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ANITA2, AN HIGH PERFORMANCE ISS AIR MONITORING SYSTEM FOR CONTINUOUS  
OPERATION

**Abstract**

Following the successful European precursor mission ANITA1 (Analysing Interferometer for Ambient Air) operating on ISS for 11 months in 2007 and 2008, the next generation system ANITA2 is in the design and breadboarding phase. The complementary ANITA1 information on the ISS air conditions has shown the advantages of an optical sensor with high time resolution and the simultaneous detection and quantification of the most important trace gases in the ISS atmosphere. Several gases were measured in the ISS air for the first time, and one of these was previously even unknown to be present. ANITA1 also delivered new, surprising results on the dynamics of the crewed cabin atmosphere. Many events occurring during the system operation, like Shuttle and Soyuz dockings, opening to new ISS modules, leakages from the Russian cooling system, and the daily variations in crew activities, could be clearly identified, analysed and assigned to the different happenings.

The successor system ANITA2 is now in the development phase considering all lessons learned from the ANITA1 operations. The new instrument design reduces the instrument mass by a factor of two and the instrument volume even more, and it also gives promises for a system with improvements in gas sensitivity and precision of one order of magnitude. The next mission is planned for three to five years of (automatic) operation on ISS, where the system relatively easily can be accommodated, since it consumes nothing but power. ANITA2 will be calibrated to detect and quantify simultaneously and quasi on-line 33 (or possibly more) of the most important trace gases in the cabin atmosphere. The optimised instrument in combination with sophisticated analysis software – based on advanced simulations and statistical regression techniques – will form a reliable and compact multi-gas air quality monitor.

ANITA2 is also suggested (like ANITA1) to be an ESA-NASA cooperative programme. ANITA2 further represents a precursor system for missions e.g. to Moon and Mars under the manned exploration programme.

The paper will report on the newly started instrument and analysis software pre-developments and will give an outlook into the future programmatics.

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