



A comprehensive estimate of recent carbon sinks in China using both top-down and bottom-up approaches

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Atmospheric inversions use measurements of atmospheric CO₂ gradients to constrain regional surface fluxes. Current inversions indicate a net terrestrial CO₂ sink in China between 0.16 and 0.35 PgC/yr. The uncertainty of these estimates is as large as the mean because the atmospheric network historically contained only one high altitude station in China. Here, we revisit the calculation of the terrestrial CO₂ flux in China, excluding emissions from fossil fuel burning and cement production, by using two inversions with three new CO₂ monitoring stations in China as well as aircraft observations over Asia. We estimate a net terrestrial CO₂ uptake of 0.39-0.51 PgC/yr with a mean of 0.45 PgC/yr in 2006-2009. After considering the lateral transport of carbon in air and water and international trade, the annual mean carbon sink is adjusted to 0.35 PgC/yr. To evaluate this top-down estimate, we constructed an independent bottom-up estimate based on ecosystem data, and giving a net land sink of 0.33 PgC/yr. This demonstrates closure between the top-down and bottom-up estimates. Both top-down and bottom-up estimates give a higher carbon sink than previous estimates made for the 1980s and 1990s, suggesting a trend towards increased uptake by land ecosystems in China.