

Tracking Changing Arctic Methane Emissions

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The Arctic is a wild card in climate change. It contains more than 1600 Pg C in permafrost ecosystems. There are also 22 to 130 Pg C in clathrates (also known as, methane hydrates) under shallow sediments near the coast of the East Siberian Arctic Shelf. These large reservoirs of carbon are very sensitive to changes in temperature. Temperatures in the Arctic are rising at three times the global rate, and this has the potential to release these stores of carbon as CO₂ or CH₄, acting as a positive climate feedback, amplifying climate change.

The potential magnitude and importance of this positive feedback calls for careful scientific study. Yet, one often finds alarmist claims in the media by scientists that suggest emissions of CH₄ in the Arctic have already dramatically increased. NOAA measurements of CH₄ from air samples collected at Arctic sites show that there were anomalously large emissions in 2007, a warm, wet year in the Arctic; since then, emissions have been close to the climatological average. This is seen indirectly in the figure where the rate of increase in CH₄ zonal mean mole fraction averaged over 53 to 90°N was quite large in 2007, but close to the global average since then. CarbonTracker-CH₄ interprets this rise as a temporary increase of ~5 Tg CH₄ in Arctic CH₄ emissions during 2007. The potential for increased CO₂ and CH₄ emissions in the Arctic is cause for concern. GMD is carefully watching the Arctic for increased emissions over large spatial scales, and also, through collaborations, increasing the types of observations that can lead to improved understanding of processes that emit CH₄, and how those processes change with climate.

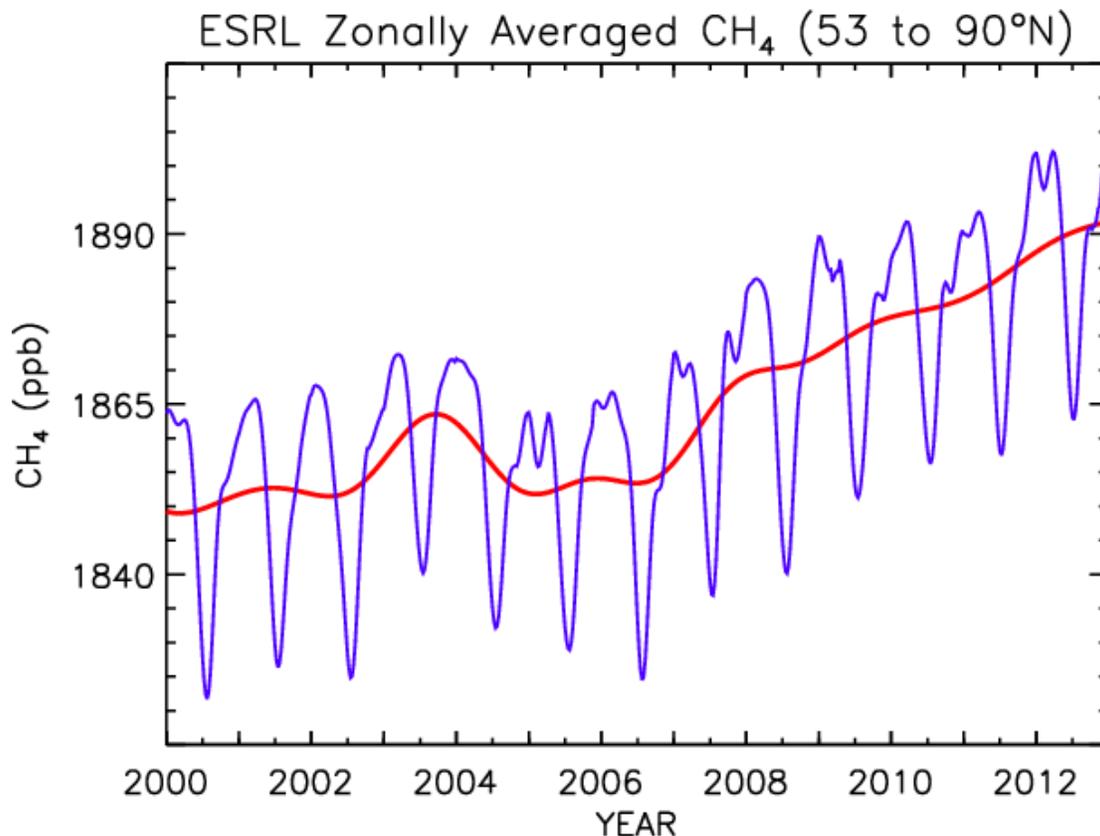


Figure 1. Methane mole fraction averaged over polar northern latitudes (blue). The red line is the deseasonalized trend.