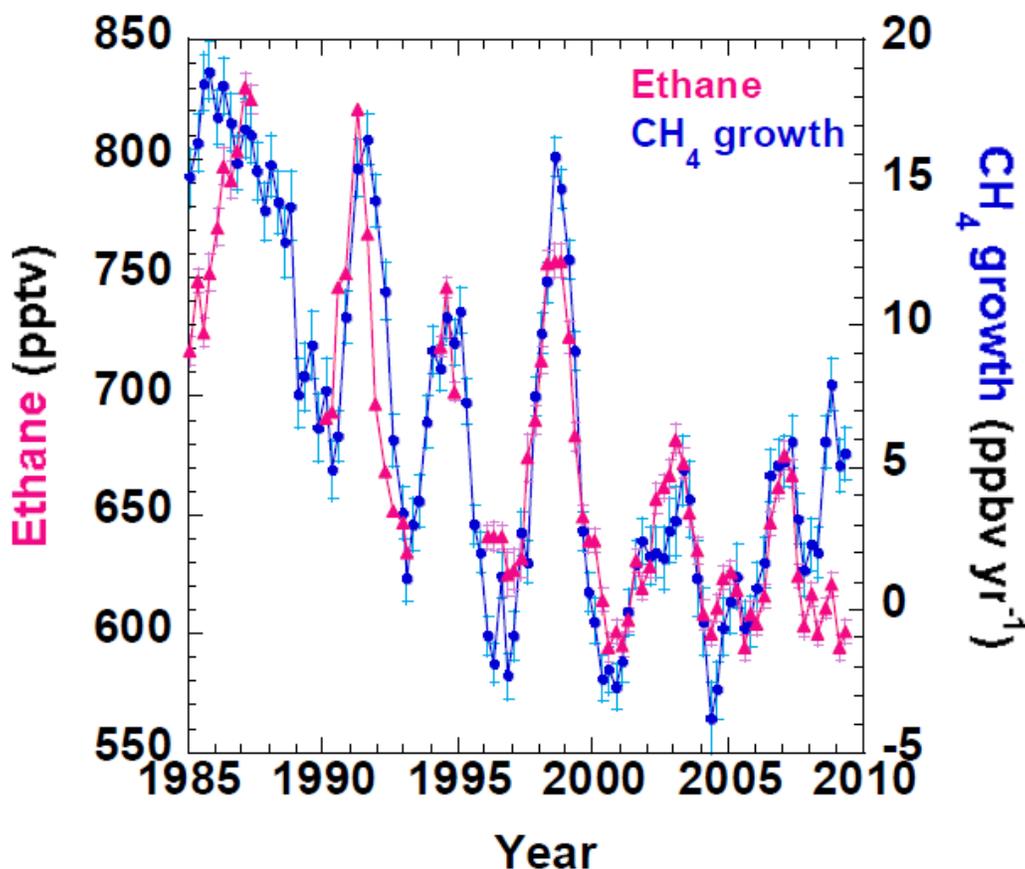


## Global Atmospheric Methane and Ethane: Updated Mixing Ratios and Trends (1984-2009)

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University of California/Irvine has performed continuous global measurements of methane ( $\text{CH}_4$ ), ethane ( $\text{C}_2\text{H}_6$ ) and many other trace gases since 1978. Here we present updated global mixing ratios and trends for  $\text{CH}_4$  and  $\text{C}_2\text{H}_6$  using data collected until September 2009. Our measurements show a global  $\text{CH}_4$  burden of  $1787.8 \pm 0.6$  ppbv for the year, ending in September 2009, with a corresponding global growth rate of  $5.5 \pm 0.9$  ppbv  $\text{yr}^{-1}$ . The renewed increases in methane's growth rate during the past few years (with growth rate peaks of  $5.9 \pm 0.9$  ppbv  $\text{yr}^{-1}$  in early 2007 and  $7.9 \pm 0.9$  ppbv in late 2008) follow a period of near-zero  $\text{CH}_4$  growth in 2005-2006 (Figure 1). For ethane, the global  $\text{C}_2\text{H}_6$  burden was  $601 \pm 10$  pptv for the year ending in September 2009, and the global  $\text{C}_2\text{H}_6$  mixing ratio has shown a long-term decline throughout our 30-year record, with significant year-to-year fluctuations that have almost always coincided with changes in methane's growth rate. Very interestingly, for the first time in two decades, the global  $\text{CH}_4$  and  $\text{C}_2\text{H}_6$  trends have now dissociated from each other, beginning in 2008. The two most recent  $\text{CH}_4$  peaks were driven primarily by growth in the tropics, which was also the case for ethane in 2007 but not in 2008. This shows that the most recent increase in the  $\text{CH}_4$  growth rate was minimally influenced by biomass burning or fossil fuel sources.



**Figure 1.** Global annual  $\text{C}_2\text{H}_6$  mixing ratio (pink triangles) and  $\text{CH}_4$  growth rate (blue circles) from September 1984 – September 2009. The data are plotted as running global annual averages at the temporal mid-point of the year during which the average was calculated (e.g. May 1, 2009 for [December 2008 to September 2009]).