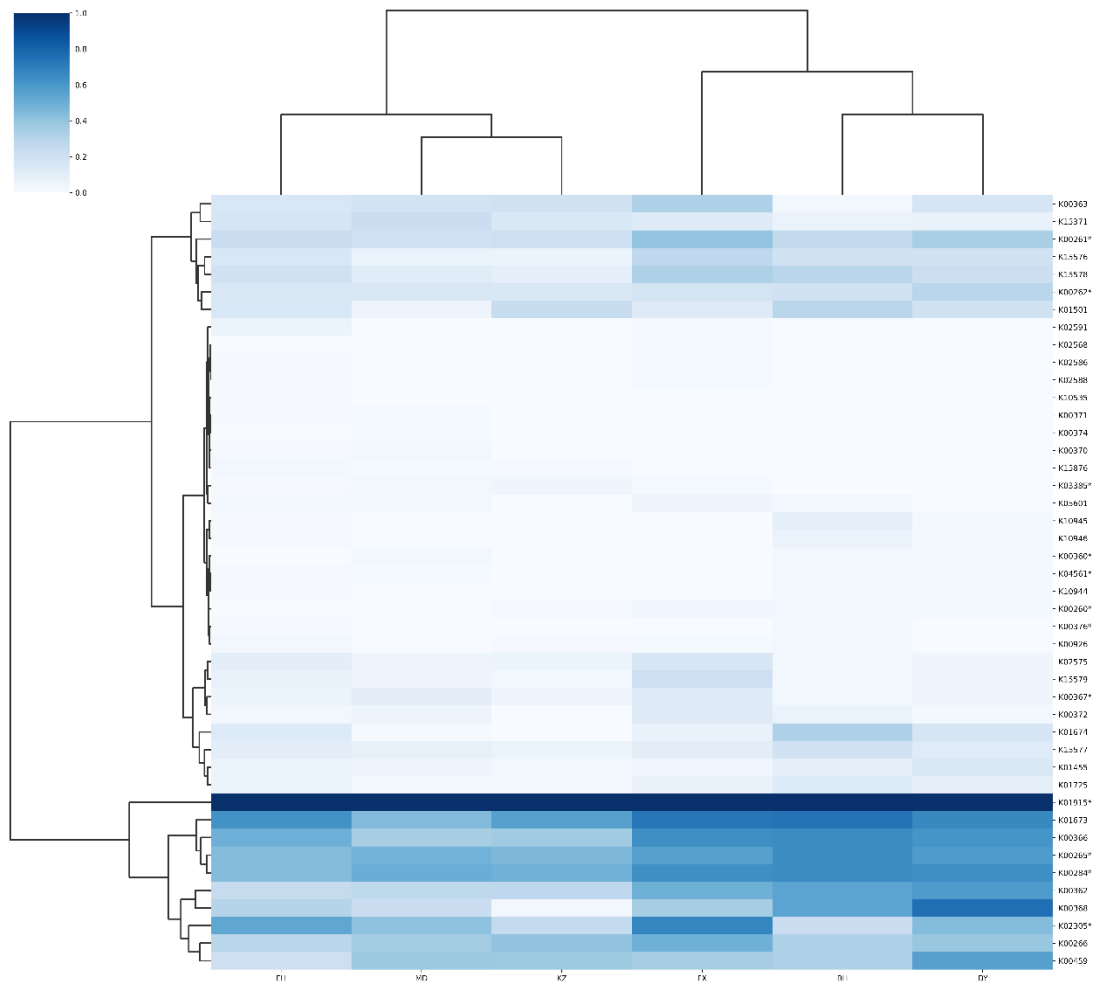
Supplement Figure S2  
Carbon

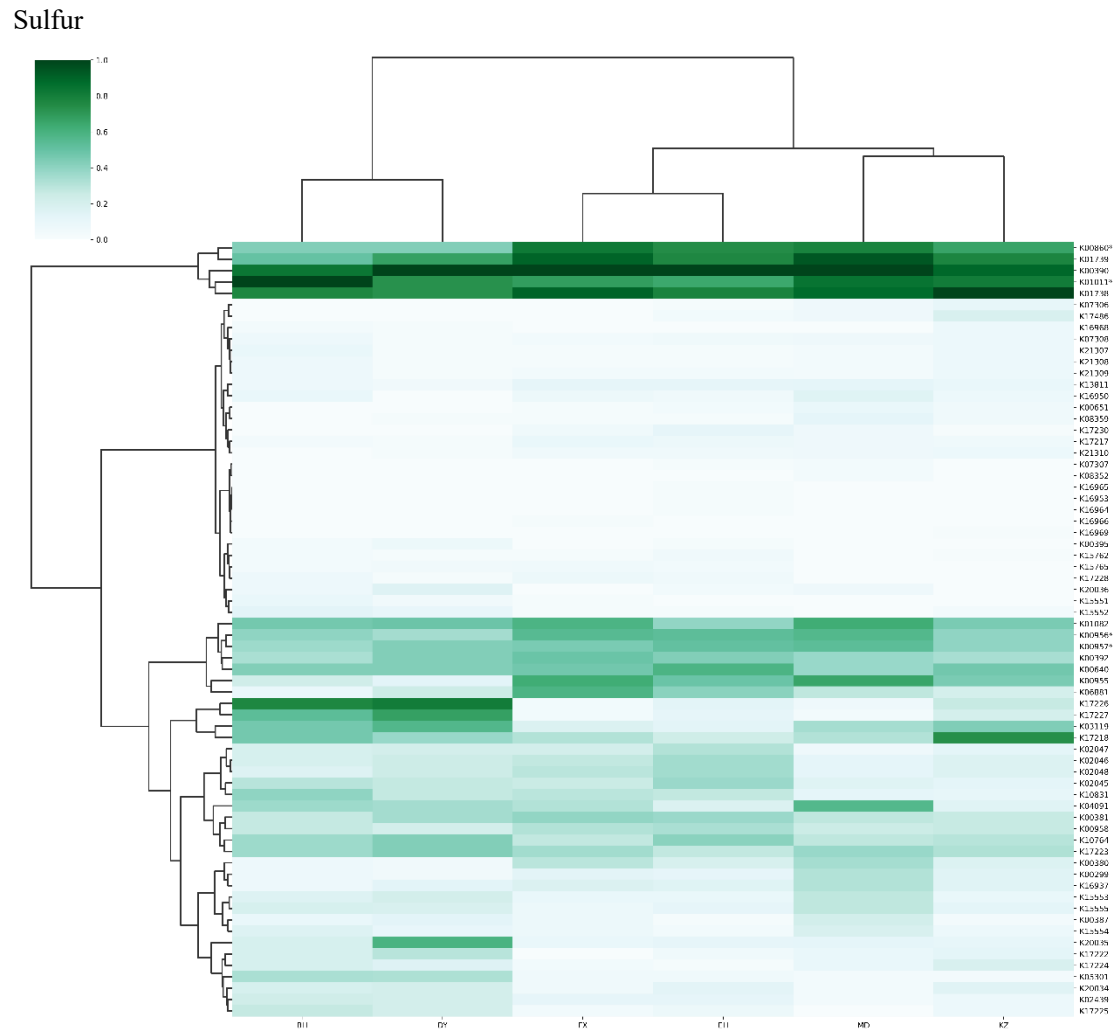


Methane



# Nitrogen





S2 | The four heatmaps represent the distribution of functional K numbers for carbon (purple), methane (red), nitrogen (blue), and sulfur (green) based on the assembled genome.