

SPACE LIFE SCIENCES SYMPOSIUM (A1)  
Public Outreach and Education in Space Life Sciences (8)

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SMALL MEDICAL EXPERIMENTS IN INNOVATIVE AEROBATIC SINGLE-ENGINE PARABOLIC  
FLIGHTS: PROVIDING DATA AND INSPIRATION FOR THE EXPLORERS OF TOMORROW

**Abstract**

Recent research undertaken by the joint venture led by the Universitat Politecnica de Catalunya, with its partners, the Aeroclub Barcelona-Sabadell and BAIE, Barcelona Aeronautics Space Association, has shown that it is possible and safe to obtain zero-gravity conditions for up to 8 seconds with single-engine aerobatic planes. The quality of the microgravity is comparable to that obtained by conventional parabolic flights. The main advantage of this technique is that a lower cost-to-time of microgravity ratio, during the parabola is obtained. Small life science experiments that require no more than this short period of time and cannot be run in drop towers, benefit from an easy access to the experimental platform. We present here how data of small medical experiments which had flown with our platform are thereafter used for the first time as an educational tool. Experiments were aimed at validating a numerical model (NELME) that has been developed in our research group, which is intended to suggest what actual changes in the cardiovascular system can be expected when the human body is exposed to reduced gravity. Some medical variables were collected from a subject who was on board, sustaining from nearly zero up to 3.5 g in the pull-in and pull-out manoeuvres. An educational tutorial was developed, based on these experiments, containing an introduction to space physiology, how the data was obtained and why it was useful, and a hands-on material where students can actually use a simulation software to see what changes may happen to the human body when exposed to long-term scenarios, like a long expedition to the Moon, or a trip to Mars. The material was tested by engineering students, who had nearly no previous understanding of medical concepts, but it can easily be used also for life sciences students with no knowledge of simulation techniques. A final survey, and an evaluation of the students work results was conducted, in order to assess the impact of this activity. Students of our University also have the opportunity to design their own experiment, and actually build it and fly it in zero gravity at Sabadell Airport (Catalunya, Spain), very near to the Faculty premises in Barcelona. In conclusion, we believe that this innovative microgravity platform will open new doors to inspire students around the world to get an interest on space medicine and research, and we look forward to expand this opportunity in the upcoming years.