

The Atmospheric Perspective of Carbon Dioxide Exchange Across North America: CarbonTracker

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Following the successful launch of CarbonTracker in early 2007, the NOAA ESRL team is preparing the first update of this new tool to be released in the fall of 2007. Here, we present the first estimate of net CO₂ exchange across North America for every week in the period 2000 through the end of 2006; one year beyond the currently publicly available record. CarbonTracker estimates are derived from a set of ~28,000 CO₂ mole fraction observations in the global atmosphere that are ingested into a state-of-the-art data assimilation system for CO₂. By design, the surface fluxes produced in CarbonTracker are fully consistent with the recent history of CO₂ in the atmosphere and provide constraints on the North American carbon cycle independent from those derived from forestry and agricultural inventories. The first release of CarbonTracker showed that the North American terrestrial biosphere was a net sink of -0.65 ± 0.20 PgC/yr averaged over the period studied, partly offsetting the 1.85 PgC/yr released by fossil fuel and cement manufacturing. The sink is located mainly in the deciduous forests along the east coast (32%) and the boreal coniferous forests (22%). Uptake was reduced to -0.39 PgC/yr during the large-scale drought of 2002 suggesting the current sink might diminish under future climate conditions. CarbonTracker results are in excellent agreement with the -0.68 PgC/yr sink reported from a wide collection of carbon inventories. These inventories form the basis of the first North American State of the Carbon Cycle Report to be released in 2007. Our work demonstrates the feasibility of monitoring carbon sources and sinks from the atmosphere, and offers a way to check CO₂ release across the globe independent from national accounting efforts.

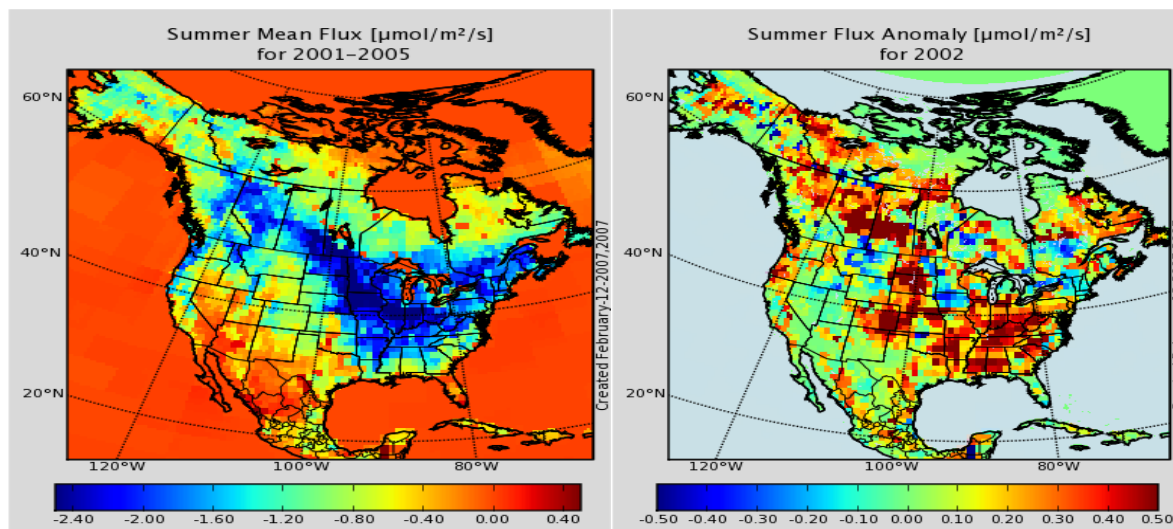


Figure 1. The mean summer CO₂ exchange (left panel) was strongly reduced in 2002 (right panel) due to a wide spread drought. This effect was picked up by CarbonTracker and demonstrates the significant sensitivity of the North American carbon sink to climate variations, and also the need to monitor these changes independent of inventory based assessments.