Paper ID: 76949
oral

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

Author: Prof. Vladimir Pletser
Blue Abyss, United Kingdom, vladimir.pletser@blueabyss.uk

# FUTURE POSSIBILITIES FOR GRAVITY-RELATED RESEARCH AND TRAINING AT BLUE ABYSS

**Abstract**

The new step in space exploration seeing an exponential increase in the number of astronauts flying in space and preparing future Moon and Mars missions in the coming years will be possible if research and training at different gravity levels is actively pursued. Blue Abyss, a UK company based in Newquay, Cornwall, with expected expansion to Cleveland, Ohio, USA, and in the future, in Middle-East and the Far-East, proposes a versatile approach for astronaut training and research at various gravity levels and in different environments. Each Blue Abyss centre [1-2] will be built around four main axes: (1) A versatile multi-use dive pool with several platforms from 3 to 20 m, a space research area, the Astrolab platform at 12m, and a 50 m deep shaft; (2) The provision of centrifuge services to refine the study of hypergravity physiological effects; (3) A parabolic flight capability to offer zero, reduced and hyper gravity for physical, biology and human physiology research; and (4) A pedagogical and outreach program offering an interactive, dynamic approach to STEM-related education for students, tomorrow's scientists. The ground infrastructure will include laboratories and classrooms; hypobaric and hyperbaric chambers; and the Kuehnegger Human Performance Centre, a unique research centre that will house specialized test and evaluation facilities. The centre will include a microgravity simulation suite with a traversable, full-body suspension system and other microgravity and hypergravity simulators that will be used for physiological studies, rehabilitation and training. Astrolab will offer a pressurized module which can accommodate crews for short and long duration missions to train at 0g, Moon-g or Mars-g with special buoyancy equipment. The parabolic flight aircraft will have dedicated mock-ups of space vehicles, space station modules and extra-terrestrial planetary base modules to offer further capabilities for orbital research and training. Meticulous preparation using multiple parabolas will enable space mission procedures and protocols to be carefully and successfully practised to prepare for future Moon and Mars exploration missions. This paper will present the latest planning for these unique capabilities under development with international partners.

References 1. Pletser V., Evetts S., Vickers J., Parazynski S. "Commercial Space Flight Preparation and Extra Vehicular Activities Training: The Next Generation", New Space, J. Space Entrepreneurship and Innovation, 7(3), 120-125, 2019. 2. Pletser V., Howard M., Evetts S., Vickers J. "The Blue Abyss Commercial Astronaut Training Centre: Enabling Space Flight Participants to Fly Safely", 73rd IAC 2022 Proceedings, Paris, France