# COPERNICUS & ME

Supporting insurance companies to deal with climate-related damage to agriculture



INCREASING CLIMATE CHANGE MAKES IT DIFFICULT TO FORESEE AND ASSESS THE ECONOMIC LOSSES CAUSED BY WEATHER-RELATED DISASTERS.



DSE, A FRENCH SME, COMBINES ARTIFICIAL INTELLIGENCE AND SENTINEL-1 AND SENTINEL-2 DATA TO ESTIMATE AGRICULTURAL DAMAGE CAUSED BY WEATHER-RELATED EVENTS.

THIS SYSTEM ALLOWS INSURANCE COMPANIES TO SAVE MONEY AND TIME FOR DAMAGE ASSESSMENT AND TO AVOID FRAUDS.



### COPERNICUS



#### COPERNICUS, EUROPE'S EYES ON EARTH

Copernicus is the Earth Observation Programme of the European Union, looking at our planet and its environment for the benefit of global citizens.

Five Copernicus missions are currently in orbit. The data they provide is coupled with groundbased, airborne, and seaborne measurements to make six information services focused on monitoring: Atmosphere, Marine environment, Land, Climate change, Security, and Emergency.

Such services are free and openly accessible and can be used by private, public and international organisations to improve life on Earth.

For more information about Copernicus, visit www.copernicus.eu TODAY, THERE IS A GROWING NEED TO ENHANCE RESILIENCE TO NATURAL DISASTERS AND IMPROVE CLIMATE CHANGE ADAPTATION MECHANISMS.

Indeed, the economic impacts of weatherrelated disasters are expected to increase significantly, due to the combined effects of climate change and socio-economic developments, such as economic growth, increased urbanisation and population growth, especially in areas that are prone to disasters.

According to the World Meteorological Organization's Atlas of Mortality and Economic Losses from Weather, Climate and Water Extremes, the number of disasters related to a weather, climate or water hazard has increased by a factor of five between 1970 and 2019 globally.

In the 50-year period, weather, climate and water hazards accounted for 50% of all disasters and 74% of all reported economic losses. During the same period, 202 US million dollars in damage occurred on average every day.

Economic losses have increased sevenfold from the 1970s to the 2010s. Storms are the sole hazard for which the attributed portion is continually increasing, resulting in the largest economic losses around the globe [1].





#### AGRICULTURE IS AMONG THE SECTORS THAT ARE AFFECTED THE MOST BY CLIMATE-RELATED DISASTERS.

Indeed, if we consider the damage affecting agriculture, industry, commerce and tourism taken as a whole, on its own agriculture absorbs the disproportionate share of 63% of impact from disasters [2].

The Sendai framework for Disaster Risk Reduction for the period 2015-2030 encourages the use of instruments that finance recovery costs while offering incentives to reduce the potential impacts of weather-related disasters [3]. To establish mechanisms, and in particular insurance schemes, to support the recovery of agricultural activities affected by disasters, there is a growing need for data and information to foresee and assess such damages.

UNFORTUNATELY, INCREASING CLIMATE CHANGE MAKES IT MORE AND MORE DIFFICULT TO FORESEE AND ASSESS THE COSTS OF WEATHER-RELATED DISASTERS AND THE ECONOMIC LOSSES CAUSED BY THESE. EURISY



#### **DSE - DATA SCIENCE EXPERTS**

Type of organisation: SME Country: France Annual budget in 2020: Less than €500k Previous experience with Earth Observation data: Yes

#### DSE-DATA SCIENCE EXPERTS IS A COMPANY FOCUSED ON BUILDING PRODUCTS AND SOLUTIONS BASED ON ARTIFICIAL INTELLIGENCE.

Founded in 2020 in the French Alps by a team of engineers and researchers cumulating decades of experience in information processing and machine learning. DSE combines artificial intelligence, signal-processing, remotesensing, and computer-vision to build augmented intelligence for enerav management, smart agriculture, insurance, and transportation.

Created by Vincent Couturier-Doux, Giorgio Licciardi and Jocelyn Chanussot, today the company employs 11 people.

The founders came up with the idea for DSE after working together with AXA Climate on using AI in damage estimates.

The team's vision is to enhance insurance companies' efforts in providing support to the agriculture sector in times of natural disasters.

In 2020, the European Space Agency listed DSE among the 50 European startups that count in the industrial space landscape [4].

In the same year, the young SME received the Copernicus Masters France Award, and it is currently supported by BPI Banque publique d'investissement (a French public investment bank), as part of the i-Nov programme for the period 2021-2023.

Furthermore, DSE received in 2020 the ENEL Innovation Challenge prize for a competition focusing on the detection of archaeological remains by remote sensing.

