

IAF SPACE EXPLORATION SYMPOSIUM (A3)  
Moon Exploration – Part 3 (2C)

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MOON GRAVITY PARABOLIC FLIGHTS ONBOARD NOVESPACE'S AIRBUS A310 ZERO G: A  
COST-EFFECTIVE AND CRITICAL TEST BED FOR UPCOMING LUNAR MISSIONS**Abstract**

In recent years, space agencies have shown a real political will to return to the Moon with the initiation and strengthening of the Artemis program. To be successful, this program requires the development of new technologies and new materials to design innovative life support systems, pressurized modules or extravehicular space suits that will allow astronauts to land, work and live on our satellite. The critical nature of these elements and the considerable cost of transporting them to the Moon require a particularly high level of reliability. In this perspective, tests in reduced gravity conditions (0.16g) are essential.

Parabolic flight aircraft are the only way on Earth to place objects and people in a reduced gravity field. The Airbus A310 Zero G from Novespace is particularly suitable for carrying out such scientific and technological research flights. Indeed, it offers scientists and engineers an experimentation area of more than 100m<sup>2</sup>, with up to 2.26m of ceiling height, which makes it possible, for example, to carry out human tests of space suits or deploy large systems. Standardized interfaces allow for the installation of laboratory equipment or custom-made experimental setups.

Up to 40 researchers and 12 multidisciplinary experiments can board the aircraft at the same time, making it an efficient and cost-effective means of experimentation. A flight includes either 16, 31 or 61 parabolas lasting 25s, i.e. a cumulative time in microgravity of about 6.5, 13 or 26 minutes per flight respectively. Throughout the preparation and the flight, participants are guided by a highly-qualified team, which benefits from more than 30 years of experience in operating microgravity flights.

This oral presentation details the interfaces and the performance of the Airbus A310 Zero G, the different ways for the scientific community or companies to participate in partial gravity flights as well as relevant examples of experiments that have recently flown on board. It thus gives a global vision of the possibilities offered to the space community for the preparation of future missions to the Moon.