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One Year Of Observations By The Atmospheric Chemistry Suite (ACS) Experiment On Board The ExoMars Trace Gas Orbiter

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The Atmospheric Chemistry Suite (ACS) on board ESA-Roscosmos ExoMars 2016 Trace Gas Orbiter (TGO) spacecraft will complete one year of Mars observations in March 2019. ACS consists of three infrared spectrometers targeting the detection of trace gases of potential geophysical or biological interest, as well as the monitoring of the martian atmosphere state. ACS channels feature high resolving power (>10,000) and broad spectral coverage (0.7 to 17 μm). The near-infrared (NIR) channel covers the 0.7-1.6 μm spectral range with a resolving power of $\geq$20,000. Results of solar occultation sounding by NIR, including profiling of H_2O with high accuracy and in a broad altitude range, and the first ever profiling molecular oxygen O_2 in the lower atmosphere will be reported. The mid-infrared (MIR) channel is a high spectral resolution (resolving power of $\geq$30,000) instrument dedicated to solar occultation measurements in the 2.2-4.4 μm range. MIR is conceived to accomplish the most sensitive measurements of the trace gases in the Martian atmosphere, allowing also parallel profiling of the abundant components such as CO_2, H_2O and their isotopologues. MIR results putting stringent upper limits to methane abundance will be reported. The thermal-infrared channel (TIRVIM) is a Fourier-transform spectrometer with cryogenically-cooled detector encompassing the spectral range of 1.7-17 μm. Observing the CO_2 15-μm band in nadir TIRVIM returns temperature profiles from the surface up to 50-60 km, together with the dust and water ice optical depth. Also the surface temperature is measured. In solar occultation TIRVIM delivers profiles of CO_2, CO, H_2O and aerosols, as well allowing to distinguish between mineral and condensate aerosols. ACS has monitored the state of the martian atmosphere before and during the dust event 2018A. The status of the experiment and key findings will be summarized in the talk.