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Microgravity Experiments from Sub-Orbital to Orbital Platforms (3)

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MICROGRAVITY FOR EVERYONE - THE UPCOMING SUBORBITAL EXPRESS SOUNDING ROCKET MISSION FOR SCIENCE, TECHNOLOGY AND COMMERCIAL APPLICATIONS – A MISSION OUTLINE

Abstract

SSC, the Swedish Space Corporation, has a long and successful heritage in sounding rocket payloads and missions. This paper sets focus on the scientific and technological payloads of the next such mission, the upcoming SubOrbital Express 3 – M15, and describes the mission outline. The flight will provide approximately 6 minutes of microgravity by reaching an apogee of about 260 km. The vehicle will be comprised of the reliable VSB-30 motor and includes recovery and service systems.
The mission offers 285 kg of scientific or technical payload capacity of which a significant part is allocated to ESA experiments. Nevertheless, the Suborbital Express rideshare concept allows utilization of the entire payload capacity affording non-Agency organisations access to this microgravity platform.
The ESA microgravity experiments were selected as part of the E3P CORA (Continuously Open Research Announcement) and are namely *ARLES-II* and *CHIP*. The *ARLES-II* (*Advanced Research on Liquid Evaporation in Space* / University of Marseilles) investigates fluid flow motion and flow instabilities of droplets during the evaporation process. *CHIP* (*CHarges In Planet formation* / University of Duisburg-Essen) examines the influences of charged particles in the aggregation process of planet formation. The experimental payload modules are being developed and built by SSC.
The Italian Aerospace Research Centre (CIRA) participates with *Mini-Irene*, the technological demonstrator of *IRENE* (*Italian Re-Entry NacellE*), a low-ballistic-coefficient re-entry capsule. Mini-Irene will be ejected during flight for free fall as part of qualification of a deployable and flexible thermal protection system. The drop capsule falls back to earth and is recovered separately. A team of the Universities of NOVA Lisbon, Caparica, Coimbra, the Polytechnical School of Porto and MIT contributes with the experiment *Lab-on-Paper* which evaluates the feasibility of colorimetric rapid tests under the influence of microgravity. The flight ticket is provided by the European Low Gravity Research Association (ELGRA).
Several more scientific and technical payloads are going to be discussed in this paper.

Microgravity research, atmospheric science and direct access to space have been served since the 1950s by the means of sounding rockets, launched from all over the world. SSC contributes with launches of sounding rockets from Esrange Space Center in northern Sweden for more than 50 years. The location enables the unique opportunity to launch and recover the payloads from land within 2 hours and provides herewith a perfect environment for scientific research under microgravity and in-situ measurements in the atmosphere of the polar regions.