Giannis Gallios

Soil & Water Data Scientist

University of Florida
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OBJECTIVE

To build practical AI models that translate environmental data into measurable climate and land-management insights. My work combines remote sensing, soil spectroscopy, and privacy-preserving ML to deliver transferable soil property models and monitoring tools for real-world deployment.

EDUCATION

Ph.D. Candidate
University of Florida, U.S.A. | *Soil, Water, and Ecosystems Sciences Department*
August 2023 – Present

- Research Focus: Address Soil Data Sovereignty and Scarcity Limitations using Advanced AI Techniques
- Dissertation: "Exploration of decentralized approaches for preserving data privacy while using hyperspectral satellite data and AI to improve digital soil mapping."
- GPA: 4.00

Master's Degree
University of Georgia, U.S.A. | *Crop and Soil Science Department*
May 2021 – May 2023

- Focus: Precision Agriculture & Irrigation Scheduling Tools
- Thesis: "Decision support tools for irrigation scheduling in peanuts"
- GPA: 3.80

Graduate Minor/Certificate
University of Georgia, U.S.A. | *Agricultural Data Science & ML Applications*
September 2021 – August 2022

Integrated Master's & Bachelor's Degree
Agricultural University of Athens, Greece
September 2015 – February 2021

- Bachelor's: Natural Resources Development and Agricultural Engineering
- Master Thesis: "Prolonged Drought and Scarcity Indicators on Guadiana River, Spain/Portugal."

WORK EXPERIENCE

Assistant Researcher
Soil Artificial Intelligence Lab, University of Florida
August 2023 – Present

- Developed deep-learning models for soil spectroscopy using low-cost NIR scanners and geospatial covariates.
- Contributed to digital soil mapping and carbon sequestration monitoring using advanced AI techniques.

Freelance Soil & Remote Sensing AI Consultant
Self-Employed | Remote
July 2023 – Present

- Build end-to-end ML/AI solutions for soil and environmental monitoring, combining satellite remote sensing (e.g., Sentinel), in-situ observations, and soil spectroscopy to estimate soil properties and support digital soil mapping (University of Florida, University of Georgia)
- Design privacy-preserving and scalable modeling workflows (including federated learning) and deliver client-ready outputs such as reproducible code pipelines, technical reports, and lightweight web dashboards for decision support (collaborations with University of São Paulo)

Assistant Researcher
Irrigation Scheduling Lab, University of Georgia
May 2021 – July 2023

- Led precision agriculture projects, developing irrigation scheduling tools based on volumetric water content sensors.
- Worked on creating a soil moisture Decision Support Tool to monitor flash droughts and soil saturation in pasture systems.

Lab Intern
University of Porto (Portugal), Faculty of Engineering (FEUP)
Department of Civil Engineering, Hydraulics Laboratory (SHRHA)
March 2020 – June 2020

- Conducted data analysis and modeling for the Guadiana River basin water conservation plan, focusing on water resource management in drought-prone regions.

- Developed hydrological models to assess water conservation strategies and their impacts on agricultural practices within the Guadiana River basin.

TEACHING EXPERIENCE

Invited Instructor
Federated Learning for Decentralized Soil Spectral Analytics, IEEE SA P4005 Workshop (September 2025)
• Invited talk delivered at the IEEE Standards Association P4005 working group workshop

Teaching Assistant
Soil Health Data Course SWES 6406 , University of Florida (Fall 2024)

- Actively participating in teaching and grading
- Supervised by Dr. Yang Lin

Invited Instructor
Federated Learning Applications in Soil Spectroscopy, University of Sao Paulo, Brazil (October 2024)

- Delivered a workshop at the University of Sao Paulo Soil Science Department.

Invited Instructor
Irrigation Scheduling Tools Workshop, University of Georgia (July 2022)

- Delivered a workshop for UGA county agents at the Stripling Irrigation Research Park

Teaching Assistant
Advanced Topics in Precision Agriculture Course CRSS 6060, University of Georgia (Spring 2022)

- Instructed the laboratory part of the course
- Supervised by Dr. George Vellidis

KEY SKILLS

- AI & Machine Learning: CNN, Federated Learning, Transfer Learning, and Large Language Models (LLMs) for environmental data.
- Programming: Python, R, Pandas, MATLAB, GIS software (ArcGIS, QGIS).
- Data Analysis: Google Earth Engine, geospatial analysis, soil spectroscopy.
- Research & Development: Soil carbon prediction, precision agriculture, climate modeling.

EXTRACURRICULAR SKILLS

Languages: Greek (Native), English (C2), Spanish (B2), German (B1), Portuguese (A2)

Certifications:

- PADI Open Water Diver: Certified for open water scuba diving
- CPR & First Aid Certification: Certified in first aid and emergency response
- FL Boat Operation License

Volunteering:

- Active participant at AgVenture 4H events, volunteering at a soil science stand to engage children of all ages with interactive demonstrations on the fundamentals of soil science.
- Attended several Erasmus+ projects during 2020-2023, promoting sustainable agriculture and agricultural entrepreneurship in Europe. Erasmus Youth-pass obtained and growing.
- European Solidarity Corps short-term volunteer in Croatia, Oct 2020, focusing on local sustainable agriculture.

