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Terrestrial carbon fluxes for North America and Europe estimated from NOAA-ESRL CO_2 observations

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We present an analysis of terrestrial net CO_2 fluxes for the period 2000-2005. These fluxes consist of weekly global maps at $\sim$70km$\times$100km resolution that are consistent with observed atmospheric CO_2 mixing ratios, as well as with varying climatic conditions across different ecosystems. The flux maps are created in a newly developed ensemble data assimilation system that consists of the atmospheric Transport Model v5 (TM5), simple descriptions of terrestrial and oceanic carbon exchange, and an efficient Bayesian least-squares algorithm to optimize the net CO_2 fluxes from different ecoregions against CO_2 mixing ratios from the NOAA-ESRL observing network. We will focus our analysis on monthly sub-continental flux patterns for North America and Europe in relation to known drivers of the carbon cycle such as temperature and precipitation. A challenging test for our system is to reproduce drought related reduction of carbon uptake in 2003 over Europe (Ciais et al., Nature, 2005), and the observed reduction of the Northern Hemisphere mid-latitude terrestrial uptake in the past decade (Miller et al., Science, submitted).