

IAF MICROGRAVITY SCIENCES AND PROCESSES SYMPOSIUM (A2)  
Facilities and Operations of Microgravity Experiments (5)

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ACE2SPACE - HOW PARABOLIC FLIGHT CAN BE AFFORDABLE & FLEXIBLE

**Abstract**

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# ace2space

Royal Netherlands NLR and Delft University of Technology

IAC 2021

## **How parabolic flight can be affordable and flexible**

**ace2space** is the name under which Royal Netherlands Aerospace Centre NLR and Delft University of Technology perform parabolic flights. The aircraft used for these flights is a Cessna Citation II research aircraft, a twin-engine, business-type aircraft. The aircraft has several features that improve the quality of the parabolic manoeuvres, which will be addressed below.

ace2space offers *flexible* and *affordable* parabolic flight services. The term *flexible* refers to a short time between request and flight, something ace2space can offer because of their compact organization. As ace2space flies with one customer at a time, it is easy to return to base and save valuable time and money whenever needed. Other aspects of flexibility range from the ability to fly a customer defined number of parabolas, easy rescheduling of flights when needed, to such practical things as the ability to park the aircraft in a limited hangar space at customer's premises/nearby airport.

*Affordable* obviously means a low price per parabola, which ace2space can offer because of the low operating cost of the relatively small aircraft.

ace2space has given much attention to the quality of the parabola by developing means to provide flight guidance to the pilots. Flight guidance can be displayed on Augmented Reality Glasses as well as on a display in the cockpit. With these means, 15 second parabolas with an accuracy of about 0.01g can be achieved. Also Moon (0.17g) and Mars (0.38g) parabolas, or any other g-target between 0 and 1g, can be flown. The relatively small size of the aircraft makes sure that the experiment in the cabin is always very close to the center of gravity, which further adds to the high quality of the gravity condition.

Several standard cabin layouts have been certified and are available for use. These layouts consist of all kinds of combinations of seat arrangements, instrumentation boxes and experiment tables. A minimum seat arrangement is ideal for free floating experiments. A maximum seat arrangement (8 seats in the cabin) can host a Flying Classroom environment, in which each seat is equipped with a personal instrumentation system displaying real-time primary flight data via a wireless connection.

With this unique flight facility, ace2space contributes to the low gravity research community by filling up a niche in the total spectrum of services.