AWARDS & SCHOLARSHIPS

- Victor W Carlisle Scholarship, University of Florida (2,000$) 2025
- GFSI Joint Linkage Call, Co-PI (8,000$) 2025
- University of Florida, GSC Travel Award (500$) 2025
- Spectral Evolution Research Partnershop Program (Equipment) 2025
- University of Georgia, CRSS Travel Award (500$) 2023
- Gerondelis Foundation Scholarship for Excellence in Graduate Studies (5,000$) 2022
- University of Georgia, CRSS Travel Award (1,000$) 2022

CONFERENCE PARTICIPATION

- IEEE International Geoscience and Remote Sensing Symposium, Brisbane, Australia (August 2025)
  Presentation: "GaiaBot: Simplifying Access to Soil Data" (Oral Presentation)
- American Geophysical Union (AGU) Fall Meeting, Washington, D.C., USA (December 2024)
  Presentation: "Federated Learning for Advanced SOC and pH Modeling Using Simulated Satellite Spectral Data" (Oral Presentation)
- CANVAS 2024, San Antonio, TX, USA (November 2024)
  Presentation: "Implementation of a Federated Learning Approach Using Low-Cost NIR Scanners for Soil Properties Prediction" (Oral Presentation)
- FAO Global Symposium on Soil Information and Data, Nanjing, China (September 2024)
  Presentation: "Federated Learning (FL) in Soil Spectroscopy" (Oral Presentation)

- IEEE International Geoscience and Remote Sensing Symposium, Athens, Greece (July 2024)
  Presentation: "Synergistic Use of Low-Cost NIR Scanner and Geospatial Covariates to Enhance Soil Organic Carbon Predictions" (Oral Presentation)
- ESA Symposium on Earth Observation for Soil Protection and Restoration, Frascati, Italy (March 2024)
  Presentation: "Enhancing Soil Organic Carbon Predictions through Low-Cost NIR Scanner Integration with Geospatial Covariates" (Poster Presentation)
- American Peanut Research and Education Society Annual Meeting. Savannah, GA, USA (July 2023) *Presentation*: " Decision Support Tools (DST) for Irrigation Scheduling in Peanut" (Oral Presentation)
- American Society of Agricultural and Biological Engineers Annual Meeting, Omaha, NE (June 2023) *Presentation*: " SI Peanut: An ET-Based Peanut Irrigation Scheduling Tool for the Southeast" (Poster Presentation)
- Soil Science Society of America Annual Meeting, Baltimore, MD, USA (November 2022) *Presentation*: "Volumetric Water Capacitors for Peanut Irrigation Scheduling Using Irrigator Pro" (Oral Presentation)
- International Conference on Precision Agriculture, Minneapolis, MN, USA (June 2022) *Presentation*: " Making Irrigator Pro an Adaptive Irrigation Decision Support System" (Poster Presentation)
- Soil Science Society of America Annual Meeting, Salt Lake City, UT, USA (November 2021) *Presentation*: "Making Irrigator Pro an Easier-to-Use Irrigation Scheduling Tool" (Poster Presentation)

PUBLICATIONS

- Gallios, I. et al. Federated Earth-Observation Models for Collaborative Farm-Scale Soil Mapping.", 2025, International Journal of Applied EO and Geoinformation Link
- Bartsch, B. et al. "Soil laboratory and satellite spectral data filtering: A Spectral Quality Protocol (SQuaP).", 2026, Remote Sensing of Environment Link
- Gallios, I., Tsakiridis, N., Tziolas, N. "Federated Learning Applications in Soil Spectroscopy", 2025, Geoderma. Link
- Gallios, I., Kritharoula, A., Tziolas, N. "GaiaBot: Simplifying Access to Soil Data", 2025, IGARSS 2025, IEEE International Geoscience and Remote Sensing Symposium.
- Gallios, I., Tsakiridis, N., Tziolas, N. "Implementation of a Federated Learning Approach Using Low-Cost NIR Scanners for Soil Properties Prediction." *ASA, CSSA, SSSA International Annual Meeting*, 2024. Link

- Gallios, I, Tziolas, N. "Synergistic Use of Low-Cost Nir Scanner and Geospatial Covariates to Enhance Soil Organic Carbon Predictions Using Dual Input Deep Learning Techniques." *IGARSS 2024, IEEE International Geoscience and Remote Sensing Symposium*, 2024. Link
- Gallios I., Butts C., Porter W., Vellidis G. "Incorporating Volumetric Water Content (Capacitance) Sensors as an Automated Data Entry Solution for Irrigator Pro", 2024, American Society of Agricultural and Biological Engineers. Link
- Maktabi, S., Gallios, I., Knox, P., Kukal, S., Vellidis, G. "Developing a Soil Moisture Decision Support Tool to Quantify the Occurrence of Flash Droughts and Saturated Soil Conditions for Pasture Grasses in the Southeast United States." *European Geosciences Union General Assembly Conference Abstracts*, EGU22-10381, 2022. Link
- Vellidis, G., Butts, C., Gallios, I., Liakos, V., Ortiz, B. "CropFit: An Integrated Smart Irrigation Mobile App for Corn, Cotton, Peanut, and Soybean." *ASA, CSSA, SSSA International Annual Meeting*, 2021. Link

REFERENCES

- Assistant Professor Dr. Nikolaos Tziolas, Soil, Water, and Ecosystems sciences, University of Florida, U.S.A., Contact
- Assistant Professor Dr. Yang Lin, Soil, Water, and Ecosystem sciences, University of Florida, U.S.A., Contact
- Associate Professor Dr. George Vellidis, Crop and Soil Department, University of Georgia, U.S.A., Contact
- Agriculture Engineer Dr. Chris Butts, US Department of Agriculture, Contact
- Associate Professor Dr. Christos Karavitis, Water Resources Management, Dean School of Environmental and Agricultural Engineering, AUA (Prof. Affiliate, Dep. Of Civil and Environmental Engineering, Colorado State University, U.S.A.), Contact
- Professor, Dr. Nikolaos Moustakas (Director of Soil science Specialization, Dep. of Natural Resources Development and Agricultural Engineering, AUA), Contact
- Associate Professor Dr. Dionisios Gasparatos (Applied Soil Science, Director of Soil Chemistry Laboratory, AUA), Contact