

Icos ATC Metrology Lab: A Facility for Metrological Performance Assessment of Prototypes and Commercialized GHG Analyzers

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In the framework of ICOS, an European research infrastructure aiming to provide harmonized high precision data for advanced research on carbon cycle and greenhouse gas (GHG) budgets over Europe, the Atmosphere Thematic Centre (ATC), located at LSCE in Gif-sur-Yvette, France, includes the Metrology Lab, a facility mainly dedicated to elaborating measurement protocols and evaluating performance of GHG analyzers. The Metrology Lab assesses the ICOS compliance of the analyzers before deployment in the ICOS monitoring station network, but also carries out a technology watch by testing the performance of new instrument, prototype and emerging technology from company and research group. The current species handled by ICOS for continuous measurement are CO₂, CH₄ and CO. However ICOS is targeting in a near future other species such as N₂O and isotopologues of CO₂ and CH₄. Most of the analyzers tested at the Metrology Lab are based on Cavity Enhanced Spectroscopy. The conducted tests consist in characterizing the metrological performance in term of precision, repeatability, linearity, drift, cross sensitivity with other species, thermal sensitivity, water vapor correction (to derive the dry mixing ratio) among others. For that purpose, the Metrology Lab has at its disposal a lot of sources of stable air (tanks) with different mixing ratios of the targeted trace gas and all the required equipment such as a humidifying bench able to humidify a known mixing ratio gas at different stable H₂O levels.