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Performance of N2O and CO analyser for high-precision measurements of atmospheric mole fractions

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N2O and CO are two important biogenic and anthropogenic greenhouse gases. N2O has a global warming potential approximately 300 times greater than CO_2 on a per-molecule basis over a 100 year time horizon and is one of the most important factors affecting stratospheric ozone depletion. CO is a key gas in tropospheric photochemistry, constraining OH concentrations in the unpolluted atmosphere and the oxidising capacity in the troposphere. Due to the importance of N2O and CO as greenhouse and ozone depleting gases, precise high-frequency measurements of the two gases are necessary to better understand atmospheric mixing ratios. A number of different methods are available to measure the two gases, mainly based on chromatographic and reduction methods. The chromatographic method used to quantify atmospheric N2O mole fractions has not yet reached the WMO compatibility goal of $\pm$ 0.1 ppb.

Over the past few years, new analytical techniques based on optical spectroscopy have been developed and become commercially available, providing near-real time data to high precision. In this presentation, we will give an overview of the performance of an Off Axis-Integrated Cavity Output Spectroscopy analyser with improvements made to temperature and pressure stability by the Scripps Institute of Oceanography. Results of the continuous repeatability measurement (referred to as precision by the manufacturers), short- and long-term repeatability, drift, temperature dependence, instrument linearity and H_2O sensitivity will be presented.