ExoLab-10
Carbon Farmer

Capture Carbon Dioxide for Survival on Earth and in Space

Join Us | Soil Ground Trial in March | Space Mission in October 2022
OYA - ExoLab 10

In collaboration with

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION

Food and Agriculture Organization of the United Nations

Magnitude.io

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SensAfrica
About

The “Opportunities for Youth in Africa” (OYA) Programme.

The programme was developed jointly by the United Nations Industrial Development Organization (UNIDO) and the Food and Agriculture Organization of the United Nations (FAO) in response to a dedicated call for accelerating efforts in the area of job creation for African youth, especially through agribusiness and entrepreneurship development.

FAO and UNIDO launched this joint programme at the Seventh Tokyo International Conference on African Development (TICAD7) in Yokohama, Japan, on 29 August 2019. By joining forces, FAO and UNIDO will leverage on their comparative advantages, technical expertise and best practices in the areas of decent employment creation and entrepreneurship, as well as agriculture and agribusiness value chain development.

The programme proposes an integrated approach for the creation of quality on- and off-farm employment and self-employment opportunities for African youth in agriculture and agribusiness. It highlights the central role of agriculture for Africa’s development, while emphasizing the need for continuous empowerment of African youth to be the engine of this growth. The multi-level approach (continental, sub-regional, national) reflects the need for a concerted effort between public institutions and the private sector on capacity development, access to resources, improved coordination and linkages, and knowledge generation and dissemination. Based on specific criteria, the programme carefully selected six (6) pilot countries: Cabo Verde, Democratic Republic of Congo (DRC), Ghana, Kenya, Tunisia and Zambia.

SensXAfrica

Is a unique business platform that aspires to play a leading role in providing an enabling environment for entrepreneurs to succeed by developing their business skills through training programs, networking and creating investment opportunities needed to launch, build and scale their businesses. We also aim to provide entrepreneurs with the right platform to share their experiences, collaborate and enhance investment opportunities.

SensXAfrica’s vision is to unlock the potential of Africa’s startups and develop an innovative ecosystem that addresses challenges and formulates sustainable solutions to empower entrepreneurs.

Our objective is to foster and promote the spirit of entrepreneurship in Africa by providing an innovative and technologically friendly ecosystem that empowers businesses to thrive accomplished by showcasing African innovation through disruptive business models that are ready to take on emerging global markets.

SensXAfrica is one of OYA’s and UNIDO collaborating partners with its CEO Ms Bibusa Wissemann appointed as the first Global Ambassador of Magnitude.io, Inc.

Magnitude.io, Inc.

Is an award winning US-based educational company that operates missions in microgravity aboard the International Space Station for schools, science centers, and museums around the world. Founded in 2013, Magnitude.io has completed 9 science missions to date with the tenth mission, ExoLab-10, scheduled for launch aboard the SpaceX-26 resupply mission in October 2022.

The ExoLab-10 program begins through ground-based trials in early March 2022 to more deeply engage students in the scientific and engineering process for the mission. These pre-flight trials also enable the collective effort of participating schools around the world to establish protocols for the scheduled mission in October.

Post-flight collaboration on this mission is with the Lawrence Berkeley National Laboratory through possible investigations via hard x-ray tomography, electron microscopy, and/or potentially single cell transcriptomics (sc-RNA-seq).
The Platform
This mission is built on our custom designed ExoLab architecture. ExoLab is a globally networked series of IoT devices that connect to a live mission aboard the International Space Station. On Earth, these labs measure 20cm x 10cm x 10cm. Optimally, teams of 2 or 3 students paired with an ExoLab develop their own ground protocols and share their findings throughout the mission with their peers and the global community of ExoLab users.

Learning objective
Based on grade level, students will use scientific inquiry to learn about the importance of the carbon cycle on Earth and in space. The curricular targets are grades 9-10 and University Level.

Student investigation
How can you capture the most carbon growing alfalfa? In this inquiry-based investigation, students will design an experiment to capture the most carbon by growing alfalfa, a versatile forage and legume crop known for high edible biomass production, ability to sequester carbon and rejuvenate soils, and potential for biofuel.

Driving a mission for change, students will become climate change solutionaries experimenting with alfalfa on a small scale in class/Lectureroom experiments and potentially plan for a larger impact with a school/university garden of alfalfa. Concurrently, they will learn about space life support systems and food crop production. Students will conduct ground trials considering and comparing growing methods best for Earth and in space. The goal is to grow the biggest plant in 28 days.

Their ideas and data will be used and connected to the flight experiment being developed separately but concurrently with the researchers.
Why experiment in space?

By growing alfalfa in space, this crop could be evaluated for:

- Biofuel production,
- Biomass production to promote regolith to soil development on the Moon or Mars,
- Bioregenerative life support through removal of carbon dioxide,
- And edible biomass as a supplemental food source for astronauts.

SpX-26 launches in late October 2022 and returns in early December 2022 with about **45 days** in orbit. The mission will investigate the carbon sequestration potential of Medicago sativa and/or Medicago Truncatula while under the stress of spaceflight for consideration in biofuel production, bioregenerative life support systems, and edible biomass.

Post-mission research on microgravity samples will be done through a Magnitude.io partnership with Lawrence Berkeley National Lab with plans to include hard x-ray tomography, electron microscopy, and if possible, innovative single cell transcriptomics.

The youth engaged in this program will connect with others around the world and investigate state of the art engineering and science in the context of their local soils. Each will be challenged to design solutions that are unique to each of their communities.

"Survival on Earth and in space depends on solutionaries like you! Through the ExoLab-10 Carbon Farmer ground trials, you are part of this mission for change"

Ted Tagami CEO of Magnitude.io and Education Chair of the User Advisory committee for the International Space station US National lab