ECOLOGICAL GEOSPATIAL DATA – ECOGEODATA SARLU

END-OF-TRAINING REPORT

Introduction to JavaScript and Spatial Mapping on Google Earth Engine

Organized by par :
ECOGEODATA
via its training plateform EGD Academia

Period : December 2025
Format : Online training (visioconference + digital learning ressources)

Funded by The Rufford Foundation as part of the grant awarded to PhD candidate Caleb Ngaba Waye Taroum

1. Context and objectives of the training

As part of capacity building for researchers and collaborators involved in **remote sensing and web mapping**, ECOGEODATA organized a specialized training entitled: **"Introduction to JavaScript and Spatial Mapping on Google Earth Engine."**

This training was designed to enable participants to master the basic skills required for the analysis of geospatial data derived from satellite imagery, particularly in environmental and territorial contexts.

The main objective was to provide participants with the technical skills necessary to:

- ✓ understand the **Google Earth Engine (GEE) environment**;
- ✓ use **JavaScript as a command language for spatial analysis**;
- ✓ manipulate and filter **multi-temporal satellite data**;
- ✓ compute **vegetation indices adapted to arid environments (NDVI, MSAVI)**;
- ✓ produce **reproducible spatial analyses** and simple **web-based cartographic visualization tools**.

The training also integrated important cross-cutting dimensions, including :

- ✓ **scientific collaboration around geospatial scripts and analyses,**
- ✓ **the responsible use of artificial intelligence (AI) to improve and document scripts, particularly with assistants such as Copilot, Gemini, and ChatGPT.**

2. Presentation of ECOGEODATA and the EGD Academia platform

ECOGEODATA is a consulting firm specialized in:

- ➢ **geospatial analysis,**
- ➢ **remote sensing,**
- ➢ **cartography and web mapping,**
- ➢ **the design of environmental and territorial monitoring tools.**

As part of its capacity-building activities, the firm developed EGD Academia (www.egdacademia.com), an African infrastructure dedicated to the development of geospatial and climate-tech skills.
EGD Academia aims to:

- ✓ disseminate operational skills in **GIS, remote sensing, and geo-analysis**,
- ✓ support researchers, technicians, and institutions in the use of modern spatial data processing tools.

- ✓ promote a **practical, project-oriented approach adapted to African contexts**.

The training conducted within this framework fully aligns with this mission.

3. Organization and implementation of the training

The training was conducted **entirely online via MS Teams**, through interactive sessions combining:

1. theoretical presentations,
2. live demonstrations on the Google Earth Engine JavaScript code editor interface,
3. guided practical exercises,
4. technical exchanges with participants.

Participants benefited from several types of training materials:

- ➢ **detailed PDF manuals and tutorials,**
- ➢ **commented Google Earth Engine scripts,**
- ➢ **video recordings of training sessions,**
- ➢ **practical exercises and applied case studies (evaluation project).**

All these resources were shared with learners to enable them to review concepts and reproduce analyses
independently.

