Can a Decrease in Anthropogenic Methane Emissions From the Former Soviet Union be Seen in the 12-year (1988-2000) Continuous Methane Record at Alert, Canada?

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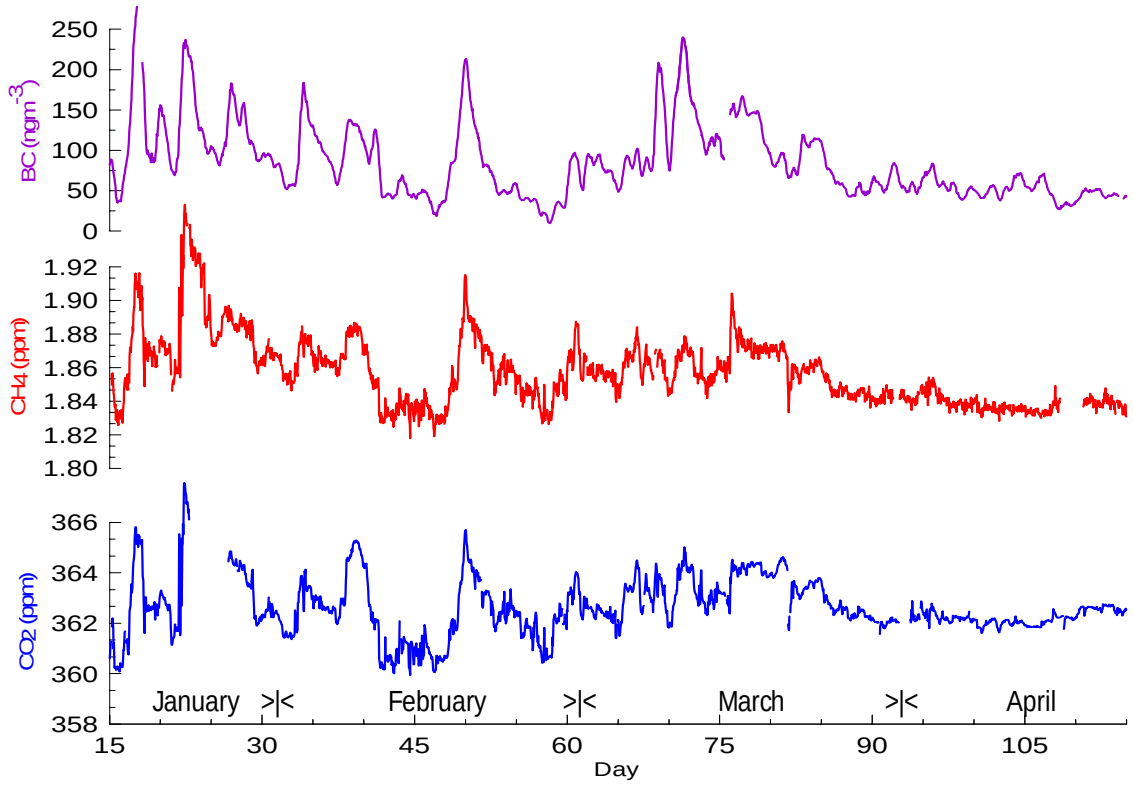
The Canadian Baseline Observatory at Alert, (82°28'N, 62°30'W) located on the northeastern tip of Ellesmere Island in the Canadian Arctic has been making continuous measurements of carbon dioxide (CO_2) and methane (CH_4) since 1988. The time series of these two trace gases are frequently highly correlated during winter with well-defined episodes lasting from 2 to 5 days (figure). Shortly after polar sunrise, the temporal variability in both trace gases diminishes. The winter variability is related to synoptic meteorology, weak vertical mixing, and rapid air mass transport originating from Siberian and European source regions. Given the lack of significant sources of CO_2 and CH_4 during the winter in the high Arctic, these temporal changes in the mixing ratios of atmospheric CO_2 and CH_4 during winter reflect the source strengths in the lower latitudes. In this presentation, annual and interannual variations of these episodic events for CH_4 and CO_2 (as well as black carbon (BC) when available) over the 12-year time period are explored in detail. Preliminary results indicate a decrease in anthropogenic CH_4 emissions from Siberia and Eastern Europe.



Time series of hourly averaged CO_2, CH_4, and BC over the period of January 16 to April 24, 1992. Most of the short-term episodic variability is related to rapid air mass transport from Siberia and Eastern Europe arriving across the pole to Alert. Analysis of 11 long-range transport events during this period resulted in an average ratio (slope) of CH_4 to CO_2 of ~15 ppb/ppm.