

# ICEYE

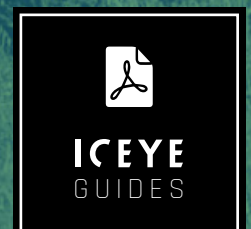
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## PERSISTENT AGRICULTURAL LAND MONITORING

WITH DAILY  
RADAR SATELLITE DATA

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Utilizing ICEYE SAR satellite data enables modernising processes in agricultural financing for governments and the finance sector in both developing and developed countries.



## AGRICULTURE REQUIRES TRANSPARENT FINANCING MECHANISMS

There is a global need for new solutions around agricultural financing and risk management.

In the developing world, the key question is how to increase the availability of affordable financing solutions for farmers. This can be advanced by establishing reliable and transparent insurance and financing control systems. In developed countries, the digitalisation of agricultural support programs in particular - an ongoing effort in the European Union - requires regular and reliable sources for field monitoring data. ICEYE's innovative radar technology and microsatellite constellation provide accurate field monitoring data at an unmatched frequency for these needs.

The World Bank estimated in 2018 that the global demand for food will increase by 70% by the year 2050. This translates to an investment need of at least 80 billion USD each year<sup>1</sup>. To make such an increase in investment possible, new and efficient ways of developing agricultural financing mechanisms are desperately needed.

The lack of financing is a critical problem for farmers around the world. More food is needed for the growing populations of the world, but food production faces economic, political, and environmental challenges. Governments guide and support local farmers in order to secure the self-sufficiency of food production, endorse the export of farm products, and ensure the sustainability of agriculture. Despite these efforts, additional funding and financial support for farmers are still much needed in both poor and wealthy countries. The key to positive development is effective risk management, which entails the availability of reliable and transparent information processes.

The progress in innovative remote sensing technologies and machine learning is transforming agricultural governance, financing, and risk management around the world. New field monitoring technologies can also be applied to many other agriculture management needs, such as optimising operative farming.



## ACCURATE FIELD MONITORING INFORMATION ENABLES POSITIVE DEVELOPMENT

In developing countries, the key problem is underdeveloped financing mechanisms combined with the risk of losing crops due to weather-related disasters or political instability. Solutions for managing such risks require reliable and easily available information on the status of fields and crops in remote locations. This information helps insurance companies to secure a predictable return on investment when providing affordable index insurances. This in turn helps farmers to get financing and financial support for crop production.

Agriculture is supported and funded in developed countries in as well, but in a different level of maturity of the overall funding ecosystem. The challenges are partly different: insurances, funding, and support for farmers are needed, but the advanced finance sector has more capital to offer, and common agriculture policies provide stability as well as financial support. The administration of the support programs is still labour-intensive, which is why modern technology and digitalisation will provide tools for more efficient control and payment procedures. The European Union has already started the digitalisation of these processes with the help of Earth Observation technologies.

The use of Synthetic Aperture Radar (SAR) satellite technology enables frequent and precise large-scale field monitoring. Timely satellite imagery supports fact-based processes and decision-making for the various parties involved in the farming and agriculture industry. This is the beginning of a new era in the use of field segmentation data: ICEYE's monitoring and analytics service delivers accurate classification data, as an example on soil and crop types, as well as harvest time.

*1. The World Bank (2018) Agriculture Finance & Agriculture Insurance.  
<http://www.worldbank.org/en/topic/financialsector/brief/agriculture-finance>*

## THIRD PARTY INFORMATION HELPS BUILD TRUST IN DEVELOPING COUNTRIES

Risks are always a part of agriculture. Crops can be destroyed by weather, pests, or plant diseases. Due to the fluctuation of farm product prices, the profitability of farming is uncertain. What is certain is that farmers need funding and risk coverage for producing crops. On the other hand, the finance sector also needs tools to manage their risks in order to be able to provide insurances and loans for farmers.

In developing countries, risks are exceptionally high. Climate change increases the number and the impacts of droughts, floods, and storms. Political instability and underdeveloped governance also carry a risk of corruption. Consequently, agricultural insurances are either hard to obtain or they do not exist at a price a farmer in a developing country can afford.

