FARMING BY SATELLITE

PRIZE 2020

Results Brochure

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GSA
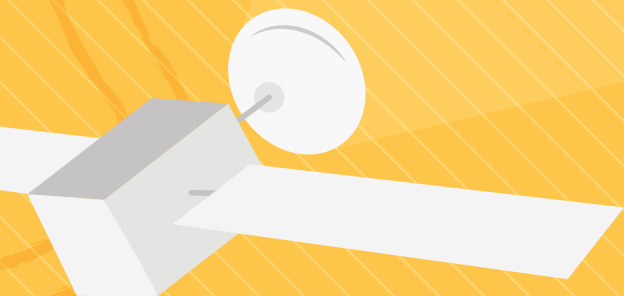
European Environment Agency

CLAAS

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FARMING BY SATELLITE PRIZE

Using European satellite technologies to improve agriculture and reduce environmental impact

The 2020 edition of the Farming by Satellite Prize has officially come to an end. This year, we celebrate the fifth edition and looking back at the numerous ideas submitted, we see a thriving entrepreneurial ecosystem building around satellite technology enabled solutions for sustainable agriculture in both Europe and Africa.

Innovation is crucial for the growth and sustainability of the agricultural sector and enables the response to emerging global challenges such as the rise of the global population and the impact of climate change. The Farming by Satellite Prize is designed to encourage young professionals, farmers, and students in Europe to create new, sustainable, and environmentally friendly solutions using Copernicus, EGNOS and Galileo.

Europe's flagship space programmes – EGNOS, Galileo and Copernicus – serve very different functions. EGNOS and Galileo provide users with high accuracy positioning and navigation, whereas the Copernicus programme analyses and provides the characteristics of a given area on the Earth using remote sensing. These programmes create an array of opportunities for new applications and business ideas individually, but perhaps their true potential is found within their synergies.

GNSS is a key enabler of precision agriculture, allowing farmers to operate machinery along parallel lines, avoid overlaps and gaps in field cultivation, and reduce their fatigue thanks to satellite-enabled autopilot. GNSS also helps to reduce agriculture's ecological footprint. In particular, the satellite programmes play a crucial role in the Common Agricultural Policy, delivering significant added value for farmers, the institutions involved and society at large. Leveraging this innovation potential for society and encouraging this type of strong innovative thinking from the next generation are key motivators for setting up this competition.

The competition is a joint initiative by the European GNSS Agency (GSA), the agency of the European Union (EU) managing Europe's satellite navigation systems, EGNOS and Galileo, and the European Environment Agency (EEA). The 2020 edition was also supported by industry partners with the sponsorship of CLAAS, a manufacturer of agricultural engineering equipment.

We wish the best success to all the participants, finalists and grand finalists who participated in the prize this year and we encourage all future participants to take advantage of this unique opportunity.

Joaquín Reyes González
Market Development Technology Officer
European GNSS Agency

FARMING BY SATELLITE
PRIZE

The participant journey

The submission process

1 Register

2 Submit your idea

3 Deep dive into your ideas

4 Pitch live to the jury

5 Awards ceremony

Who?

Innovators under the age of 32 residing in Europe or Africa. Applicants can be individuals or in teams of up to 4 people

When?

Applications were open from 16th March to 30th June 2020

Special Africa Prize

Returning in 2020, this special prize was awarded to the best idea looking to improve agriculture in or for Africa.
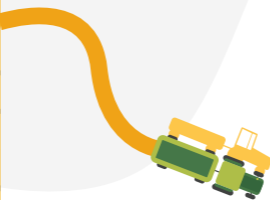
farmingbysatellite.eu

Meet the Start-ups

Winner

Graniot.com

Satellite crop monitoring

Team
Pablo Romero Díaz
Manuel Castro Ruíz

HQ
Granada, Spain

Website link
graniot.com

One third of the water used in Europe goes to the agricultural sector and in Spain the percentage rises to almost 80%. Much of this water is wasted and contaminated by bad fertilising practices. Graniot offers a solution to farmers and agronomists to lower the amount of wasted water through its web application. This app performs a weekly monitoring of crop parameters such as vigour, chlorophyll, and water stress using satellite data. Graniot uses Copernicus Sentinel-1 and -2 data to obtain vegetation indices for the different crops. To improve the accuracy of their geolocation system they use the EGNOS Open Service. This also makes it possible for their customers to upload georeferenced information such as documents and photos through the web application. Finally, other Earth observation data from agroclimatic stations as well as private data from farmers' IoT sensors is combined into the Graniot package.

