4.010 Reduced biomass burning emissions reconcile conflicting estimates of the post-2006 atmospheric methane budget.

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Abstract:

Several viable but conflicting explanations have been proposed to explain the recent ~8 p.p.b. per year increase in atmospheric methane after 2006, equivalent to net emissions increase of ~25 Tg CH4 per year. A concurrent increase in atmospheric ethane implicates a fossil source; a concurrent decrease in the heavy isotope content of methane points toward a biogenic source, while other studies propose a decrease in the chemical sink (OH). Here we show that biomass burning emissions of methane decreased by 3.7 (±1.4) Tg CH4 per year from the 2001–2007 to the 2008–2014 time periods using satellite measurements of CO and CH4, nearly twice the decrease expected from prior estimates. After updating both the total and isotopic budgets for atmospheric methane with these revised biomass burning emissions (and assuming no change to the chemical sink), we find that fossil fuels contribute between 12–19 Tg CH4 per year to the recent atmospheric methane increase, thus reconciling the isotopic- and ethane-based results. The abnormally large ENSO in 2015 iis associated with almost a doubling of the atmospheric mthane growth rate, iWe use data from the AIRS and GOSAT record, along with the surface network, to contribution of biomass burning to these changes