### CONSEQUENCES OF TODAY'S FIELD MONITORING CHALLENGES

The penetration of agricultural insurance in high-risk areas is low because the insurance industry lacks reliable

information processes in order to secure the ROI of their business. The compliance of farming activities with insurance policies must be verified: what has been sowed, when and where. If risks materialise, the insurer needs proof of reported damages, that is, when and in which fields the crop has been destroyed.

Today, monitoring of activities in rural fields is a challenge, especially in large developing countries. Accurate, up-to-date and reliable information is difficult and expensive to obtain. Inspections take time, require trained resources and still include the risk of intended or unintended error. How can a financier or insurer know if a farmer's activity complies with the issued insurance contract? How can all parties be sure that the insurance remuneration is fair and based on objective facts alone?

This uncertainty creates distrust between farmers, insurance issuers, and financing parties, which consequently reduces the interest in providing financial services in developing countries. The situation can be improved only by investing in field monitoring technologies which enable cost-efficient risk-management on a large scale.

## RELIABLE FIELD MONITORING ENABLES TRANSPARENCY AND TRUST

Exact and timely information about the actual status of the insured and financed crops helps increase transparency and build trust between creditors, insurers, and farmers. Payment decisions concerning warranties and claims can be made on a factual basis.

Risks can also be reduced when an insurer or financier is able to objectively verify the regulatory compliance of the field-specific data reported by the farmers. Ultimately, this is beneficial to farmers, too.

This kind of data reliability helps develop and provide new services, such as agricultural index insurances. Such insurances will be affordable for an increasing number of farmers in developing countries, which improves their position in getting loans with reasonable interest rates.

*Objective data on  
farming activities  
creates mutual trust.*

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## RISK MANAGEMENT IN BRAZIL

In Brazil, the government steers agricultural development with a risk management strategy. For this purpose, financing instruments like PSR (Government Premium Subsidies Program for Agricultural Insurance) and Proagro (Guarantee Program for Agricultural Activities) have been created.

PSR aims to increase the penetration of agricultural insurance products by providing Federal Government subsidies, which aim at reducing the cost of insurances. Proagro is an insurance policy for small and medium-sized producers who have received rural credit financing and need protection against losses caused by natural disasters, pests, or plant diseases.

Rural credit is financing offered for farmers, cooperatives, or farmers' associations by the Brazilian government. There are also other financial assets available to farmers, such as the CPR (Certificate of Rural Product).

There is continuous advance in the financing and risk management of agricultural production in Brazil, but this kind of system involving many parties in such a vast country is complex and difficult to control. Positive development requires transparency and trust, which can be achieved by eliminating suspicions of corruption or misuse of credits, bonds, or insurance remunerations.

2. Rural Finance Innovations (RFI) ESW (2005) Study on Cedula De Producto Rural (CPR) - Farm Product Bond in Brazil



## AGRICULTURAL SUBSIDIES MANAGEMENT IS BEING MODERNISED IN THE EU

In 2018, the EU supported its farmers with 58.82 billion euros<sup>3</sup>. The management of application, decision, control, and payment processes of the agricultural subsidies requires significant time and effort annually from the EU administration and from individual farmers.

The EU has decided to modernise its CAP (Common Agricultural Policy) payment checks by using Earth Observation technologies. The goal is to digitalise the labour-intensive on-farm checking procedures,

which enable the CAP payments to farmers<sup>4</sup>. The new rules allow the use of Earth observation data as evidence when checking if the farmers have fulfilled the CAP requirements. New monitoring technologies may include the use of satellite data, geo-tagged photos, and information from drones, for example.

The goal of farm checks using satellite data is to reduce bureaucracy and improve administrative efficiency, but also save farmers' time and nerves. Repeated



on-farm checks have often been considered stressful by farmers. Satellite monitoring also makes it possible for farmers to get on-the-spot guidance in advance on how they can fulfill the requirements.

EU member states can already start replacing or complementing their on-farm checks with these new technologies. As planned, satellite and other remote sensing data can be automatically processed with the help of algorithms and machine learning, then compared and combined with EU's Land Parcel Identification System, which is a part of the EU's Integrated

Administration and Control System. Verified data enables payments, and farmers need to provide additional information only in cases where automation does not provide sufficient data.

