



Press Release – 2 April 2019

IGLUNA – a moon habitat demonstration by students inside the glacier cave of Klein Matterhorn in Zermatt

20 student teams designed their prototypes during the autumn semester 2018 which they are building in the spring semester 2019. These modules will come together during a field campaign inside the glacier cave of the Klein Matterhorn and an exhibition downtown in Zermatt, Switzerland, building a habitat in ice and answering the question, how humans can survive in an extreme environment like the moon.

The designs of the modules elaborated by the student teams were frozen at the midterm event, which was organized in January at CERN in Geneva. During the next two months, the project teams are building their prototypes and will ship them by June to Zermatt in order to launch this space like mission. During this field campaign, the elements come together: the students will build the habitat, test their equipment and present their projects. The ice cave is located 3883 meters above sea level, inside the glacier, 15 meters underneath the surface with a temperature of -4°C . In this extreme environment, students will build the habitat and test their prototypes. Additionally, they will also test their equipment outside the cave on the surface of the glacier of the Klein Matterhorn. In parallel, students will set-up an exhibition hall in Zermatt at the Art Gallery of the Backstage Hotel Vernissage.

As the field campaign is open to public, exhibitions related to IGLUNA and the topic of living on the moon will be organised in the Glacier Palace and downtown Zermatt. A media tour will be organized at the beginning of the field campaign in June.

IGLUNA consists of the following projects, which will be present at the field campaign from June 17 until July 3, 2019:

#1 Construction robot (CHIRON) by ETH Zurich, Switzerland

Robotic system equipped with an autonomous robotic arm that has interchangeable tools to cut out ice blocks and build a wall with them.

#2 Smart Waste-based Agriculture Growing System (SWAG-System) by ZHAW, Switzerland

Optimized closed agricultural growing system for a lunar habitat that uses human waste as nutritional input integrated with hydroponic and lunar soil-based agricultural systems.

#3 Sociokinetic analysis as a tool for optimization of environmental design by EPFL, Switzerland

Tracking of multiple people in a multi-camera environment with an algorithm analysis to establish the relationship between social behaviour and the built environment.

#4 Algal bioreactor by HSLU, Switzerland

Bioreactor for cultivating algae and producing oxygen.

#5 GrowbotHub by University of Lausanne and EPFL, Switzerland

Automated structure hosting the hydroponic system (SWAG).

#6 Habitat concept in lunar lava-tube (MOONY) by Politecnico di Milano, Italy

Moon habitat design where the environment and different assets aim to foster the best psychophysiological conditions for the inhabitants.

#7 Bricks Arch Structure for Ingenious Construction (BASIC) by EPFL, Switzerland

Habitat architectural design and lay-out coordination using an extendable arch structure by wood and glass wool insulation sandwich-panels for construction.

#8 Digging robot with navigation in ice capability by University Politehnica of Bucharest, Romania

Robot with the capability to navigate in ice and dig its own path.

#9 Demonstrator for Oxygen Production (DOP) by University Politehnica of Bucharest, Romania

Demonstrator of gaseous hydrogen and oxygen production through water electrolysis.

#10.1 CircaDia by Tallinn University of Technology, Estonia

Human health monitoring by schedule management through circadian rhythm and fatigue analysis.

#10.2 LunAva by Tallinn University of Technology, Estonia

Avatar that assists in the management of human capital and information communication in space.

#11 Smart Monitoring by Tallinn University of Technology, Estonia

Intelligent rule-based decision engine that can reason and make decisions on incomplete monitoring data.

#12 Aachen Modular Planetary Exploration System (AMPEX) by RWTH Aachen University, Germany

Experiment box based on iBOSS technics including a drill to extract ice cores and a corresponding handling system.

#13 Cybernetic Companion pLAnts to Mitigate Insufficient iNteraction with nAture (CYCLAMINA) by Technical University of Crete and Athens, Greece

Plant-computer interface that will augment a typical plant (i.e. with movement, sound, pseudo-decisions) using the plant's electrophysiological signals as input.

#14 Guidance and Localisation for Astronauts Cooperating in Environmental Roughness (GLACiER) by Warsaw University of Technology, Poland

Habitat-astronaut radio communication and localization outside the habitat in real time using radio modules.

#15 VU Science Experiments (VUSE) by VU Amsterdam, the Netherlands

Science-based platform for geological, astrobiological and glacial research focused on analysis of ice cores.

#16 Smart Ice Lab by VU Amsterdam and ILEWG, the Netherlands

Working station and protocols for science research to analyse ice samples and cores, working with art scientists to visualize scientific data and provide public outreach.

#17 3D – Laser Shock Peening of a High Performance Ice Saw (Hephaestus) by EPFL, Switzerland

High performance additively manufactured ice saw through the use of the 3D - Laser Shock Peening technique.

#18 Designing a power system for a moon inhabitation (MPS) by University of Strathclyde, United Kingdom

Design for the system in charge of generation, storage, distribution and control of power supply.

#19 Virtual Reality 3D Model by EPFL, Switzerland

Mars/Lunar-based model with interactive VR-environment and representation of interior ambi-ances.

#20.1 Lunar Exercise and Activity Platform (LEAP) by Tallinn University of Technology, Estonia

Physical training design through a gamified physical routine experience.

#20.2 Holistic Lunar Fitness (HLF) by Tallinn University of Technology, Estonia

Multifunctional and modular training area design.

IGLUNA, as a demonstrator pilot project, is aimed at supporting and accelerating the [ESA Lab initiative](#). The lessons learned from IGLUNA will help for the implementation of future ESA_Labs. The Swiss Space Center serves as coordinator for the events and main systems engineering activities and is supported by the Swiss Space Office of the State Secretary of Education, Research and Innovation and the European Space Agency.

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Further information and download of pictures:

www.spacecenter.ch/igluna/media

Presentation of the projects and the teams:

www.spacecenter.ch/igluna/projectteams

The Swiss Space Center is a national entity with offices in the Swiss Federal Institutes of Technology. The Swiss Space Center contributes to the implementation of the Swiss Space Policy. It provides a service supporting academic institutions, research and technology organisations and industries to access space missions and related applications, and promotes interaction between these stakeholders.

The Swiss Space Center has 23 collaborators including Professor and former ESA astronaut Claude Nicollier, as well as three PhD students and five national trainees located at several sites of the European Space Agency ESA.

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