



Supplement of

GRiMeDB: the Global River Methane Database of concentrations and fluxes

Emily H. Stanley et al.

Correspondence to: Emily H. Stanley (ehstanley@wisc.edu)

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Table S1. Linear regression results for (1) person-to-person comparisons to determine the consistency among different individuals digitizing the same data, and (2) person-to-known-data comparisons comparing digitized results generated by different individuals to actual data. Seven separate plots were evaluated, four of which were digitized by two different individuals to further check for operator consistency. For person-to-known-data comparisons, digitized data (x) were used to predict actual data (y). Sample size (*n*) for each regression denotes the number of data points digitized in each comparison. All regressions were significant ($P < 0.0001$).

| Comparison | <i>n</i> | Regression equation | R^2 |
|----------------------|----------|-----------------------|--------|
| Person to person | 15 | $y = 1.001x - 2.388$ | 0.9998 |
| | 19 | $y = 0.979x + 0.086$ | 0.9988 |
| | 39 | $y = 1.001x - 0.264$ | 1.00 |
| | 90 | $y = 0.999x + 0.005$ | 1.00 |
| | 10 | $y = 0.992x + 3.778$ | 0.9996 |
| Person-to known-data | 21 | $y = 0.997x + 0.730$ | 0.9997 |
| | 21 | $y = 0.993x + 0.009$ | 0.9997 |
| | 20 | $y = 0.966x + 25.886$ | 0.9644 |
| | 19 | $y = 0.996x - 2.436$ | 0.9999 |
| | 8 | $y = 1.050x + 0.166$ | 0.9985 |
| | 39 | $y = 0.991x + 1.357$ | 1.00 |
| | 39 | $y = 0.992x + 1.109$ | 1.00 |
| | 90 | $y = 1.001x + 0.006$ | 1.00 |
| | 90 | $y = 1.000x + 0.009$ | 1.00 |
| | 10 | $y = 1.003x - 1.779$ | 0.9996 |
| | 10 | $y = 0.995x + 1.873$ | 0.9999 |

Table S2. Summary of number of observations for all variables by continent. Variable titles correspond to GriMeDB column titles and are defined in Tables A1-A4.

| Variable | Africa | Asia | Central America | Europe | Green-land | North America | Oceania | South America | Total |
|----------------------|--------|------|-----------------|--------|------------|---------------|---------|---------------|-------|
| Sites | 561 | 761 | 5 | 1244 | 37 | 2031 | 117 | 281 | 5037 |
| Elevation_m | 552 | 376 | 5 | 255 | 0 | 1031 | 83 | 140 | 2442 |
| Slope_m_per_m | 3 | 37 | 0 | 41 | 0 | 396 | 0 | 0 | 477 |
| Strahler_order | 0 | 186 | 4 | 661 | 0 | 458 | 5 | 19 | 1333 |
| Basin_size_km2 | 69 | 98 | 2 | 500 | 1 | 654 | 43 | 29 | 1396 |
| CH4mean or CH4median | 1854 | 2350 | 11 | 6157 | 181 | 12416 | 388 | 667 | 24024 |
| CO2mean or CO2median | 563 | 655 | 11 | 4887 | 125 | 10561 | 302 | 551 | 17655 |
| N2Omean or N2Omedian | 1721 | 591 | 0 | 1399 | 0 | 4338 | 179 | 181 | 8409 |
| WaterTemp_degC | 1800 | 2033 | 11 | 4959 | 181 | 11028 | 380 | 470 | 20862 |
| Cond_uScm | 1642 | 455 | 1 | 1467 | 181 | 8791 | 165 | 499 | 13201 |
| pH | 631 | 1620 | 0 | 2019 | 181 | 8954 | 345 | 416 | 14166 |
| DO_mgL | 230 | 837 | 0 | 936 | 125 | 6102 | 296 | 397 | 8923 |
| DO_percentsat | 1316 | 1302 | 0 | 1247 | 181 | 4267 | 194 | 192 | 8699 |
| Q | 102 | 104 | 10 | 2126 | 47 | 5528 | 223 | 290 | 8430 |
| NO3 | 1061 | 1478 | 0 | 3045 | 117 | 7401 | 192 | 36 | 13330 |
| NH4 | 1052 | 1486 | 0 | 2862 | 118 | 7211 | 182 | 39 | 12950 |
| TN | 75 | 138 | 0 | 2198 | 119 | 6624 | 8 | 180 | 9342 |
| SRP | 524 | 242 | 0 | 1910 | 118 | 6030 | 182 | 36 | 9042 |
| TP | 219 | 229 | 0 | 1294 | 0 | 5796 | 8 | 36 | 7582 |
| DOC | 1269 | 756 | 0 | 4019 | 119 | 8659 | 296 | 367 | 15485 |

