Efforts to separately report random and systematic measurement uncertainty for continuous measurements in the NOAA Global Greenhouse Gas Reference Network

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We have developed a multi-species framework for separately reporting time-dependent random and systematic uncertainties for continuous measurements of CO_2, CH_4, and CO [Andrews et al., 2014]. Knowledge of systematic errors enables reliable trend detection and confident interpretation of spatial gradients, and information about random errors is needed to correctly propagate uncertainties when computing time averages and to estimate atmospheric variability. We will show that in most cases, random and systematic errors can be estimated using straightforward diagnostics, and we will describe modifications for measurements of humid air streams. We will also discuss challenges encountered in applying the framework to historical data records.

References

A. E. Andrews et al., CO_2, CO, and CH_4 measurements from tall towers in the NOAA Earth System Research Laboratory's Global Greenhouse Gas Reference Network: instrumentation, uncertainty analysis, and recommendations for future high-accuracy greenhouse gas monitoring efforts, Atmos. Meas. Tech., 7, 647–687, 2014 www.atmos-meas-tech.net/7/647/2014/ doi:10.5194/amt-7-647-2014.