

Table S2. Annual mean values for model-data mismatches, emissions and burdens of CH₄ (summarized in Table 2).

| Year | Observation CH ₄ concentr. | | E_{ini} (Tg yr ⁻¹) | E_{opt} (Tg yr ⁻¹) | B_{opt} (Tg) |
|------|---------------------------------------|----------------|-------------------------------------|-------------------------------------|-------------------|
| | with E_{ini} | with E_{opt} | | | |
| 1910 | 34.31 | -3.90 | 308.1 | 289.5 | 2625.9 |
| 1911 | 36.64 | -3.95 | 312.3 | 295.3 | 2640.0 |
| 1912 | 39.10 | -3.42 | 311.2 | 293.0 | 2651.9 |
| 1913 | 40.62 | -3.59 | 311.3 | 295.5 | 2664.1 |
| 1914 | 42.07 | -3.27 | 315.9 | 299.8 | 2676.6 |
| 1915 | 42.95 | -3.21 | 319.7 | 304.9 | 2689.4 |
| 1916 | 44.30 | -2.56 | 316.2 | 299.7 | 2705.4 |
| 1917 | 43.74 | -3.46 | 312.9 | 302.2 | 2720.7 |
| 1918 | 42.77 | -3.42 | 317.4 | 308.1 | 2735.8 |
| 1919 | 42.91 | -2.35 | 325.5 | 312.9 | 2753.8 |
| 1920 | 42.58 | -2.29 | 323.5 | 312.3 | 2770.7 |
| 1921 | 42.49 | -1.92 | 325.6 | 313.8 | 2789.0 |
| 1922 | 42.16 | -1.85 | 325.3 | 314.3 | 2806.2 |
| 1923 | 41.49 | -1.89 | 326.3 | 316.4 | 2821.2 |
| 1924 | 39.72 | -2.41 | 325.1 | 318.9 | 2837.5 |
| 1925 | 38.01 | -2.18 | 324.8 | 319.0 | 2854.4 |
| 1926 | 35.39 | -2.52 | 329.6 | 327.0 | 2869.4 |
| 1927 | 32.41 | -2.55 | 327.0 | 326.3 | 2889.3 |
| 1928 | 30.52 | -1.61 | 329.3 | 326.1 | 2906.3 |
| 1929 | 28.51 | -1.49 | 327.5 | 325.2 | 2923.2 |
| 1930 | 26.91 | -1.10 | 332.3 | 329.3 | 2935.7 |
| 1931 | 24.21 | -1.70 | 336.6 | 337.4 | 2952.5 |
| 1932 | 24.22 | 0.14 | 335.2 | 328.4 | 2971.8 |
| 1933 | 22.79 | -0.67 | 334.7 | 332.3 | 2985.7 |
| 1934 | 21.42 | -0.67 | 332.8 | 330.7 | 2999.7 |
| 1935 | 20.34 | -0.41 | 336.8 | 334.2 | 3011.1 |
| 1936 | 18.79 | -0.66 | 338.0 | 337.2 | 3023.4 |
| 1937 | 18.11 | -0.05 | 342.0 | 338.8 | 3036.6 |
| 1938 | 17.50 | 0.05 | 341.4 | 338.2 | 3049.4 |
| 1939 | 17.79 | 0.63 | 340.2 | 334.3 | 3061.3 |
| 1940 | 17.00 | -0.07 | 343.4 | 340.8 | 3069.3 |
| 1941 | 15.51 | -0.56 | 346.6 | 346.5 | 3082.5 |
| 1942 | 15.02 | 0.13 | 345.5 | 342.7 | 3097.8 |
| 1943 | 14.72 | 0.31 | 345.0 | 341.8 | 3109.2 |
| 1944 | 14.17 | 0.15 | 353.3 | 350.9 | 3119.8 |
| 1945 | 14.56 | 0.74 | 350.6 | 345.4 | 3132.8 |
| 1946 | 13.11 | -0.44 | 352.6 | 353.1 | 3149.6 |
| 1947 | 12.64 | 0.16 | 357.5 | 355.3 | 3167.0 |
| 1948 | 11.45 | -0.24 | 359.4 | 359.6 | 3187.1 |
| 1949 | 11.06 | 0.28 | 357.9 | 356.0 | 3205.2 |

