

MICROGRAVITY SCIENCES AND PROCESSES (A2)  
Microgravity Experiments from Sub-orbital to Orbital Platforms (3)

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THE FIRST JOINT EUROPEAN PARTIAL-G PARABOLIC FLIGHT CAMPAIGN: A JOINT  
APPROACH BETWEEN ESA, CNES AND DLR TO CONDUCT SCIENCE AND TO PREPARE  
EXPLORATION AT MOON AND MARS GRAVITY LEVELS

**Abstract**

Aircraft parabolic flights provide repetitively short periods of reduced gravity during ballistic flight manoeuvres. Parabolic flights are used to conduct scientific and technology microgravity investigations, to test instrumentation prior to space flights and to train astronauts before a space mission. Since 1997, ESA, CNES and DLR use the Airbus A300 'ZERO-G', currently the largest airplane in the world for this type of experimental research flight. This mean is managed by the French company Novespace. Since 2010, Novespace offers the possibility of flying reduced gravity levels equivalent to those on the Moon and Mars achieved repetitively for periods of more than 20 seconds. ESA, CNES and DLR issued an international call for experiments inviting European Scientists to submit experiment proposals to be conducted at these partial gravity levels. The scientific objectives are on one hand to obtain results at intermediate levels of gravity (between 0 and 1g) allowing to better study the influence of gravity, and on the other hand to give them some elements to prepare for research and exploration during space flights and future planetary exploration missions. ESA, CNES and DLR will jointly organise in June 2011 the first Joint European Partial-g Parabolic Flight (JEPPF) campaign with 13 experiments selected among 40 received proposals.

Parabolas will be flown during three flights providing micro-, Moon and Mars gravity levels with duration typically of 20s, 25s and 28s with a mixed complement of investigations in Physical and Life Sciences and in Technology. The paper will present the Airbus A300 'ZERO-G' technical capabilities for this kind of experimental flights to support and conduct investigations at Moon-, Mars- and micro-gravity levels. The 13 selected experiments will be introduced and some experiment preliminary results will be presented to show the interest of this unique research tool for microgravity and partial gravity investigations.