***Open Call**: DACIA5 Data challenge - Satellite data for smarter agriculture*

Exploring the potential of the DACIA5 dataset for agricultural crop identification

We are pleased to announce an open data challenge aimed at students and early-career researchers with experience or interest in machine learning, data science, Earth observation, and agricultural applications, focused on the **DACIA5 dataset**. The dataset is publicly available at Zenodo - https://zenodo.org/records/14283243 and was originally introduced in the publication: "**DACIA5: a Sentinel-1 and Sentinel-2 dataset for agricultural crop identification applications**" available here: https://www.tandfonline.com/doi/full/10.1080/20964471.2025.2512685

This challenge encourages innovative uses of the **DACIA5 dataset**, including the development of new models, integration through data aggregation or fusion with complementary sources, and the exploration of novel research directions beyond the scope of the original publication.

Data

The dataset provided for this challenge is the DACIA5. It contains all the available images from Sentinel-1 SAR and Sentinel-2 MSI from 2020-2024 over a specific area to the north of Brașov city, Romania, together with the 32 x 32-pixel radar and multi-spectral patches for a crop identification task using a learning model.

- 172 Sentinel-2 images. Each image has a dimension of 800 x 450 x 12 (height x width x spectral bands) and is saved in GeoTIFF format;
- 159 Sentinel-1 images. Each image has a dimension of 800 x 450 x 2 (height x width x radar channels) and is saved in GeoTIFF format. For each Sentinel-2 image we have a corresponding Sentinel-1 image, this correspondence was made based on the acquisition data, a Sentinel-1 image may correspond to multiple Sentinel-2 images;
- 17 crop types
- 6454 optical patches 32 x 32 x 12 (Sentinel-2- patches) saved in GeoTIFF and MAT format;
- 5995 radar patches 32 x 32 x 2 (Sentinel-1-patches) saved in GeoTIFF and MAT format;
- For each year, there is a mask showing all the parcels and the crops from the National Institute of Research and Development for Potato and Sugar Beet (NIRDPSB): https://potato.ro/en/

The table below summarizes the dataset main properties:

Property	**Value**
Dataset name	DACIA5
File format	GeoTIFF (.tif) and .mat
File size	3.4 GB
Number of optical images	172 (Sentinel-2)

Number of radar images	159 (Sentinel-1)
Number of optical patches (32 x 32)	6454 (Sentinel-2)
Number of radar patches (32 x 32)	5995 (Sentinel-1)
Timestamps	331
Spectral bands (Sentinel-2)	12
Radar channels (Sentinel-1)	2
Spatial resolution	10 meters
Dimensions of images (height x width)	800 x 450
Dimensions of patches (height x width)	32 x 32
Annotation level	Pixel level
Crop types	agriculture crops
Potential classes	winter wheat, corn, corn silage, peas, winter rapeseed, late potato, other potato, spring wheat, soybean, sugar beet, alfalfa
License	CC BY 4.0
Data link	https://zenodo.org/records/14283243

Challenge tracks

Participants may submit projects aligned with one or more of the following objectives:

1. **Model development and performance enhancement**
   Employ machine learning or deep learning models (pre-trained or custom-built) using **DACIA5** as input, with the goal of improving crop classification accuracy, testing new architectures, or applying innovative techniques to satellite-based agricultural analysis. Proposals aiming to achieve **at least 5% improvement in classification accuracy** compared to the baseline results from the original article mentioned above will be considered **eligible** for evaluation under the performance enhancement track.
2. **Multi-source data integration**
   Combine **DACIA5** with other relevant satellite-based or ground truth datasets to improve generalizability and model robustness. Creative approaches to data fusion and augmentation are encouraged.
3. **Bias, fairness, and reliability evaluation**
   Explore and address potential dataset or model biases related to geography, class distribution, or sensing modalities. Propose strategies to improve the fairness, transparency, and reliability of models trained on **DACIA5**.
4. **Visualization and decision-support tools**

Create dashboards, maps, or visual analytics tools that translate **DACIA5**-based model outputs into useful insights. Emphasis should be placed on usability for agronomists or farmers.

Team guidelines

- Individual participation or teams of up to **2 people** are allowed.
- Multidisciplinary teams (e.g., EO + ML, agriculture + computer vision) are highly encouraged.

Eligibility

This challenge is open to early-career researchers, including:

- Undergraduate students with a strong interest in machine learning, Earth observation, or agricultural applications
- Master's and PhD students
- Postdoctoral researchers
- Junior research assistants and fellows

Participants from academia, research institutes, and independent backgrounds are all welcome.

Submission guidelines

Participants are expected to submit the following materials **by July 31, 2025**.

1. **Code**
   - The implementation should be shared either as a Google Colab notebook, or as a zipped folder containing the source code and clear instructions for execution (README file).
   - All dependencies must be clearly listed. Use of pre-trained models or open-source libraries is allowed and encouraged, as long as it is clearly documented.
2. **Technical report (max. 3 pages)**

   A short technical report or extended abstract summarizing:
   - The approach taken (modeling strategy, data preprocessing, etc.)
   - The track or direction explored (e.g., performance improvement, dataset fusion, transfer learning, etc.)
   - The main results, with emphasis on classification performance and any comparisons with baseline models
   - [Optional] observations, limitations, or suggestions for future work
3. **[Optional] Supplementary materials**
   - Visualizations, tables, or diagrams that help explain your solution are welcome
   - A brief video pitch (max. 2 min) is optional but can strengthen the submission

How to submit

All materials should be submitted via a.baicoianu@unitbv.ro and mihai.ivanovici@unitbv.ro

Please ensure that:

- The email subject line or file names clearly include the participant name (s)
- All materials are submitted before 23:59 CET on July 31, 2025

Recognition and next steps

- The **top 3 submissions** will receive dedicated mentorship and guidance to further develop their work into a scientific article (with support in structuring, writing, and identifying suitable venues for publication).
- Selected projects will be showcased in an online event or workshop, with the opportunity to present results and exchange feedback.

This is your opportunity to engage with a real-world Earth observation dataset and contribute to the future of agricultural monitoring and remote sensing.