Pablo Romero Díaz is co-founder and CEO of Graniot. He is a telecommunications engineer working on the customer side and the back-end application of the project. Manuel Castro Ruíz is the other co-founder and CTO of Graniot. He is a telecommunications engineer in charge of the business and Graniot's front-end application. Both Team are passionate about using technology to benefit people, and Manuel even owns some olive trees that he can test new technology on. They started Graniot as a company focused on IoT sensors, but when they found out how Copernicus data could benefit them, they pivoted their business model from software and hardware to only software based. Their vision is to encourage more sustainable agriculture in southern European countries by giving technology to small and medium sized farmers.

Graniot's Web Application

Genuine

Optimising tractor navigation route

Team
Valeria Belloni
Virginia Coletta
Marco Fortunato
Michela Ravanelli

HQ
Rome, Italy

Current studies agree that the need for food and resources will increase by 70% before 2050, underlining the importance of innovative, sustainable, and more productive agricultural practises. Genuine is a web application that combines Copernicus data and EGNSS signals into a unique platform that optimises fertilising and irrigation practises. Copernicus Sentinel-2 data is used to assess crop health, perform crop border detection, and generate maps. The specialised maps identify the most water stressed areas on a field, as well as the optimal tractor path for fertilising or irrigating. Once the optimal route is defined, the farmer is guided using GNSS technology and the GNSS POWER (Positioning and Variometric Velocities Estimation in Real-time) algorithm. The GNSS processing is executed real-time in the cloud using the web application. The integration of Galileo with the other GNSS systems ensures more redundancy, robustness and accuracy in Genuine's solution.

The team is composed of four PhD students at the Geodesy and Geomatics Division of Sapienza University of Rome. Valeria Belloni and Virginia Coletta are currently working on remote sensing and photogrammetric techniques involving deep learning approaches. Valeria deals with geohazard and infrastructure monitoring, and Virginia is involved in studies on the topic of hydrogeological risk assessments for cultural heritages. Their team members, Marco Fortunato and Michela Ravanelli, are deeply involved in GNSS data processing. Marco works on the improvement of GNSS real-time navigation while Michela is focused on the application of GNSS seismology and ionosphere sounding. The team came up with the idea for Genuine because they wanted to create a solution that would have a high, positive impact on the environment.

Genuine's unique selling points

AI4Ocean Farming

Using satellite data for ocean farming

Team
Eva Fernández Rodríguez
Zahra Okba
Elisée Tchana

HQ
Madrid, Spain

The Food and Agriculture Organisation of the United Nations (FAO) estimates that 35% of fish and seafood from fisheries and aquaculture is wasted. This waste is caused by conditions such as harmful algal blooms, ocean acidification, harsh weather conditions, and ocean litter pollution. With this in mind, AI4OceanFarming has come up with a solution to improve the performance of fish farms and minimise waste. They combine earth observation (EO) and artificial intelligence to study the feasibility of establishing an ocean farming system that is connected by satellites. Additionally, they are using it to already identify hazards and threats to ocean fish farms. In this way, AI4OceanFarming can obtain accurate farm positions and information about water parameters for the farmers. The analysis is done by merging different input data sources: satellite data from Copernicus constellations, GNSS data, Mercator-ocean, the European Centre for Medium-Range Weather Forecasts (ECMWF); on-site data from IoT devices, and their own specialised databases.

The team is composed by Eva Fernández Rodríguez, GNSS engineer and project manager, Zahra Okba, a PhD student in oceanography and the data manager, and Elisée Tchana, data scientist, GIS/Remote sensing expert, Drone pilot and IoT developer. They all share the same passion and determination for the ocean and for making a difference in the ocean farming sector by encouraging sustainable fishing. They believe that by improving equal access to EO and quality data for farmers, ocean farming can increase food security and minimise overexploitation of the ocean's resources. Their goal is to increase the success rate and performance of this sector, with the overarching hope of tackling several objectives of the sustainable development goals (SDGs) for 2030.

Working towards a better world by encouraging ocean farming

Harvesting Prizes

# Farming correctly, we all win

Team
Sergio Sobrino
Antonio Vizcaino

HQ
Valladolid, Spain

The ability to detect the individual fertiliser and irrigation requirements of each crop in a field is a money-saving, environmentally friendly method of farming. This can be achieved through precision agriculture and Variable Rate Technology (VRT). However, as team Harvesting Prizes discovered, due to a lack of Variable Rate Application (VRA) tools for data analysis, these financial gains from precision agriculture are delayed. That is where their idea comes into play. Harvesting Prizes is a tool that integrates all VRA files for every field in the farm. GNSS positioning data is used to localise the user and link all VRA maps. It is then able to translate the input rates into real monetary outcomes, like €/ha and kg CO2/ha. Special economic prizes will be included in the app and will be geolocated at specific moments as a gamification of the service. Special prizes will appear in these moments to reward farmers for sustainable intensification. The tool integrates Copernicus Sentinel-2 images, Galileo OS-NMA, and cloud services to provide a robust service that is easy to use. Additionally, mobile networks will be used to transfer information to and from the cloud.

