



RUSALKA experiment to measure carbon dioxide and methane from ISS

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RUSALKA experiment aimed to demonstrate the method to monitor CO₂ and CH₄ is now prepared for the Russian segment of the International Space Station (ISS). Hardware will be delivered to ISS in March 2009. The novel instrument is a high-resolution near-IR spectrometer combining an echelle grating with an acousto-optic tunable filter (AOTF) for separation of diffraction orders. A compact design with no moving parts within the mass budget of 2 kg allows to reach the resolving power of 10000-20000 in the spectral ranges of 1580 nm (CO₂), 1640 nm (CH₄), in 49 and 47 diffraction orders, and of reference O₂ bands 760 and 1270 nm, in 101 and 61 diffraction orders. Only one diffraction order can be measured at a time, but thanks to flexibility of the AOTF tuning, any order can be measured randomly and rapidly within the spectral range. A spectrometer, based on this principle, SOIR (Solar Occultation InfraRed) is operational on Venus Express ESA mission since 2005. RUSALKA investigation targets precision measurements of CO₂ and CH₄ integral quantities, in nadir/oblique or observing solar glint over the water surfaces. Test measurements are also planned in solar occultation mode. Battery-powered RUSALKA package consists of the spectrometer itself, standard photographic camera for context imaging, and adapters. Measurements will be performed by crew members pointing manually the target areas. Such measurements from ISS will allow to verify the method to be used in the future on different satellite platforms. The small size of the instrument makes it ideal for micro-satellites, capable to provide necessary pointing for glint or solar occultation observations. The status and calibration of RUSALKA flight hardware will be discussed.