

Global Reconciliation of Land, Ocean, and River Carbon Fluxes

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Disparities and uncertainties in the sinks for carbon on land are tied to uncertainties in the magnitude and the north-south distribution of ocean and river carbon fluxes. We use a new observational constraint based on ocean heat transport and its tight link to ocean carbon transport to evaluate existing ocean and river fluxes and propose a revised budget. Our revised ocean/river budget, combining carbon dioxide partial pressure ($p\text{CO}_2$) based ocean flux estimates with a global river carbon discharge of ~ 0.8 PgC/y, shows a stronger ocean and river carbon uptake in the northern extra-tropics than prior budgets and therefore calls for a weaker northern land sink.

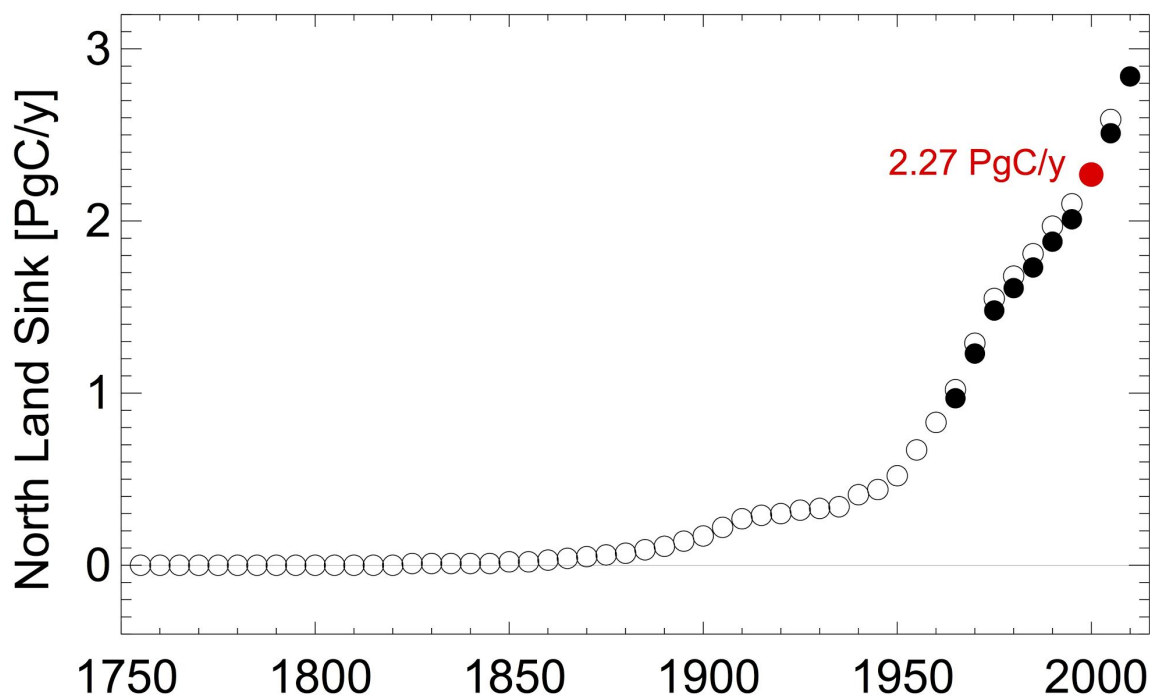


Figure 1. Temporal evolution of the Northern land sink derived from our revised carbon budget for the 1990-2010 period and extrapolated in time using a linear relationship with fossil fuel emissions from 1) Le Quéré et al. (2015) (filled circles) and 2) Boden et al. (2015) (open circles). Fossil fuel emissions were averaged over 10-year periods to smooth out interannual variability.

Boden, T.A., G. Marland, and R.J. Andres. 2015. *Global, Regional, and National Fossil-Fuel CO₂ Emissions*. Carbon Dioxide Information Analysis Center, Oak Ridge National Laboratory, U.S. Department of Energy. doi:10.3334/CDIAC/00001_V2015

Le Quéré, C. et al. *Global Carbon Budget 2015 Earth System Science Data*, 7, 349-396 doi:10.5194/essd-7-349-2015 (2015).