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The ExoMars Trace Gas Orbiter – Progress and future studies

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The Trace Gas Orbiter, TGO, is now well into its second Martian year of operations. The first year has been a highly successful Martian year, starting with the rise, plateau and decay of the major Global Dust Storm in the summer of 2018. This has enabled interesting results to be derived on the dynamic behaviour as a consequence of the dust storm. A significant observations is the strong upward transport of water vapour that has been found during the dust storm. HCl has been detected for the first time in the Martian atmosphere, and characterisations of the other minor species and trace gasses are continuing. A large numbers of profiles are being produced on a daily basis. The dedicated search of methane is continuing and still shows that there is no methane above an altitude of a few km, with an upper limit established at about 20 pptv (2×10^{-11}).

We now have a full Martian year of observations after the Global dust storm, and seasonal effects can now be studied under normal conditions. Climatological studies, benefitting from the 400km, 74 degrees inclination non-solar synchronous orbit, have been initiated, even if the full potential will be visible only after a few Martian years of operation. The FREND instrument has characterised the hydrogen in the shallow sub-surface on a global scale, at a spatial resolution much better than previous missions have been able to do. It has found areas at surprisingly low latitudes with significant amounts of sub-surface hydrogen, most likely in the form of water ice. The CaSSIS camera has made a well above 15,000 of images over a large variety of targets, including the landing sites of the 2020 NASA and 2022 ESA rovers, Jezero Crater and Oxia Planum. Stereo imaging has enabled topographic information and precise 3-D landscape synthesis.

This presentation will summarise the highlights and recent results and discuss planned activities for the near and medium term future.

The ExoMars programme is a joint activity by the European Space Agency (ESA) and ROSCOSMOS, Russia. It consists of the ExoMars 2016 mission, launched 14 March 2016, with the Trace Gas Orbiter, TGO, and the Entry Descent and Landing Demonstrator, EDM, named Schiaparelli, and the ExoMars 2022 mission, to be launched in September 2022, carrying a Rover and a surface science platform to the surface of Mars.