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A new observational system for remote in-situ measurements of atmospheric trace gases in Namibia

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It is a considerable challenge to make high-precision, continuous *in-situ* measurements of atmospheric trace gases, especially in remote locations where equipment must be run with little or no technical assistance. We present an observational system for measurements of atmospheric CO_2, CH_4, CO and O_2, which is applicable for remote locations. This system employs a novel method for CO_2 and CH_4 measurements based on Cavity Ring Down Spectroscopy (CRDS) developed by Picarro Inc. Using the CRDS instrument (model ESP-1000) we expect to achieve a CO_2 precision of $<$0.02 ppm and CH_4 precision of $<$0.3 ppb (1σ SD over 1 min). This method is linear for CO_2 and CH_4, has very low drift and requires no consumables. For CO, we use a VUV resonance fluorescence method (Aerolaser, model AL5001) achieving a precision of $<$1.5 ppb (1σ SD over 1 min) and for O_2, a fuel-cell technique (Sable Systems, model OXZILLA-FCII) with a precision of $<$0.1 ppm (1σ SD over 1 min).

It is planned that the system will be installed near the Gobabeb Training and Research Center, Namibia (23˚35'S, 15˚.00'E, 456 m asl) in order to measure the atmospheric signals from air-sea gas exchange (of CO_2 and O_2) in the region of the Benguela Current, as well as to fill a conspicuous gap in the global observation network. Furthermore, some information from land fluxes in the African sub-continent will be contained in the atmospheric signal, which will provide an additional constraint on emissions of greenhouse gases from this region.