

Traceability of Measurements Within the Global Atmosphere Watch Programme: Results from the World Calibration Centre WCC-Empa

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Empa operates the World Calibration Centre for Carbon Monoxide (CO), Methane, Carbon Dioxide and Surface Ozone (O₃) (WCC-Empa) since 1996 as a Swiss contribution to the Global Atmosphere Watch (GAW) programme and has conducted over 70 system and performance audits over the past 20 years. This activity significantly contributes to sustain and improve the data quality required for climate and environmental research. The concept of the performance audits was recently expanded by the addition of parallel measurements with a travelling instrument using an entirely independent inlet system and calibration scheme.

The presentation will focus on results of CO and O₃ comparisons with relation to the measurement technique. Our performance audit results for CO show that the World Meteorological Organization (WMO)/GAW compatibility goal of 2 nmol/mol is often not met. Further, the advantages of the new performance audit approach will be shown. Results of CO comparisons from various stations using different analytical techniques will be analyzed, and aspects such as water vapor interference, calibration frequency, data coverage, and aggregation times will be addressed. An example of a parallel measurement between the station CO analyzer of Ushuaia (Horiba APMA-360 NDIR instrument) and the WCC-Empa travelling analyzer (Picarro G2401 Cavity Ring-Down Spectrometer) is shown in Figure 1. The temporal variation was well captured by both instruments, and a mean offset of 2.8 ± 2.7 nmol/mol was observed. Our results further indicate that the Ushuaia station can be significantly influenced by local and / or regional pollution sources, which has to be considered for data interpretation.

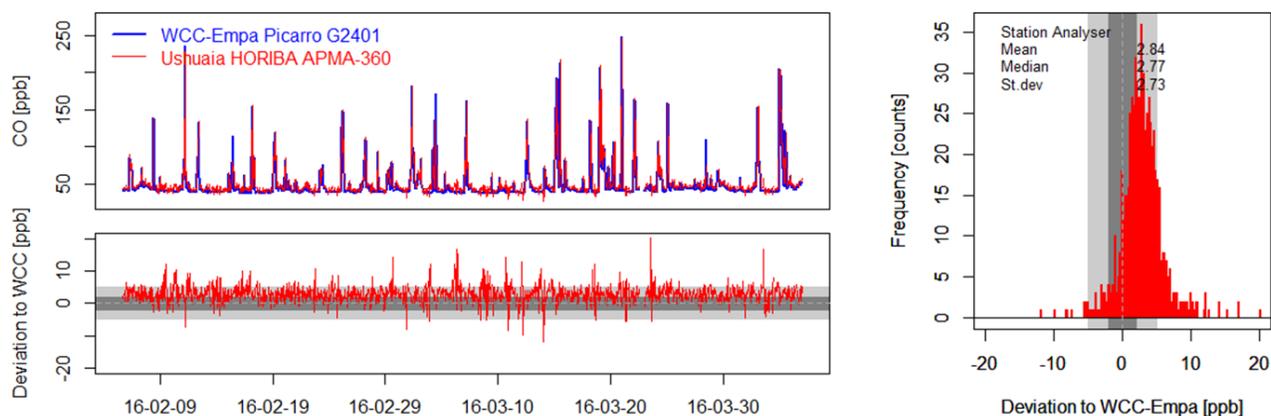


Figure 1. Left: Upper panel: Time series (1-h averages) of the Ushuaia station CO analyzer (red line) and the WCC-Empa travelling instrument (blue line). Lower panel: Difference between Ushuaia and WCC-Empa. Right: Deviation histogram. The dark and light grey areas correspond to the WMO/GAW compatibility and extended compatibility goals.