ESA_Lab@CH Project
IGLUNA 2020

Igniting innovation

Powered by

European Space Agency
Agence spatiale européenne

Swiss Space Center
Federation of Switzerland
Federal Department of Economic Affairs, Education and Research
State Secretariat for Education, Research and Innovation SERI
Swiss Space Office
Background

ESA_Lab Initiative

ESA_Lab Demonstrator: IGLUNA 2019

ESA_Lab@CH: IGLUNA 2020
ESALab Initiative

Cooperation
- International platform
- Interdisciplinary collaboration

Inspiration
- Student education
- Next generation of space experts

Development
- Maturity of key technologies
- Future of space exploration
Conception & Structure
- P01 – CHIRON construction robot
- P06 – Habitat in lunar lava-tubes
- P07 – Habitat in ice structure
- P19 – 3D virtual reality model
- P03 – Sociokinetic analysis

Life Support
- P02 – Human waste based agriculture
- P04 – Algal bioreactor
- P05 – Greenhouse module
- P09 – Oxygen production

Power management
- P18 – Power system

Communication and Navigation
- P08 – Digging & navigation robot
- P14 – GLACiER multitask device

Human Wellbeing
- P13 – CYCLAMINA cybernetic plant
- P10 – Wearable health monitoring
- P11 – Smart monitoring system
- P20 – Physical activity training

Science
- P12 – Experiment box
- P15 – Science laboratory
- P16 – Geological experiments
- P17 – 3D-printed ice saw

20 student teams
13 Universities
9 Europe countries
Over 150 students

IGLUNA 2019 Field Campaign

A Moon-like extreme environment on & inside the glacier at 3883 m and in Zermatt village

- New Space industry representatives
- Astronauts
- ESA & NASA representatives
- Outreach events & international media coverage
- 600 tourists per day at the glacier, many more at the exhibition downtown
Focus

- demonstrating **technologies** to sustain life in an extreme environment for a **space habitat**

Objectives

- enhance most relevant IGLUNA projects by **building-up on the achievements**
- include **new actors** with **new content**
- involve more **industrial actors**

Opportunities

- be part of the **international** and **interdisciplinary** platform
- work on your own project in **collaboration** with actors from the space domain
- space project **management experience** for students
- international **visibility** and life-long **network**
IGLUNA 2020 Scope

Showcase technologies
• Robotic exploration & ISRU
• Moon base demonstration & life support systems

Demonstrate feasibility to European Stakeholders

Focus on key technologies & their operations
• Robotics & autonomous systems
• In situ manufacturing
• Life support systems & waste management
• Power generation & management
• Communication

Conducted by student teams
Attract engineers & scientists
Integrate industry, academia & research institutions
Raise public awareness about space & Switzerland
IGLUNA 2020 Topics

- Life Support
- Conception & Structure
- Human Wellbeing
- Communication and Navigation
- Science Experiments
- Power management

Space habitat demonstrator
- functional prototypes integrated in the test bed in an extreme environment
- simulations of prototypes for a public exhibition
IGLUNA 2020 Student Projects

P01_MELiSSA
University of Antwerp
Regenerative life support

P02_GrowbotHub EPFL Lausanne
Autonomous vegetable production

P03_SWAG ZHAW Zurich
Smart Waste-based Agricultural Growing System

P04_V-GELM Sapienza University Rome
Virtual Greenhouse Experimental Lunar Module

P05_SAMPLE University of Technology Warsaw
Life-sustaining, radiation hardened outdoor modules

P06_HYDRATION MIT Boston
Water production from ice

P07_HABITAT BTU Cottbus
Inflatable lunar habitat

P08_AMPEX RWTH Aachen University
Miniature Moon fiber spinning plant from lunar soil

P09_CONCEPTLAB Windesheim University
Lunar repair workshop

P10_FOCUS Politecnico di Milano
Exhibition towards concepts of a better life in space

P12_Smart Lunar Clothing TalTech Tallinn
Connected space suit

P13_LIGHT Thessaloniki
Lunar navigation helmet

P14_LDMS FOR LIFE Bern
Amino acid detection by laser desorption mass spectrometer

P15_POWERHAB University of Strathclyde Glasgow
In situ power harvesting

P16_ROVER Politehnica Bucharest
Remotely Operated Vehicle for Environment Reconnaissance
IGLUNA 2020 Timeline

Field Campaign: 10. – 19. July 2020

- Sep 10 - Sep 13: Kick-off Workshop
- Nov 4 - Nov 8: PDR
- Nov 25 - Nov 29: Delta PDR (if failed)
- Feb 10 - Feb 21: CDR
- Mar 10 - Mar 13: Mid-Term Event
- May 18 - May 22: RR
- Jun 22 - Jul 5: Shipping
- Jul 6 - Jul 24: Field Campaign
- Jul 10 - Jul 19: Set-up Decommissioning
- Jul 10 - Jul 19: Test bed operations
- Jul 10 - Jul 19: Open exhibition
- Jul 18 - Jul 19: Closing Event
- Jul 10 - Jul 19: Realization Go / No-go
- May 22: Field Campaign Go / No-go
- Sep 10: Kick-off
- Nov 29: Go / No-go
- Feb 28: Realization Go / No-go
- May 22: Field Campaign Go / No-go
IGLUNA 2020 Field Concept

Nine days of public accessible space technology and space exploration in July 2020 in the heart of Switzerland – with a **Test Bed in an extreme environment on mount Pilatus** and an **Exhibition with the control room in the Swiss Museum of Transport in Lucerne**.
IGLUNA 2020 Partners and sponsors