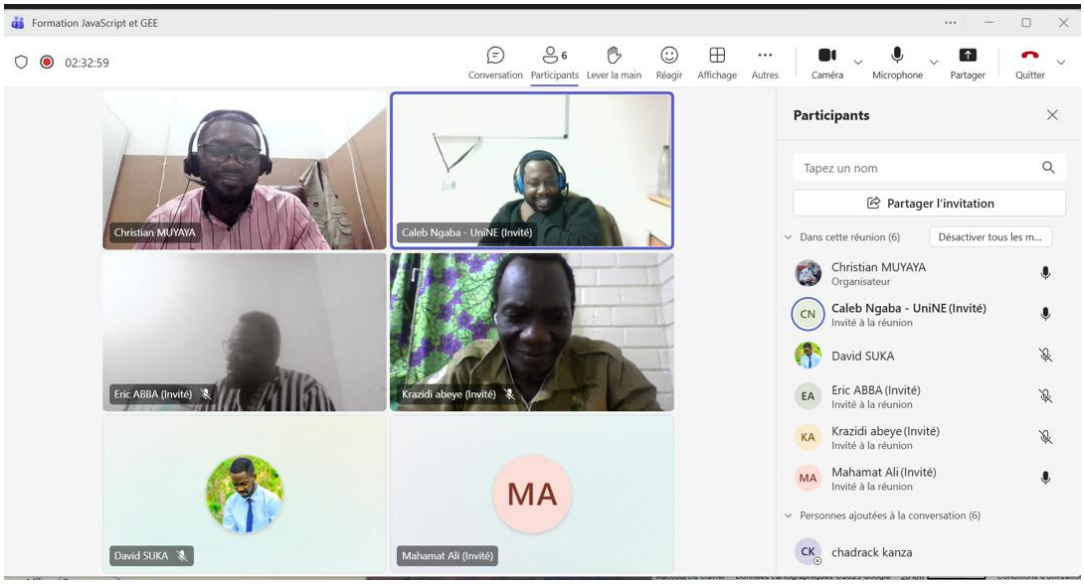


Figure 1: Screenshot of participants during the first session.

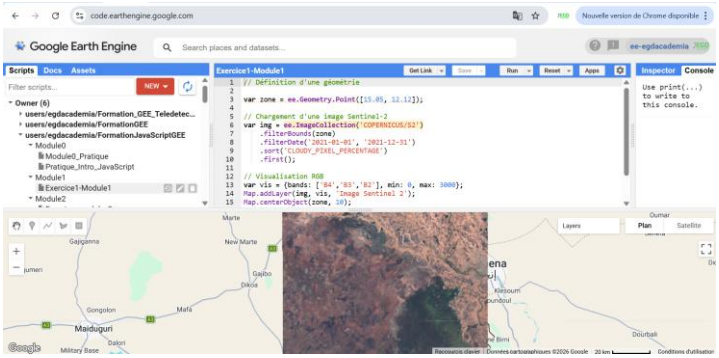
4. Training content

The training was structured around **five main modules**, complemented by cross-cutting chapters.

Module 1 : Introduction to Google Earth Engine and JavaScript basics

This module enabled participants to become familiar with:

- the interface and architecture of Google Earth Engine;
- the fundamental concepts of the JavaScript language used in GEE;
- the manipulation of geospatial objects (images, image collections, geometries).



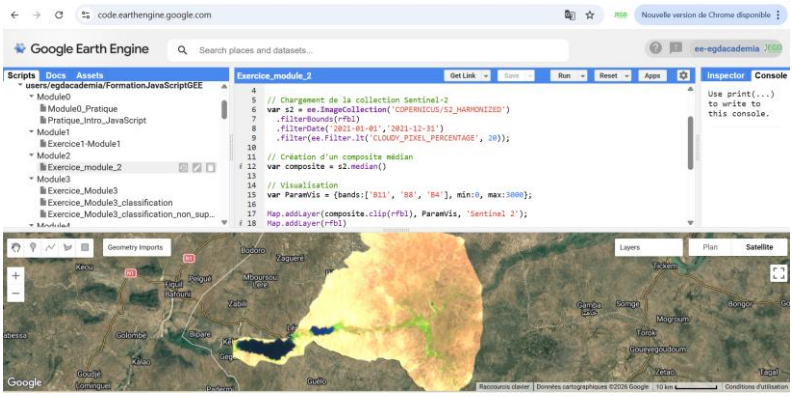
Participants learned to write their first scripts to load and visualize satellite data.

Figure 2: Screenshot of GEE during the first session.

Module 2 : Satellite data manipulation and filtering

This module introduced the basic principles of managing satellite image collections, including:

- spatial and temporal filtering,
- selection of Sentinel-2 images,
- creation of composites,
- exploration of time series



Participants also learned how to prepare data for thematic analyses

Figure 3: Screenshot of GEE during the second session.

Module 3 : Thematic analyses and vegetation indices

This module focused on the use of vegetation indices for environmental analysis.
Participants learned to:

- ✓ calculate **NDVI**,
- ✓ use **MSAVI**, particularly suitable for arid and Sahelian environments,
- ✓ interpret vegetation variations from satellite imagery,
- ✓ introduce simple classification methods.