3. European Commission. *The common agricultural policy at a glance*. [https://ec.europa.eu/info/food-farming-fisheries/key-policies/common-agricultural-policy/cap-glance\\_en](https://ec.europa.eu/info/food-farming-fisheries/key-policies/common-agricultural-policy/cap-glance_en)

4. European Commission (2018) *Modernising the CAP: satellite data authorised to replace on farm checks*. [https://ec.europa.eu/info/news/modernising-cap-satellite-data-authorized-replace-farm-checks-2018-may-25\\_en](https://ec.europa.eu/info/news/modernising-cap-satellite-data-authorized-replace-farm-checks-2018-may-25_en)

The logo for ICEYE, consisting of the word "ICEYE" in a bold, white, sans-serif font.The text "FIELD MONITORING" in a white, sans-serif font, positioned on a horizontal green bar.A white rectangular box containing the text "ICEYE SATELLITE IMAGE OF NOVA ANDRADINA, BRAZIL, WITH SEGMENTABLE AGRICULTURAL FIELDS." in a white, sans-serif font. The background of the box is the satellite imagery.The main title "BENEFITS OF ICEYE SAR IMAGERY IN CROP MONITORING" in a large, white, bold, sans-serif font, centered on the page.



## FREQUENT DATA

New radar satellite technology developed by ICEYE has enabled the creation of a SAR satellite constellation that is able to provide timely and reliable satellite imagery of large areas around the world. Data streams on the use of individual fields as well as vast and remote plantations are provided with excellent frequency: the satellite imagery can be updated as frequently as every few hours depending on location.

## RELIABILITY AND ACCURACY

The more timely and more accurate the available information is for managing agricultural risks, financing, and subventions, the fairer and more transparent all procedures can become. ICEYE's radar satellite monitoring areas can be tailored to the customer's needs. SAR images are taken and delivered even during night time and through clouds, which means that monitoring data is available for analysis whenever and where-ever needed.

## TAILORED DATA STREAMS FOR AGRICULTURE USES

Efficient and actionable documentation of agricultural land use requires a reliable stream of monitoring data. ICEYE's SAR satellite imagery is analysed and processed to deliver specific information services to customers, for example, in the agrochemical and agro-finance industries, as well as in agriculture governance. This creates a reliable basis for the development and management of agricultural financing and insurance applications, as well as for other agriculture management and farming needs.

## SAR SATELLITE DATA IN A NUTSHELL

Active synthetic-aperture radar (SAR) technology is reliable since it is not limited by weather conditions or the need for daylight for imaging the Earth from space. Each radar satellite pass over a desired area can be used to provide accurate imaging, regardless of light or weather conditions on the ground.

## Process from Satellite Data to Actionable Analysis

1.



### DEFINE

PLAN MONITORING AREA,  
FREQUENCY AND TIMING

2.



### COLLECT

ACQUIRE IMAGES AND  
DOWNLINK TO GROUND

3.



### PROCESS

PROCESS SAR IMAGERY  
FOR ANALYSIS

4.



### ANALYZE

- RUN FIELD SEGMENTATION ALGORITHM
- DATA FUSION WITH DATA FROM OTHER SOURCES
- ICEYE ANALYST VALIDATION AND CLASSIFICATION

5.



### APPLY

DELIVER TO END USERS FOR  
OPERATIONAL MANAGEMENT

## SAR DATA PILOT PROGRAM FOR AGRICULTURE USES

Using ICEYE's radar satellites, segmentation data on agricultural lands can be acquired within hours for crop monitoring. Based on segmented crops, ICEYE's alerts and information tracking system can reveal when harvest activities begin and end in particular plots. This kind of timely SAR data by ICEYE helps in developing and managing new financial instruments and insurance products for the agriculture sector.

ICEYE develops advanced field monitoring solutions for the use of insurance and financing organisations, agricultural administration, as well as other end users. Applications are tailored to the individual needs of each customer organisation. The outcome of ICEYE's pilot program is a customised, timely data flow into your chosen operational systems, which enables cost-effective and fact-based measurements. Start a pilot project to learn about the advantages and to establish the integration of SAR data with existing or evolving field segmentation solutions.

Get more information about a pilot program with ICEYE

Contact ICEYE for further information on radar satellite data stream solutions for field segmentation purposes:  
[www.ICEYE.com/contact](http://www.ICEYE.com/contact)

**REQUEST A PILOT PROGRAM  
WITH ICEYE**



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