DSE's portfolio of clients includes AXA, EDF, Boston Consulting Group, SpaceAble, CORYS, CSUG, ENEL, and HPE, among others.



AIPERION IS A SYSTEM, DEVELOPED BY DSE, THAT ESTIMATES THE DAMAGE AFFECTING AGRICULTURAL FIELDS, IDENTIFIES THE BOUNDARIES OF FLOODED AND BURNED AREAS, AND DETECTS THE EXTENT, IMPACT AND DURATION OF DROUGHTS BASED ON EXTREME WEATHER EVENTS OR NATURAL DISASTERS.

AlPerion aims at supporting the crop insurance sector to accurately estimate the damage produced by natural disasters and extreme weather events, such as hailstorms, floods, wildfires, droughts, tornados, sandstorms, and windstorms.

The system is based on AI applied to Earth observation images to identify and detect the boundaries of flooded and burned areas,

It integrates meteorological data from the MSG mission (Meteosat Second Generation satellites) to detect the intensity and duration of extreme weather events. AlPerion relies on data from the Copernicus Sentinel-1 and Sentinel-2 missions, to calculate vegetation indices and estimate agricultural damage.

The Alpeiron Fire Detection Dashboard



These analyses are combined to produce an assessment of the level of damage to the crops and of its causes. The results are provided to customers through a dashboard, in the form of maps and figures.

Other satellite data, i.e., those provided by the Sentinel-5P mission, will be also included in the system to deliver new services, such as the monitoring of air quality parameters.



The AlPerion Drought Detection Dashboard

THE DSE SOLUTION HELPS CUSTOMERS, PARTICULARLY INSURANCE COMPANIES, TO PRECISELY ASSESS THE LEVEL OF DAMAGE DONE TO CROPS AND TO BETTER SUPPORT THE AGRICULTURAL SECTOR WITH EVIDENCE-BASED DECISIONS. The AIPeiron system based on Copernicus data allows insurance companies to save money and time for damage assessment and to avoid frauds. At the same time, it enables insurance companies to propose cheaper premiums and quick recovery plans to landowners affected by natural disasters.

By integrating Copernicus data into their software, DSE can provide precise information on the crops' health and determine if the damage to crop reported by farmers is actually a consequence of natural disasters and not of fraud attempts.

Moreover, based on the information provided by DSE, insurance companies can determine the premium to be paid in case of crop losses caused by natural disasters. Under the request of one insurance company, using this system DSE was able to map 80% of cultivated fields on the French territory to detect the growth status of vegetation.

That was made possible thanks to the high temporal resolution of the Copernicus data and could not have been done by using in-situ surveying techniques.





USING FREE AND OPEN COPERNICUS DATA, DSE CAN PROVIDE ITS SERVICES AT A MUCH LOWER COST THAN THE PRICE THAT THEY WOULD ASK IF THEY USED OTHER PAYING SATELLITE DATA. As a result, after only one year of existence, the company can count some of the world's biggest insurance companies among their customers.

In 2020, the AIPeiron system has been awarded the Copernicus Masters Prize for France. The Copernicus Masters are awarded to innovators fostering new solutions and concepts that showcase the benefits of the European Copernicus services for our everyday life.

## REFERENCES

[1] The Atlas of Mortality and
Economic Losses from Weather,
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[2] The impact of disasters and crises on agriculture and food security 2021, Food and Agriculture Organization of the United Nations, Rome, 2021. Consulted on 17 November 2021.

[3] Sendai Framework for Disaster Risk Reduction 2015-2030, United Nations Office for Disasters Risk Reduction (UNISDR), 2015. Consulted on 17 November 2021.

[4] ESA Startup competition: top 50 shortlist, European Space Agency's website, 25 May 2020. Consulted on 17 November 2021.

[5] Alperion: Natural disaster damage assessment made easy, Copernicus Master Website. Consulted on 17 November 2021.

# LINKS

DSE-Data Science Experts website: https://dse-datascienceexperts.com Data Science Experts - Remote Sensing and Al for insurance. Copernicus Accelerator website: https://accelerator.copernicus.eu/portfolio/d ata-science-experts/ Copernicus Masters website: https://copernicus-masters.com/ Hall of Fame, Winners 2020, Copernicus Masters website: https://copernicusmasters.com/hall-of-fame/#winners-2020 Appel à projets : Concours d'innovation - i-Nov, BPI France website: www.bpifrance.fr/nos-appels-a-projetsconcours/appel-a-projets-concoursdinnovation-i-nov Openinnovability.com, Innovation and sustainability. Enel website: https://openinnovability.enel.com Discover our satellites, Copernicus website: www.copernicus.eu/en/aboutcopernicus/infrastructure/discover-oursatellites Meteosat Second Generation, EUMETSAT website: www.eumetsat.int/meteosatsecond-generation

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