The team is made up of two members: Sergio Sobrino and Antonio Vizcaino. Both have an Agricultural Engineering degree and are highly motivated to find more efficient ways of using technology in agriculture. Their passion for Harvesting Prizes stems from their belief that sustainable agriculture should be laid in the hands of the farmer and that the farmer should be the one to receive the benefits.
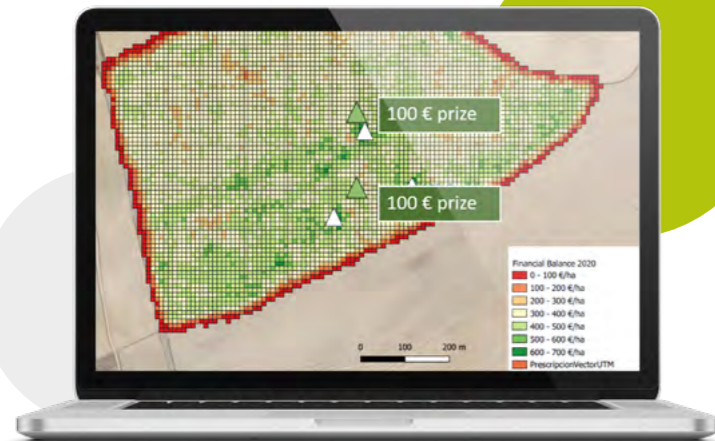
Yield map generated by the tool with two rewards shown in euros

RVRI
*Irrigating the future*

Irrigating the future
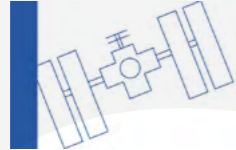
Team
Sergio Sobrino
Antonio Vizcaino

HQ
Valladolid, Spain

Water scarcity and CO2 emissions linked to pumping water will be important factors in the context of climate change. The European green deal and the post-COVID recovery phase provides opportunities to develop new products focused on the optimisation of water and energy use in the agricultural sector. RVRI is an automated system for linear and centre pivots. It detects the level of humidity in soil in real-time by analysing the difference between the direct GNSS signal and the GNSS signal reflected on the soil. With this information the system can vary the irrigation rate and communicate with the cloud, where the application data is stored. Copernicus Sentinel-2 imagery is used to show crop information in the mobile app.

Sergio Sobrino is an agricultural engineer and digital agriculture student. He comes from a family of farmers and is passionate about agriculture and farm machinery. Antonio Vizcaino is an agricultural engineer student, passionate about viticulture. Together they form the team RVRI. They came up with the idea for this intelligent system from a conversation with professors from their university. Their goal? To provide farmers with customised data to support their decision-making.
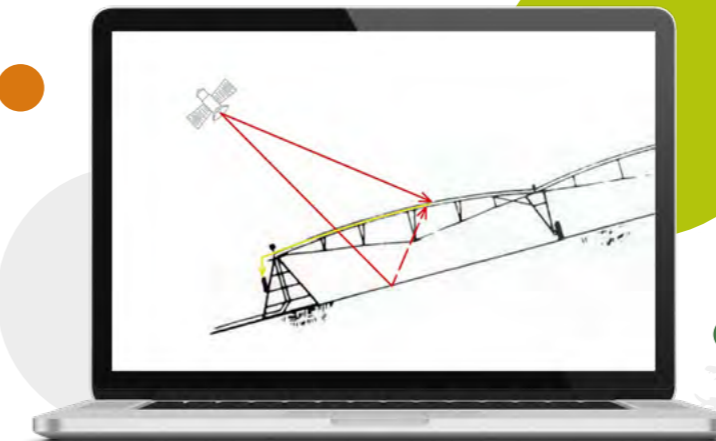
The GNSS signal is analysed to understand the soil moisture and adjust the irrigation rate