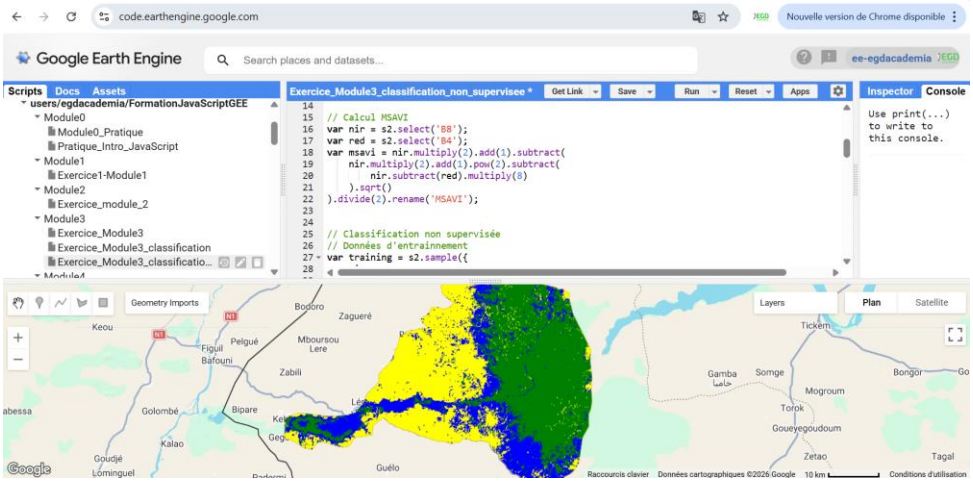


Figure 4: Screenshot of GEE during the third session.

Module 4 : Exporting results and web visualization

Participants learned to:

- ➢ export analysis results in **GeoTIFF and CSV** formats;
- ➢ produce **time-series charts**;
- ➢ design **small interactive interfaces in Google Earth Engine**;
- ➢ structure a prototype of a **simple web-mapping application**.

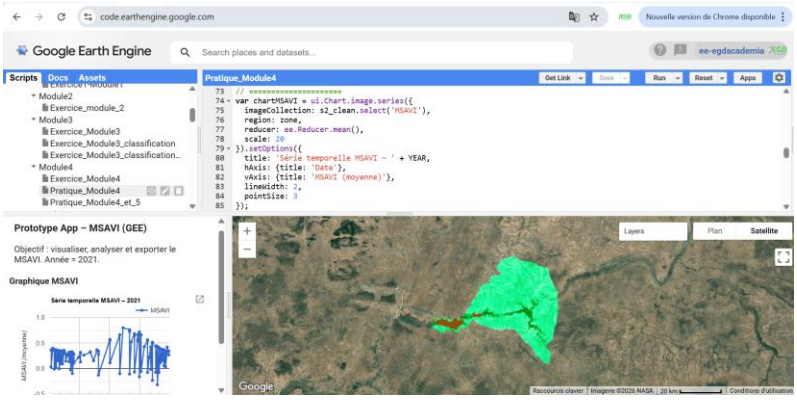


Figure 5: Screenshot of GEE during the fourth session.

Module 5 : Environmental analysis mini-project

The final module was dedicated to a **complete practical project**, in which participants applied the skills acquired to:

- analyze vegetation dynamics,
- calculate indices (MSAVI),
- produce variation maps (ΔMSAVI),
- interpret results in a real environmental context.

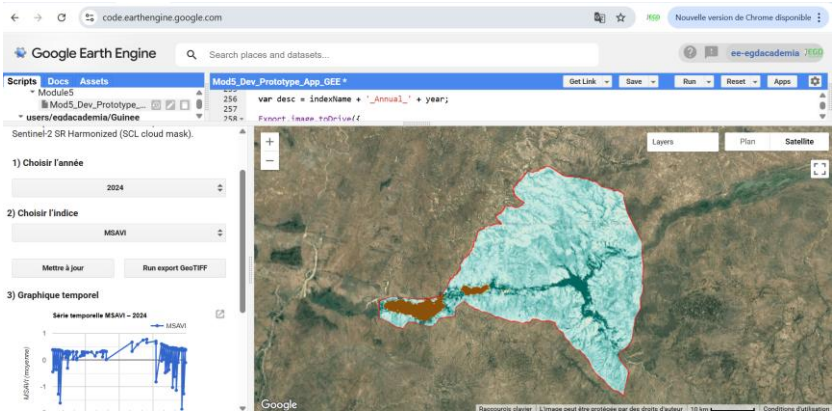


Figure 6: Screenshot of GEE during the fourth session.