Table S2. Continued

| | | | | | | | | | |
|--|-----|------|----|------|---|------|-----|-----|------|
| Diffusive_CH4_Flux_Mean or Diffusive_CH4_Median | 123 | 2360 | 10 | 1316 | 0 | 2670 | 197 | 321 | 6997 |
| Eb_CH4_Flux_Mean_or_Median | 0 | 313 | 0 | 78 | 0 | 214 | 4 | 12 | 621 |
| Total_CH4_Flux_Mean_or_Median | 39 | 329 | 0 | 113 | 0 | 91 | 3 | 12 | 587 |
| CO2_Flux_Mean_or_Median | 107 | 792 | 10 | 924 | 0 | 2237 | 158 | 216 | 4444 |
| N2O_Flux_Mean_or_Median | 74 | 622 | 0 | 42 | 0 | 595 | 42 | 144 | 1521 |

Table S3. Regression statistics for mean \log_{10} -transformed CH_4 concentration (CH_4mean) and diffusive flux as a function of the absolute value of latitude and \log_{10} -transformed basin area (km^2). Because of the \log_{10} transformation, concentrations reported as 0 or below detection ($n = 769$ or 3.3% of all CH_4mean observations) and negative, 0, or below detection fluxes (5.3% of all diffusive flux measurements) were omitted from regression analyses.

| Comparison | n | P | slope | R^2 |
|----------------------------|------|--------|----------------|-------|
| Concentration | | | | |
| Absolute value of latitude | 4589 | >0.001 | -0.003 | 0.006 |
| Basin area | 1206 | 0.092 | -0.022 | 0.002 |
| Diffusive flux | | | | |
| Absolute value of latitude | 1765 | <0.001 | -0.012 | 0.036 |
| Basin area | 606 | <0.001 | 0.152 | 0.055 |

Table S4. Summary statistics for non-gas variables. Variable titles correspond to GriMeDB column titles and are defined in Table A3.

| Variable | Unit | Mean | Median | Max | Min | SD | CV |
|-----------------|--------------------------------|------|--------|---------|--------|--------|------|
| Temp | °C | 13.3 | 12.5 | 37.5 | -3.3 | 8.25 | 62.2 |
| Cond_Uscm | µS cm ⁻¹ | 219 | 105 | 7650 | 2.6 | 294 | 135 |
| pH | | 7.04 | 7.23 | 10.86 | 2.5 | 1.01 | 14.3 |
| DO_mgL | mg L ⁻¹ | 8.84 | 8.95 | 22.62 | 0 | 3.03 | 34.2 |
| DOpercentsat | % | 80.4 | 88.5 | 301.4 | 0 | 28.6 | 35.6 |
| Q | m ³ s ⁻¹ | 2349 | 0.11 | 6950000 | -14.75 | 107859 | 4592 |
| NO ₃ | µmol L ⁻¹ | 44.5 | 3.1 | 2521 | 0 | 110 | 247 |
| NH ₄ | µmol L ⁻¹ | 29.7 | 1.5 | 4280 | 0 | 141 | 476 |
| TN | µmol L ⁻¹ | 80.6 | 24.1 | 87813 | 0 | 1537 | 1906 |
| SRP | µmol L ⁻¹ | 1.1 | 0.18 | 237 | 0 | 6.29 | 562 |
| TP | µmol L ⁻¹ | 2.2 | 0.49 | 646 | 0 | 10.9 | 490 |
| DOC | µmol L ⁻¹ | 767 | 445 | 214821 | 0 | 2628 | 343 |