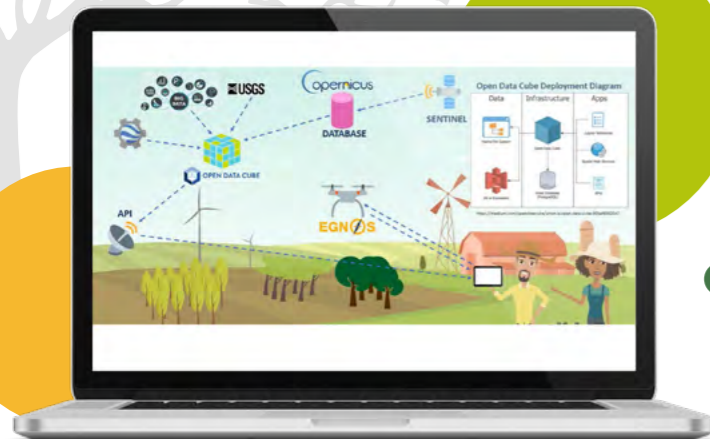**Winner**

GEOM&E

Team
Stella Mutai
Piero Massotti

HQ
Nairobi, Kenya

The agricultural sector is a major driver of Kenya's economy and provides the livelihood for a significant proportion of the population. When farmers have easy access to data about the quality of their fields, it helps them to improve their planting and harvesting practices. This is where Earth observation data comes in. GeoM&E collects data from a variety of sources and provides it all to the farmers to help foster a sustainable farming community in Kenya. Thanks to the satellite data from Copernicus Sentinel-2, Digital Earth Africa (DE Africa), GNSS data, and data from aerial drones that navigate and verify accurate positioning, GeoM&E's solution provides crop phenology statistics and analyses of agricultural fields over time. The statistics, which measure plant health and growth patterns, are particularly useful in assessments of coffee farms in Kenya.

Team Stella and Piero are an ideal team, with Stella as the remote sensing expert and Piero being the expert in economics. The idea for GeoM&E came from a training by DE Africa where the Team discovered that access to vegetation assessment data was a major problem for coffee farmers in Kenya. Their solution is developed especially for the smaller county governments in Kenya. The team's goal is to provide access to geoinformation in one click of the mouse.

Mapping crop phenology is key to addressing food security in Kenya

Grand finalist

BAOBAB

Bridging Agriculture and satellite observations for the African farming business

Team
Alessandra Mascitelli
Agostino Meroni
Lydia Letaru
Giulio Tagliaferro

HQ
Italy, Milan

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Map of the forecast for 6-hourly accumulated rainfall used to issue the user-oriented alert. Data from a case study of May 2018

HerdsAssist

The herder's guide and predictor for pastural management

Team
Odunayo David Adeniyi
Oluwatuyi Olowoyoye
Temitope James Oyedele

HQ
Akure, Nigeria

Herdsmen-farmer clashes in Africa have serious consequences for both people and animals. Herds can get sick, have lower milk output, and even die due to a lack of access to pasture. HerdsAssist is a new way for farmers to manage their grazing pastures to lessen the land competition in Africa. Using a mobile application that draws data such as land-use land-cover maps from Copernicus, this solution helps farmers to be better informed about the location of their animals and where other farmlands are. Sentinel-2 data is used to derive vegetation indices and GNSS data is used to monitor the movement of the herds via virtual fencing. Bands are placed around the necks of the animals and their location signals are sent to the HerdsAssist app, where the herdsmen can then view their movements. HerdsAssist hopes to become the digital grazing management tool for farmers around the world.

The team is made up of the two co-Team, Odunayo David Adeniyi and Oluwatuyi Olowoyeye, and Temitope James Oyedele as the third team member. Odunayo is a current PhD student at the University of Pavia, Italy, and has experience in researching the use of vegetation indices from different satellite sensors for forecasting crop yield. Oluwatuyi is a graduate student at the Institute of Water and Environmental Management of the University of Debrecen. He is a proponent of smart water management technology. The idea for HerdsAssist came to them as a response to the land conflicts in Nigeria and in Africa.

The HerdsAssist app

FARMING BY SATELLITE PRIZE

Judges

Joaquín Reyes González

Market Development Technology Officer
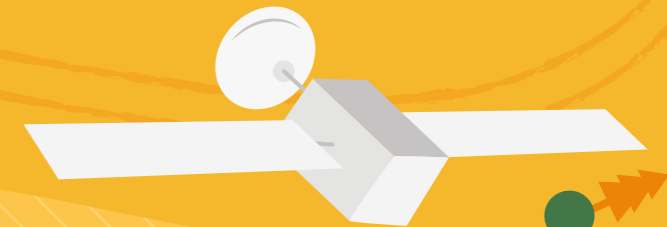
European GNSS Agency

Hans Dufourmont

Project Manager Copernicus Land Monitoring Services
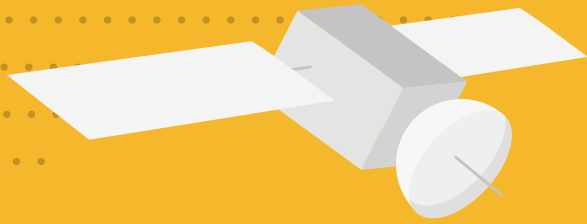
European Environment Agency

Marcel Fölsch

Head of Precision Farming Services

CLAAS E-Systems GmbH

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EGNOS