| | | | | | |
|------|---------|-------|-------|-------|--------|
| 1950 | 10.43 | 0.16 | 357.1 | 356.0 | 3221.0 |
| 1951 | 7.68 | -1.22 | 362.9 | 368.7 | 3239.4 |
| 1952 | 5.20 | -1.03 | 367.3 | 373.0 | 3262.7 |
| 1953 | 3.49 | -0.40 | 373.2 | 377.2 | 3286.9 |
| 1954 | 1.52 | -0.48 | 373.0 | 378.4 | 3315.3 |
| 1955 | -0.03 | -0.18 | 377.5 | 382.1 | 3340.7 |
| 1956 | -2.79 | -0.93 | 375.4 | 384.3 | 3368.3 |
| 1957 | -5.84 | -1.11 | 387.7 | 398.2 | 3394.1 |
| 1958 | -7.99 | -0.45 | 392.1 | 400.7 | 3427.7 |
| 1959 | -10.32 | -0.47 | 391.1 | 400.9 | 3461.0 |
| 1960 | -14.93 | -1.96 | 392.7 | 410.4 | 3494.2 |
| 1961 | -22.09 | -0.11 | 397.3 | 424.4 | 3538.0 |
| 1962 | -26.00 | 1.85 | 398.9 | 417.7 | 3577.1 |
| 1963 | -30.72 | 1.29 | 404.5 | 427.0 | 3612.9 |
| 1964 | -34.75 | 1.54 | 404.5 | 426.2 | 3655.1 |
| 1965 | -39.88 | 0.66 | 405.9 | 432.2 | 3694.2 |
| 1966 | -46.17 | -0.38 | 414.1 | 445.6 | 3732.7 |
| 1967 | -51.28 | 0.33 | 414.5 | 444.1 | 3775.6 |
| 1968 | -58.60 | -1.27 | 416.3 | 454.4 | 3817.8 |
| 1969 | -65.20 | -0.87 | 423.8 | 461.9 | 3857.5 |
| 1970 | -72.10 | -1.11 | 427.5 | 468.4 | 3906.5 |
| 1971 | -77.11 | 0.26 | 421.2 | 458.0 | 3951.4 |
| 1972 | -84.16 | -1.11 | 431.1 | 475.9 | 3988.5 |
| 1973 | -92.23 | -2.12 | 442.5 | 492.9 | 4038.0 |
| 1974 | -97.95 | -0.46 | 434.8 | 479.9 | 4087.0 |
| 1975 | -105.52 | -1.58 | 443.9 | 496.6 | 4130.8 |
| 1976 | -112.24 | -1.06 | 443.2 | 495.3 | 4178.7 |
| 1977 | -119.99 | -1.80 | 456.5 | 514.1 | 4222.4 |
| 1978 | -125.24 | -0.08 | 456.3 | 508.3 | 4271.9 |
| 1979 | -132.26 | -1.34 | 466.8 | 526.1 | 4320.5 |
| 1980 | -137.77 | -0.55 | 469.0 | 525.6 | 4371.4 |
| 1981 | -142.45 | 0.09 | 472.6 | 528.3 | 4416.4 |
| 1982 | -148.17 | -0.72 | 471.9 | 532.2 | 4460.7 |
| 1983 | -154.99 | -1.78 | 481.9 | 547.8 | 4505.5 |
| 1984 | -160.15 | -0.48 | 477.2 | 539.5 | 4555.0 |
| 1985 | -166.85 | -1.43 | 481.1 | 549.7 | 4601.3 |
| 1986 | -171.99 | -0.34 | 489.7 | 555.5 | 4644.5 |
| 1987 | -174.06 | 1.66 | 502.4 | 560.5 | 4683.5 |
| 1988 | -175.48 | 1.81 | 505.2 | 561.9 | 4724.1 |
| 1989 | -174.54 | 3.26 | 505.7 | 555.1 | 4764.2 |
| 1990 | -174.88 | 2.08 | 515.3 | 568.6 | 4797.3 |
| 1991 | -170.94 | 4.73 | 514.8 | 554.6 | 4829.4 |
| 1992 | -171.19 | 1.74 | 504.6 | 556.3 | 4853.7 |
| 1993 | -165.84 | 4.86 | 507.8 | 541.9 | 4870.2 |
| 1994 | -161.22 | 4.49 | 512.7 | 547.7 | 4874.8 |

| | | | | | |
|------|---------|-------|-------|-------|--------|
| 1995 | -158.16 | 3.03 | 514.6 | 553.2 | 4885.4 |
| 1996 | -152.64 | 4.39 | 512.4 | 542.2 | 4891.6 |
| 1997 | -153.02 | 0.35 | 518.5 | 565.3 | 4902.3 |
| 1998 | -155.28 | -1.34 | 531.3 | 584.7 | 4926.1 |
| 1999 | -154.46 | 1.06 | 518.1 | 563.3 | 4957.5 |
| 2000 | -149.75 | 4.05 | 521.4 | 552.4 | 4970.3 |
| 2001 | -141.46 | 6.34 | 532.0 | 550.5 | 4969.5 |
| 2002 | -134.71 | 4.92 | 530.6 | 551.6 | 4971.8 |
| 2003 | -127.50 | 4.82 | 534.8 | 552.4 | 4968.8 |
| 2004 | -121.52 | 3.61 | 528.4 | 547.7 | 4969.5 |
| 2005 | -113.89 | 4.44 | 535.4 | 547.7 | 4966.2 |
| 2006 | -107.07 | 3.77 | 532.5 | 545.0 | 4963.9 |
| 2007 | -106.86 | -0.82 | 532.0 | 563.4 | 4966.4 |
| 2008 | -110.77 | -3.73 | 528.1 | 572.4 | 4986.3 |
| 2009 | -110.43 | -0.72 | 535.0 | 567.0 | 4999.5 |
