Speculation on the Origin of Sub-baseline Excursions of CH_4 at Cape Grim

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The Advanced Global Atmospheric Gases Experiment (AGAGE) program has historically measured *in situ* methane (CH_4) at Cape Grim via gas chromatography with flame ionization detection (GC-FID) in 40 minutely grab samples. By adding continuous, high precision *in situ* measurements of CH_4 (Picarro cavity ring-down spectroscopy [CRDS]) at both Cape Grim, Tasmania, and Casey, Antarctica, a new feature has become apparent in the Cape Grim CH_4 record. During the austral summer (December to February), the Cape Grim CH_4 record periodically drops below baseline. For example, in Figure 1, a number of sustained episodes of depressed CH_4 concentration can be seen below the baseline selected data shown in red. Notably, these episodes are also seen in the GC-FID record.

In this presentation, we examine these sub-baseline excursions of CH_4. In conjunction with meteorology and a variety of other chemical species measured at Cape Grim, including radon, ozone, hydrogen and ethane, we speculate on a number of possible mechanisms that might be responsible for these dips in CH_4 mixing ratio.

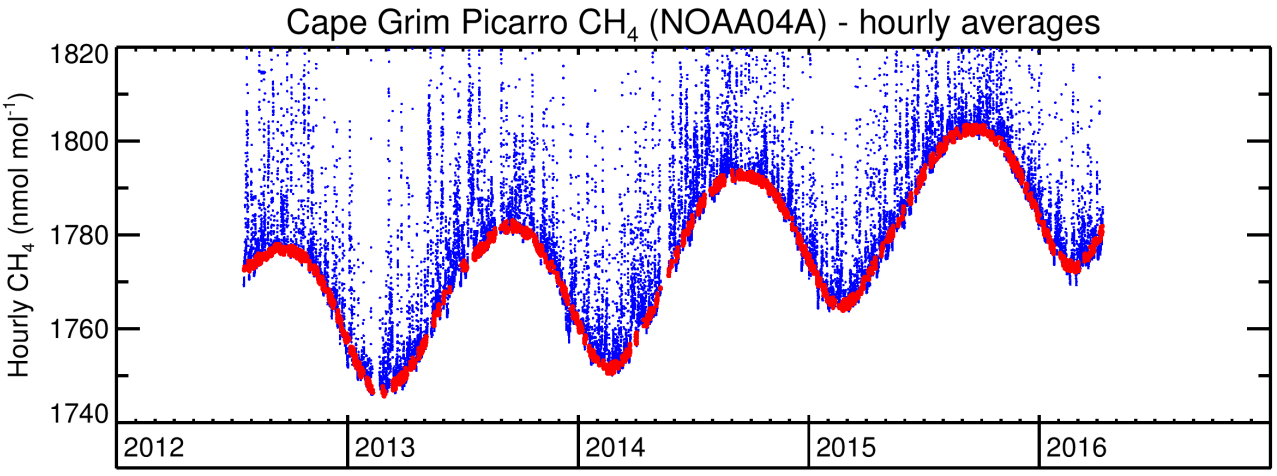

Figure 1. Hourly mean methane mixing ratios in ppb at Cape Grim, Tasmania from Picarro CRDS. Red data are baseline selected.