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Facilities and Operations of Microgravity Experiments (5)

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"TELESUPPORT", A TOOL FOR MORE EFFICIENT MICROGRAVITY EXPERIMENTS ON MID OR LONG DURATION MISSIONS

Abstract

A mission with the Russian spacecraft Foton offers a natural complement to microgravity experiments on rapid sounding rockets like Texus, Maser or Maxus but also to very long experiments on-board the Shuttle or the International Space Station. During such Foton missions, with a typical duration of two weeks, flexibility in terms of experiment schedule, configuration and/or thresholds values may become important and the introduction of telescience and a way to interact with the experiments during the mission is easy to understand and argue for. Foton-M3 was launched by a Soyuz-U rocket on September 14, 2007. On-board were eighteen ESA controlled microgravity experiment modules of a total mass of approx 400 kg. Equipped with two video channels and 16 serial interfaces, the Telescience Support Unit, "TeleSupport", supported ten of these experiment modules. During the 12-day mission, communication was established whenever the spacecraft was visible from the "Payload Operation Centre" established at Esrange in the northern part of Sweden. As the fourth generation of "TeleSupport" communicates to earth following the CCSDS standard, several ground stations could receive data and hereby establish a better around the clock coverage. Two receiving stations in Canada were used to primarily increase the amount of gathered data, but also to inform the experiment expertise at the "Payload Operation Centre" current status of their experiment before the next day's first pass. "TeleSupport" enables scientists and engineers to closely monitor the execution of their experiments in order to optimise the scientific outcome. Manned by over 40 experts, the "Payload Operation Centre" was able to analyse preliminary results and corrective actions or modifications were taken each day. In various ways, all ten experiments took good use of the flexibility made by "TeleSupport" which therefore heavily contributed to the successful outcome of the Foton-M3 mission.

Keywords: Telescience, TeleSupport, CCSDS, Esrange, Foton-M3.