**Supplementary Information**

**Dissolved organic matter and inorganic N jointly regulate greenhouse gases fluxes from forest soils with different moistures during a freeze-thaw period**

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The supplementary information has three pages including one table and one figure.

**Table S1.** Correlation coefficients among cumulative soil GHG emissions and soil properties during the freeze-thaw period.

|  | N2O | CO2 | CH4 | pH | DOC | DON | NO3—N | NH4+-N | MBC | MBN | MBC:MBN | N\_min | FDOM | BG | NAG | BG:NAG |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| N2O | 1 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| CO2 | 0.29\* | 1 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| CH4 | 0.22 | -0.67\*\* | 1 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| pH | 0.49\*\* | 0.04 | 0.36\*\* | 1 |  |  |  |  |  |  |  |  |  |  |  |  |
| DOC | 0.39\*\* | 0.31\* | 0.02 | 0.18 | 1 |  |  |  |  |  |  |  |  |  |  |  |
| DON | 0.35\* | 0.41\*\* | -0.09 | 0.26 | 0.95\*\* | 1 |  |  |  |  |  |  |  |  |  |  |
| NO3--N | -0.42\*\* | 0.39\*\* | -0.56\*\* | -0.76\*\* | 0.12 | 0.10 | 1 |  |  |  |  |  |  |  |  |  |
| NH4+-N | 0.33\* | 0.32\* | 0.29\* | 0.69\*\* | 0.18 | 0.25 | -0.40\*\* | 1 |  |  |  |  |  |  |  |  |
| MBC | 0.24 | 0.69\*\* | -0.52\*\* | 0.11 | 0.54\*\* | 0.62\*\* | 0.26 | 0.28\* | 1 |  |  |  |  |  |  |  |
| MBN | 0.16 | 0.70\*\* | -0.58\*\* | 0.13 | 0.48\*\* | 0.59\*\* | 0.28\* | 0.19 | 0.93\*\* | 1 |  |  |  |  |  |  |
| MBC:MBN | -0.11 | -0.68\*\* | 0.60\*\* | -0.15 | -0.17 | -0.29\* | -0.21 | -0.07 | -0.68\*\* | -0.83\*\* | 1 |  |  |  |  |  |
| N\_min | -0.37\*\* | 0.57\*\* | -0.59\*\* | -0.49\*\* | 0.17 | 0.22 | 0.90\*\* | -0.02 | 0.40\*\* | 0.43\*\* | -0.34\* | 1 |  |  |  |  |
| FDOM | 0.28\* | 0.70\*\* | -0.52\*\* | 0.07 | 0.69\*\* | 0.73\*\* | 0.31\* | 0.16 | 0.87\*\* | 0.86\*\* | -0.70\*\* | 0.42\*\* | 1 |  |  |  |
| BG | 0.42\*\* | 0.57\*\* | -0.13 | 0.47\*\* | 0.39\*\* | 0.50\*\* | -0.10 | 0.41\*\* | 0.52\*\* | 0.56\*\* | -0.54\*\* | 0.13 | 0.57\*\* | 1 |  |  |
| NAG | 0.50\*\* | 0.51\*\* | -0.14 | 0.39\*\* | 0.47\*\* | 0.51\*\* | -0.14 | 0.40\*\* | 0.67\*\* | 0.62\*\* | -0.56\*\* | 0.01 | 0.62\*\* | 0.48\*\* | 1 |  |
| BG:NAG | 0.02 | 0.03 | 0.01 | 0.16 | -0.02 | 0.05 | -0.01 | 0.08 | -0.07 | 0.01 | -0.01 | 0.11 | -0.02 | 0.59\*\* | -0.38\*\* | 1 |

N2O, CO2 and CH4 represent cumulative N2O, CO2 and CH4 fluxes, respectively. N\_min represents net N mineralization. FDOM represents the contribution of fulvic-like components in soil DOM. \*, *P*<0.05; \*\*, *P*<0.01.

**Figure S1.** Relationships between cumulative GHG emissions and the concentrations of DOC, the contribution of fulvic-like DOM, and net N mineralization in forest soils during the freeze-thaw period. The dots circled by dashed line were excluded from linear regressions. The unit of cumulative N2O emission is mg N2O-N m-2.

