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Improved near-infrared high-resolution solar spectrum from ACS NIR onboard TGO

Karim Gizatullin (1,2), Alexander Trokhimovskiy (1), Anna Fedorova (1) Oleg Korablev (1), Franck Montmessin (3), Daria Betsis(1), Jean-Loup Bertaux (1,3), Monique Spite (4) , and the ACS Team
(1) Space Research Institute (IKI), Moscow, Russia, (2) Moscow Institute of Physics and Technology (MIPT), Dolgoprudny, Russia, (3) LATMOS/IPSL, UVSQ Université Paris-Saclay, UPMC Univ. Paris 06, CNRS, Guyancourt, France, (4) GEPI Observatoire de Paris, CNRS, Guyancourt, France

1 Introduction

The Atmospheric Chemistry Suite (ACS) is Russian contribution to ESA-Roscosmos ExoMars 2016 Trace Gas Orbiter (TGO) mission [1], [2]. It arrived to Mars in October 2016. ACS is a package of three high sensitive infrared spectrometers with high resolve power (>10,000) and cover from 0.7 to $17\mu m$ — the visible to thermal infrared range [1].

In this work we present first results for high resolution solar spectra observed by ACS NIR [3] instrument in near infrared range.

2. Observations

The ACS NIR is a near infrared spectrometer, extension of SPICAM-IR instrument family [4], the main concept of which relies on the combination of an acousto-optic tunable filter (AOTF) and an echelle diffraction grating [1]. This combination gives resolving power $\frac{\lambda}{\Delta\lambda} \approx 25{,}000$ in spectral range of $0.73 - 1.65\mu m$ that corresponds to the echelle diffraction orders from 48 through 105. This is the first instrument that can measure with such high resolution in near-IR range outside the atmosphere. Here we present results that were obtained in June 2016 during Mid Cruise Checkout TGO Payload (MCC) observations of Sun. The NIR solar spectrum shows some undiscovered lines and differences from the known solar spectra in the range of $1.3 - 1.5\mu m$ where the strong water absorption in the Earth atmosphere prevents from getting pure solar spectrum. The comparison with the Continuum Absorption at Visible and Infrared Wavelengths and its Atmospheric Relevance (CAVIAR) [5] solar spectrum and theoretical solar spectrum will be presented here.

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