Recent updates from the Cape Point long-term data records

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The Cape Point (CPT) long-term trace gas data records have matured well and have become valuable sources of information for climate change and related observations. Carbon dioxide (CO_2), for which measurements started in 1993, is showing an unabated upward trend, with growth rates ranging between 2.20 – 2.40 ppm/yr for the 2014 -15 season. On a per-month basis, the background mean values have increased 21.14 ppm for the past decade. The much awaited 400 ppm average monthly background mean barrier has also been breached during the first quarter of 2016.

Atmospheric methane (CH_4), having a 35 year measurement record at CPT, has recently displayed a sharp increase in its growth rate, doubling from around 5.5 ppb/yr in 2013 to well over 11 ppb/yr in the 2015 season. The observation from CPT follows a similar trend to what has been observed globally.

Contrasting the observed increases in greenhouse gas atmospheric mixing ratios, our carbon monoxide (CO) records on the other hand, has displayed a small, but significant decreasing trend over the past 8+ years starting around 2005. Cape Point's 33 year old surface ozone record has also displayed a downward trend of -0.4 ppb/yr for the smoothed growth rates of 2014 – 2015, ranging from -0.1 to -0.8 ppb/yr during that same period.

The CPT Gaseous Elemental Mercury (GEM) data set, now spanning 20 years, has shown a downward trend over the first decade of measurements, but has reversed sign and is now showing an upward trend during the most recent decade with the flex point occurring sometime during 2004 – 2007 measurement period.

Whilst radon measurements at CPT are primarily applied to identify and aid with air-mass selection, its own mixing ratios in the atmosphere has shown some very interesting features over time. The frequency of CPT long-term Rn^{222} observations have shown a decrease in the upper percentile values, specifically those occurring within certain seasons and sectors. This is most likely as a result of shifting air-mass patterns within a specific wind sector due to climate change enhancements.

From a CPT regional activity perspective, our two decade old Dobson data measurements at Springbok and Irene are maturing into a fine data set with both showing an upward trend for column ozone respectively.

References

L. Martin et al., Trend of atmospheric mercury concentrations at Cape Point for 1995-2004 and since 2007, doi: 10.5194/acp-17-2393-2017.