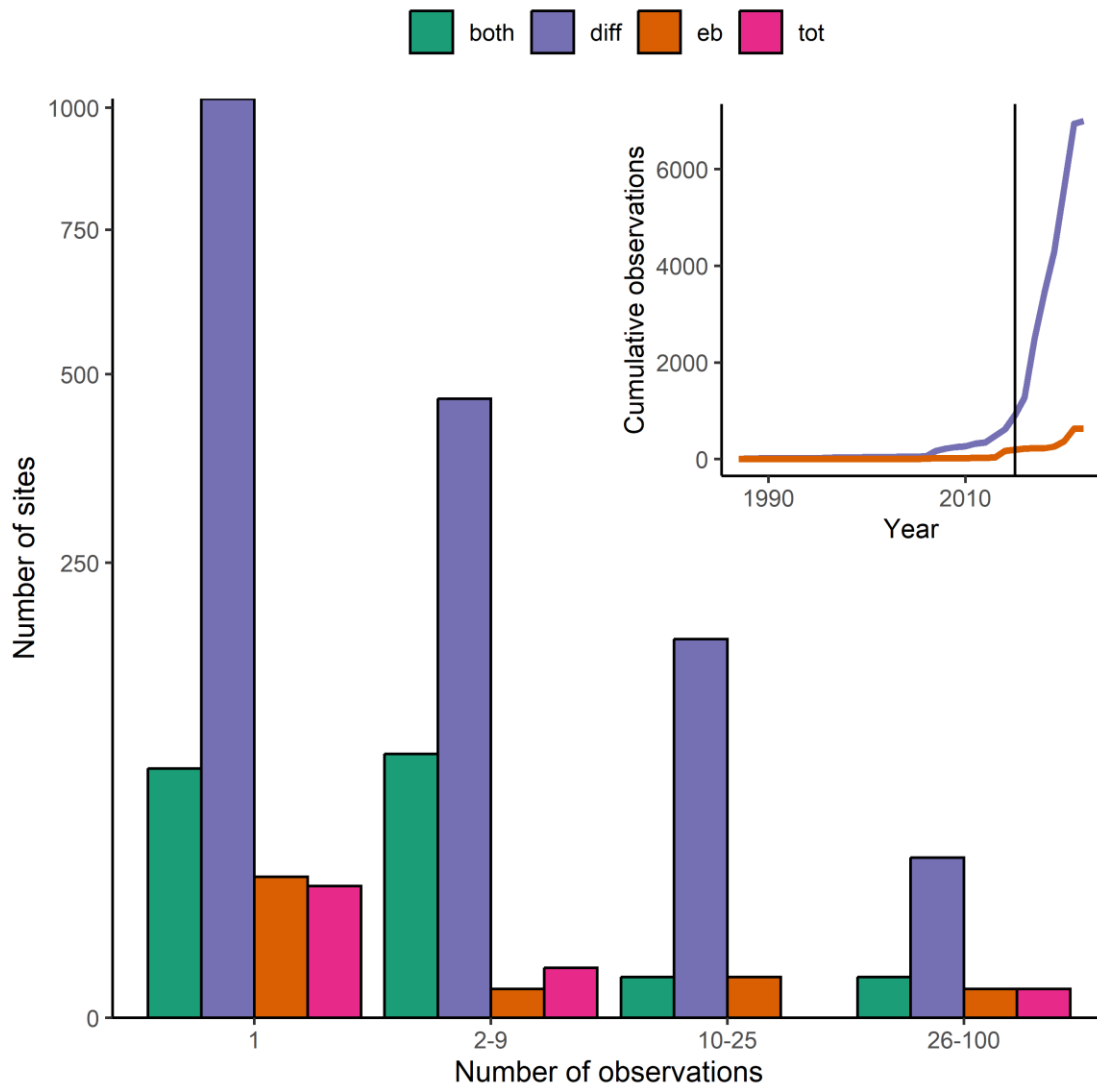


Figure S1: Distribution of the number of observations per site for the types of CH₄ fluxes (diff – diffusive, eb- ebullition, tot- total flux; both indicates sites with both diffusive and ebullitive fluxes). The y-axis reflects a square-root scaling to accommodate the range of values (bar sizes) across all categories. Inset: Cumulative observations of diffusive (purple) and ebullitive (orange) CH₄ flux data based on the year of publication of the data source. The vertical line (2015) indicates the year of MethDB (Stanley et al., 2015) publication.

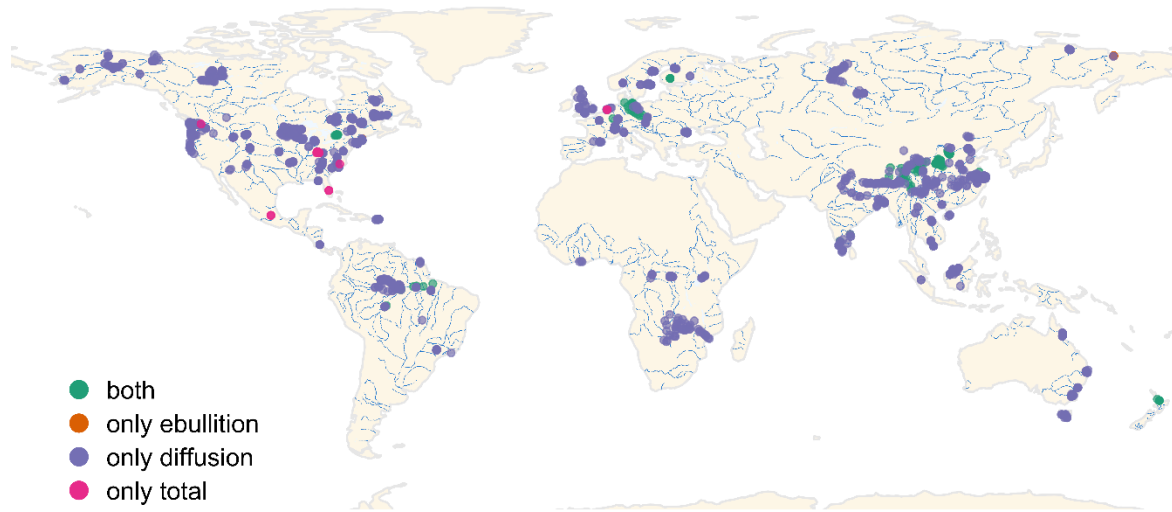


Figure S2: Global distribution of sites with data for methane (CH₄) ebullition only (only ebullition), only CH₄ diffusion (only diffusion), total CH₄ flux only (only total), and sites with both diffusive and ebullitive flux data (both).