



Eleni Saka

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ABOUT ME

I received my diploma in Rural, Surveying and Geoinformatics Engineering from the National Technical University of Athens in 2025. My background bridges geoinformatics, machine learning, and Earth Observation and my current work focuses on self-supervised learning and foundation models for geospatial applications. I am particularly interested in applying advanced ML and large-scale data processing to EO applications, building data-driven systems that leverage satellite imagery and geospatial analytics to support environmental monitoring and decision-making.

WORK EXPERIENCE

MACHINE LEARNING RESEARCHER – NATIONAL TECHNICAL UNIVERSITY OF ATHENS - LABORATORY OF REMOTE SENSING (SRSE) – 01/2026 – Current – ATHENS, GREECE

Working on self-supervised learning and geospatial foundation models, with a focus on training and developing location encoders. Projects include extending the SatCLIP framework to more modalities and developing OSMGraphCLIP, a geospatial representation model that learns global location embeddings only from OpenStreetMap data using contrastive learning. Currently exploring self-supervised learning and foundation model approaches applied to weather and climate data.

RESEARCH & MACHINE LEARNING ENGINEERING INTERN – ATHENA RESEARCH CENTER - ARCHIMEDES UNIT: RESEARCH IN AI, DATA SCIENCE & ALGORITHMS – 16/06/2025 – 30/11/2025 – ATHENS, GREECE

Developed scalable ML pipelines, distributed training frameworks, and privacy-preserving learning systems. Combined software engineering with research-driven experimentation, focused on efficient coding, automation, and reproducibility while contributing ideas and engineering decisions. Collaborated with an international research group; results and framework are being prepared for publication.

- **Project 1 — Study Memorization in LLM models:** Built a NanoGPT-inspired PyTorch training framework and conducted large-scale experiments on OpenWebText. Designed data preprocessing, training, and evaluation workflows for memorization analysis, applying modular and automated engineering practices to ensure reproducible results.
- **Project 2 — Privacy-Preserving Decentralized Training:** Developed a unified pipeline integrating DP-SGD teacher training, synthetic data generation, and knowledge distillation for decentralized learning without data sharing. Implemented multi-node distributed training with graph-based communication and extended the system to multi-dataset scenarios.

PARTICIPATION IN THE CEMS RESEARCH PROGRAM – NATIONAL OBSERVATORY OF ATHENS – 23/09/2024 – 30/11/2024 – ATHENS, GREECE

Department: Beyond Centre of EO Research & Satellite Remote Sensing

Execution of the project "Risk assessment of forest fires using machine learning, detailed mapping of burned areas, and statistical analysis of historical fires" as part of the implementation of the research program titled "CEMS"

INTERNSHIP – NATIONAL OBSERVATORY OF ATHENS – 11/07/2024 – 10/09/2024 – ATHENS, GREECE

Department: Beyond Centre of EO Research & Satellite Remote Sensing

- Processing Sentinel-2 satellite images, manual mapping of burned areas using GIS software, extraction of statistics and information for the affected areas, and creation of burned area maps.
- Retrieved and analyzed fire reports and MODIS/VIIRS/EFFIS data; evaluated FireHub performance using SEVIRI imagery and photointerpretation.
- Performed change detection and land-use validation for EMSN196 (Zambia) using photointerpretation.
- Automation of the process for retrieving suitable cloud-free images and digitizing burned areas using Python (GeoPandas, Rasterio, Xarray), improving processing efficiency and reproducibility.

- Contributed to EMSN200 (Falakro) and EMSN197 (Azores) with fire delineation, fire grading, map production, geodatabase creation and Web Map/Scene/Dashboard creation.
- Creation of a Machine Learning Dataset for fire risk estimation.

PUBLICATIONS

OSMGraphCLIP: Learning Global Location Representations from OpenStreetMap Graphs

Authors: Dimitrios Michail, Eleni Saka, Ioannis Giannopoulos, Ioannis Papoutsis | **Journal Name:** arXiv preprint | **Publisher:** arXiv

EDUCATION AND TRAINING

09/2020 – 09/2025

SCHOOL OF RURAL AND SURVEYING ENGINEERING – GEOINFORMATICS ENGINEERING National Technical University of Athens

Completed a Diploma Thesis titled **“Machine Learning for Wildfire Risk Prediction Using Positive-Unlabeled Data”**, introducing a pioneering PU Learning approach for modelling wildfire ignition risk across the Mediterranean. The study addressed key limitations of traditional supervised methods by leveraging real wildfire events together with extensive unlabeled observations, enabling a more realistic estimation of ignition probability. My work included an in-depth review of PU Learning literature, the design of a specialized sampling strategy for constructing a new spatiotemporal dataset and the development of a custom evaluation framework. The models were implemented in Python using the PyTorch framework and trained on a 27-variable dataset combining meteorological parameters, vegetation indices (NDVI, LAI) and land-surface characteristics. This project strengthened my expertise in machine learning, Python, geospatial data processing, remote sensing, model evaluation, and large-scale data engineering.

Thesis Supervisor: Dr. Ioannis Papoutsis, NTUA

Final grade 9.41/10 | **Thesis** 10/10

SKILLS

Geographic Information Systems (QGIS, ArcGIS) | Programming: Python, Matlab and C++ | Pytorch | Remote Sensing | AutoCAD | Cloud Platforms: AWS, Google Compute Engine | Microsoft Office

LANGUAGE SKILLS

Mother tongue(s): **GREEK**

Other language(s):

	UNDERSTANDING		SPEAKING		WRITING
	Listening	Reading	Spoken production	Spoken interaction	
ENGLISH	C2	C2	C2	C2	C2

Levels: A1 and A2: Basic user; B1 and B2: Independent user; C1 and C2: Proficient user

CONFERENCES AND SEMINARS

02/11/2024 – 04/11/2024 Greece

16th National Cartography Conference

"Cartography in the modern multidisciplinary world"

16/03/2026 – 20/03/2026 Greece

ELLIS Winter School 2026: AI for Earth System, Hazards & Climate Extremes

A 5-day intensive program bringing together leading experts and early-career researchers to explore cutting-edge AI techniques for extreme event analysis, including modelling, forecasting, and impact assessment of Earth hazards and climate extremes. Organized by NTUA, ELLIS Unit Jena, and the MeDiTwin and AI4PEX projects.

● **DISTINCTIONS**

Academic Awards and Scholarships

- **Diomedes Komnenos Award** – National Technical University of Athens (Year: 2020) — awarded for achieving the highest entry grade in the department
- **Nikolaos I. Kritikos Scholarship** – National Technical University of Athens (Academic Year 2020-2021)
- **Christos Papakyriakopoulos Award** – National Technical University of Athens (Academic Year 2020-2021)
- **Dimitrios Thomaidis Award** – National Technical University of Athens (Academic Year 2020-2021)
- **Dimitrios Thomaidis Award** – National Technical University of Athens (Academic Year 2021-2022)
- **Dimitrios Thomaidis Award** – National Technical University of Athens (Academic Year 2022-2023)
- **Dimitrios Thomaidis Award** – National Technical University of Athens (Academic Year 2023-2024)
- **IKY Excellence Award** – State Scholarships Foundation (Academic Year 2024-2025) — awarded to the top-ranking graduate of the department