

ExoMars Trace Gas Orbiter – Status and future activities

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Abstract

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 2020 mission, to be launched in July 2020, carrying a Rover and a surface science platform.

TGO arrived at Mars on 19 October 2016 and was inserted into a near equatorial, highly elliptical 4 sol period capture orbit. Two orbits in late November were dedicated to instrument calibration and initial science observations, where an excellent performance of all instruments could be confirmed. In January 2017 the orbital plane was changed to its final inclination of 74 degrees and the period was reduced to one Sol. Early March 2017 an additional two orbits were scheduled for instrument tests and observations, after which a long period of aerobraking commenced. The aerobraking phase was running very smoothly and was suspended for two months during the solar conjunction in the summer of 2017, and then finished with an orbit having an apocentre just above 1000km on 20 February 2018. After this a series of thruster firings brought the apocentre further down to 400 km. The final near circular 400km altitude orbit, with a 2 hour period, was reached on 7 April 2018, after which a full check out of the spacecraft and the instrument was performed. The science operations in the Commissioning and Verification Phase, including solar occultation measurements with the two spectrometers, started on 21 April. The commissioning phase will be concluded with a Mars Orbit Commissioning Review on 14 June and the full nominal science operation will start in September 2018.

The TGO scientific payload consists of four instruments. These are: ACS and NOMAD, both being spectrometers for atmospheric measurements

in solar occultation mode and in nadir mode, CASSIS, a multichannel camera with stereo imaging capability, and FREND, an epithermal neutron detector for search of subsurface hydrogen. The mass of the TGO is 3700 kg, including fuel and the mass of EDM was 600 kg. The EDM was carried to Mars by the TGO and was separated three days before arrival at Mars but unfortunately failed during the last stage of the descent.

This presentation will cover a brief description of the Trace Gas Orbiter mission, the present status, an overview of the first operations in the science orbit, and the planned future activities.