

5.037 An advanced cross platform whole air sampling system to extend airborne Volatile Organic Compound (VOC) measurement capability.

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Abstract:

In comparison to the extensive airborne measurement programme in Japan and the United States (e.g. at NIES, NCAR, NOAA and NASA), VOC observations made from aircraft in whole air samples (WAS) across Europe are relatively limited. Regular routine sampling into glass canisters is on going as part of the IAGOS-CARABIC project, analogous to the Japanese CONTRAIL project, but other air sampling systems are generally limited to single campaigns or specific to individual measurement platforms. For example, the large UK aircraft (FAAM BAe146) has dedicated WAS, used by multiple institutions but bespoke for that aircraft and unavailable for use in other platforms within the European fleet.

A new, universal WAS system has been developed to meet the requirements of multiple platforms, accessible to any downstream analytical system and that is lightweight, robust and portable. This greatly enhances the scope of future measurements as the system can be operated on almost any measurement platform, easily transported globally and the analysis of samples carried out at any appropriate facility without geographic limitation. The system is a modular design of 6U, 19" rack mountable units with stand-alone electronic control and basic operating requirements. Each 20 kg unit houses 16 bellows valve (Swagelok) actuated Entech Silonite coated 1.4 L canisters (as per NASA Global Hawk) optimised to preserve VOC integrity.

To test the system cross-platform, it has been deployed on the BAS DHC-6 Twin Otter during oil and gas emission monitoring flights (small aircraft experiments), the University of York mobile laboratory for the quantification of exploratory 'fracking' activities (on-road mobile experiments) and it will replace the current WAS system aboard the FAAM BAe146 (large airborne) for future aircraft atmospheric chemistry experiments, providing 96 canisters per flight with fully automated event driven sampling, synchronised via data

links with other networked aircraft systems/instruments.