



## **What caused the abrupt increase in the methane growth rate during 2014?**

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CH<sub>4</sub> is the second most important anthropogenic greenhouse gas, after CO<sub>2</sub>, and is directly responsible for approximately 20% of the human-induced greenhouse effect. Year-to-year variations in the atmospheric CH<sub>4</sub> growth rate have been puzzling, but show significant correlation with climatic drivers.

The CH<sub>4</sub> mole fraction increased by ~14 ppb/yr during 2014. This was the largest annual growth in global CH<sub>4</sub> since the strong El Niño of 1998 (15 ppb/yr). Interestingly, unlike 1998, the 2014 enhancement happened before the strong El Niño of 2015. Here we try to decipher the causes of 2014 enhancement using the TM5-4DVAR inverse modelling system applied to GOSAT total column and NOAA surface-flask CH<sub>4</sub> measurements. To further constrain the source/sink processes responsible for this enhancement, CH<sub>4</sub> isotope measurements have been analyzed, along with biomass burning data from GFED and CO total column retrievals from MOPPIT. To constrain variation in atmospheric chemistry, a TM5-full chemistry run was performed. We will present a synthesis of this analysis, discussing the role of the main drivers of the 2014 growth rate anomaly.