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Supporting Information for

**A process-model perspective on recent changes in the carbon cycle of North America**

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**Table S1. DGVMs characteristics and key processes included in this study. Additional information can be found in Friedlingstein et al. (2020) table A1.**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Cable-pop** | **Classic** | **CLM5** | **DLME** | **IBIS** | **ISAM** | **ISBA** | **JSBACH** | **JULES.ES.10** | **LPJ.Guess** | **LPX.Bern** | **LPJ** | **OCN** | **ORCHIDEE** | **ORCHIDEE.CNP** | **ORCHIDEEv3** | **SDGVM** | **VISIT** | **YIBs** |
| **Original Resolution** | 1x1 | 2.185x2.185 | 1.25x0.9375 | 0.5x0.5 | 1x1 | 0.5x0.5 | 1x1 | 1.875x1.875 | 1.875x1.25 | 0.5x0.5 | 0.5x0.5 | 0.5x0.5 | 1x1 | 0.5x0.5 | 2x2 | 0.5x0.5 | 1x1 | 0.5x0.5 | 1x1 |
| **Fire** | No | Yes | Yes | No | No | No | Yes | Yes | No | Yes | Yes | Yes | No | No | No | No | Yes | Yes | No |
| **Harvest****(wood + crops)** | No | No | Yes | No | No | No | Yes | Yes | Yes | Yes | No | No | No | Yes: | Yes | No | No | No | No |
| **Grazing** | No | No | No | No | No | No | No | Yes | No | Yes | No | No | No | No | No | No | No | No | No |
| **FLUC** | No | Yes | Yes | No | No | Yes | Yes | Yes | Yes | Yes | No | No | Yes | Yes | Yes | Yes | Yes | Yes | Yes |

**References**

Friedlingstein, P., Jones, M. W., O'sullivan, M., Andrew, R. M., Hauck, J., Peters, G. P., ... & Zaehle, S. (2019). Global carbon budget 2019. Earth System Science Data, 11(4), 1783-1838.

**Table S2. Model Ensemble Mean C fluxes by subregion and decade.**

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Region** | **Decade** | **NBP** | **NBP error** | **GPP** | **GPP error** | **RH** | **RH error** | **Ra** | **Ra Error** | **D** | **D error** |
| **USA** | 2000-2009 | 0.14 | 0.16 | 8.50 | 1.09 | 3.71 | 0.67 | 4.23 | 1.06 | 0.41 | 0.49 |
|  | 2010-2019 | 0.17 | 0.17 | 9.12 | 1.17 | 3.95 | 0.69 | 4.55 | 1.14 | 0.43 | 0.40 |
| **CAN** | 2000-2009 | 0.15 | 0.11 | 5.76 | 1.26 | 2.74 | 0.68 | 2.59 | 0.86 | 0.10 | 0.08 |
|  | 2010-2019 | 0.20 | 0.12 | 6.10 | 1.31 | 2.86 | 0.70 | 2.75 | 0.91 | 0.11 | 0.07 |
| **MEX** | 2000-2009 | 0.02 | 0.05 | 2.08 | 0.41 | 0.86 | 0.28 | 1.12 | 0.22 | 0.08 | 0.21 |
|  | 2010-2019 | 0.02 | 0.05 | 2.19 | 0.42 | 0.89 | 0.29 | 1.18 | 0.23 | 0.07 | 0.13 |
| **CA+C** | 2000-2009 | 0.01 | 0.02 | 1.87 | 0.83 | 0.71 | 0.22 | 1.09 | 0.64 | 0.02 | -0.08 |
|  | 2010-2019 | 0.01 | 0.02 | 1.91 | 0.83 | 0.72 | 0.22 | 1.12 | 0.65 | 0.02 | 0.05 |

**Figure S1: temporal NBP evolution in North America by individual Models from 2000-2019.**



**Figure S2. Individual NBP model evaluation based on the mean and trend for the period 2000-2019. Grey rectangle indicates ranges of observed values from previous works as reported in Table 1 of the main text. Models that include a fire module are indicated in red.**



**Figure S3: gridded NBP during years with the lowest (left) and highest (right) NBP values in each decade. **

**Table S3 NBP separated for the conterminous USA and Alaska for 2000-2019.**

|  |  |  |
| --- | --- | --- |
| **Region** | **Period** | **NBP (PgC yr-1)** |
| Conterminous USA | 2000-2019 | 0.12 ± 0.13 |
| Alaska | 2000-2019 | 0.04 ± 0.05 |
| Whole USA | 2000-2019 | 0.16 ± 0.17 |

**Figure S4. Land mask employed for this work.**

