Uncertainties in Preliminary Estimates of CO_2 and CH_4 Trends

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NOAA/GMD's "Trends in Atmospheric CO_2" web page is extremely popular with thousands of hits per month. On this page, users can find current trends at Mauna Loa Observatory and globally, each updated monthly. While there are few limitations to calculating preliminary annual increases and annual means for data from Mauna Loa, there are limitations globally. When the first estimate of annual means and annual increases for the previous year is reported in March, the global calculation is limited by available data from our cooperative global air sampling network. In early-March, because many air sampling sites are remote, many samples from the previous year have not yet been received and analyzed. This is especially important for calculating the annual increase. Since we will soon extend this web page to globally averaged atmospheric methane (CH_4), we looked in detail at potential sources of uncertainty in preliminary estimates. The figure shows the impact of adding successive months of data, up to 50 months out and color coded by year, on the annual increase for CH_4. The initial estimate can be in error by ±2 ppb yr^{-1}, which is significant given that CH_4 has had an average increase of 6 ppb yr^{-1} over the past 8 years. In this presentation, we will explore potential contributors to significant errors for globally averaged monthly means, annual means, and annual increases for CH_4 and CO_2.

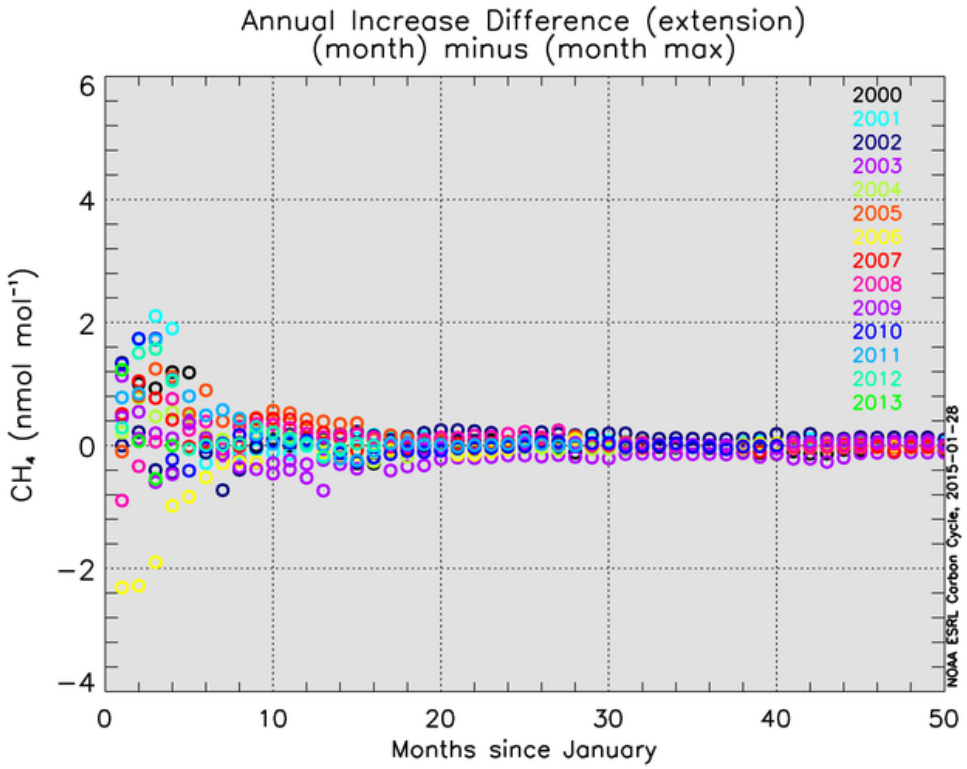

Figure 1. Difference between preliminary and "final" annual increases determined for globally averaged CH_4 (y-axis) as successive months of data are added, up to 50 months (x-axis). Differences are color coded by year.