5. Cross-cutting modules: collaboration and use of AI

In addition to the technical modules, the training integrated two essential chapters for professional practice.

5.1. Scientific collaboration

Participants were introduced to best practices for collaboration in geospatial projects:

- sharing and documenting scripts,
- collective review and validation of analyses,
- organizing teamwork around GIS projects.

5.2. Use of artificial intelligence

An introduction was also provided on the use of AI-assisted tools to improve technical work, including:

- the use of Copilot, Gemini, and **ChatGPT to explain errors in scripts**,
- code optimization and documentation,
- accelerated learning of new analysis methods.

These tools were presented as **technical assistants**, complementary to the scientific understanding of methods.

6. Evaluation method

The final evaluation was based on:

- **practical exercises carried out during the modules**,
- **a guided individual project**, enabling participants to apply the concepts learned.

This final project consisted of:

- ✓ analyzing satellite data,
- ✓ calculating vegetation indices,
- ✓ producing interpretable maps and charts.

Participants who met the evaluation criteria received a Certificate of Participation issued by ECOGEODATA and verifiable via the EGD Academia platform (https://www.egdacademia.com/verify-certificate).

Example of a typical project completed (Case of Mr. Caleb): https://code.earthengine.google.com/?scriptPath=users%2FcalebngabaGEE%2FECOGEODATA%3AModule_5_Project

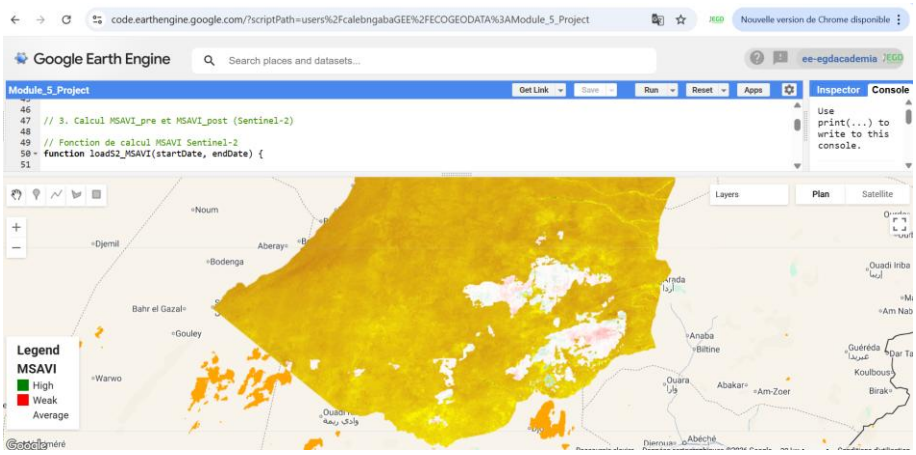


Figure 7: Screenshot of the GEE project completed by one of the participants.

7. Results and outcomes of the training

The training enabled participants to:

- acquire operational skills in **geospatial analysis with Google Earth Engine**;
- develop a better understanding of **environmental dynamics observable through remote sensing**.
- produce their first **reproducible analysis scripts**.

Discussions during the sessions also encouraged a **progressive appropriation of tools**, as well as collective reflection on possible applications in research and environmental monitoring projects.

Conclusion

The training was conducted under very good conditions and achieved the defined educational objectives. Thanks to the practical approach adopted by **ECOGEODATA** and the support of the **EGD Academia** platform, participants were able to develop concrete skills in the use of Google Earth Engine for geospatial data analysis.

This initiative contributes to strengthening technical capacities in the field of remote sensing and opens important prospects for the use of geospatial technologies in scientific and environmental projects.