

# NIKOLAOS TZIOLAS

University of Florida, Department of Soil, Water and Ecosystem Sciences  
Southwest Florida Research and Education,  
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## EDUCATION

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2022 Ph.D. Soil Science Artificial Intelligence, Aristotle University of Thessaloniki, Greece  
2015 M.Sc. Geo-Information, Wageningen University, The Netherlands  
2013 B.Sc. Agricultural Engineering, Aristotle University of Thessaloniki, Greece

## RESEARCH INTERESTS

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Earth and Planetary Sciences | Artificial Intelligence | Computer Science | Engineering |  
Environmental Science | Agricultural and Biological Sciences | Mathematics | Soil Science

## ACADEMIC POSITIONS

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2023-present Assistant Professor, University of Florida  
2016-2023 Graduate Student Researcher, Aristotle University of Thessaloniki, Greece  
2016-2023 Associate Researcher, Inter-Balkan Environment Center, Greece  
2017-2022 Owner and research Coordinator, AGROKAT CO & G.P., Greece

## REFERRED PUBLICATIONS

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### Journal Articles

1. Karyotis K, Tsakiridis NL, **Tziolas N**, Samarinas N, Kalopesa E, Chatzimisios P, Zalidis G. On-Site Soil Monitoring Using Photonics-Based Sensors and Historical Soil Spectral Libraries. *Remote Sensing*. 2023; 15(6):1624. [doi.org/10.3390/rs15061624](https://doi.org/10.3390/rs15061624)
2. Francos, N., Heller-Pearlshtien, D., Dematte, J.A.M., Van Wesemael, B., Milewski, R., Chabrillat, S., **Tziolas, N.**, Sanz Diaz, A., Yague Ballester, M.J., Gholizadeh, A. & Ben-Dor, E. 2023, "A Spectral Transfer Function to Harmonize Existing Soil Spectral Libraries Generated by Different Protocols", *Applied and Environmental Soil Science*, vol. 2023. [doi:10.1155/2023/4155390](https://doi.org/10.1155/2023/4155390)
3. Kalopesa, E., Karyotis, K., **Tziolas, N.**, Tsakiridis, N., Samarinas, N. & Zalidis, G. 2023, "Estimation of Sugar Content in Wine Grapes via In Situ VNIR–SWIR Point Spectroscopy Using Explainable Artificial Intelligence Techniques", *Sensors*, vol. 23, no. 3. [doi:10.3390/s23031065](https://doi.org/10.3390/s23031065)
4. Ottoy, S., **Tziolas, N.**, Van Meerbeek, K., Aravidis, I., Tilkin, S., Sismanis, M., Stavrakoudis, D., Gitas, I.Z., Zalidis, G. & De Vocht, A. 2022, "Effects of Flight and Smoothing Parameters

- on the Detection of Taxus and Olive Trees with UAV-Borne Imagery", *Drones*, vol. 6, no. 8. doi:10.3390/drones6080197
5. **Tziolas, N.**, Ordoudi, S.A., Tavlaridis, A., Karyotis, K., Zalidis, G. & Mourtzinis, I. 2021, "Rapid assessment of anthocyanins content of onion waste through visible-near-short-wave and mid-infrared spectroscopy combined with machine learning techniques", *Sustainability (Switzerland)*, vol. 13, no. 12. doi:10.3390/su13126588
  6. **Tziolas, N.**, Tsakiridis, N., Chabrillat, S., Demattê, J.A.M., Ben-Dor, E., Gholizadeh, A., Zalidis, G. & van Wesemael, B. 2021, "Earth observation data-driven cropland soil monitoring: A review", *Remote Sensing*, vol. 13, no. 21. doi:10.3390/rs13214439
  7. **Tziolas, N.**, Tsakiridis, N. & Zalidis, G. 2021, "Cropland Topsoil Properties Mapping By Applying A Machine Learning Algorithm To Open Access Copernicus Data", *International Geoscience and Remote Sensing Symposium (IGARSS)*, pp. 484. doi:10.1109/IGARSS47720.2021.9554733
  8. Karyotis, K., Angelopoulou, T., **Tziolas, N.**, Palaiologou, E., Samarinas, N. & Zalidis, G. 2021, "Evaluation of a micro-electro mechanical systems spectral sensor for soil properties estimation", *Land*, vol. 10, no. 1, pp. 1-16. doi:10.3390/land10010063
  9. Karyotis, K., **Tziolas, N.**, Tsakiridis, N., Samarinas, N., Chatzimisios, P., Demattê, J.A.M. & Zalidis, G. 2020, "Digital soil mapping using Sentinel-2 imagery supported by ASTER thermal infrared bands", *Proceedings of SPIE - The International Society for Optical Engineering*. doi:10.1117/12.2570821
  10. Samarinas, N., **Tziolas, N.** & Zalidis, G. 2020, "Improved estimations of nitrate and sediment concentrations based on SWAT simulations and annual updated land cover products from a deep learning classification algorithm", *ISPRS International Journal of Geo-Information*, vol. 9, no. 10. doi:10.3390/ijgi9100576
  11. **Tziolas, N.**, Tsakiridis, N., Ben-Dor, E., Theocharis, J. & Zalidis, G. 2020, "Employing a multi-input deep convolutional neural network to derive soil clay content from a synergy of multi-temporal optical and radar imagery data", *Remote Sensing*, vol. 12, no. 9. doi:10.3390/RS12091389
  12. **Tziolas, N.**, Tsakiridis, N., Ogen, Y., Kalopesa, E., Ben-Dor, E., Theocharis, J. & Zalidis, G. 2020, "An integrated methodology using open soil spectral libraries and Earth Observation data for soil organic carbon estimations in support of soil-related SDGs", *Remote Sensing of Environment*, vol. 244. doi:10.1016/j.rse.2020.111793
  13. Angelopoulou, T., **Tziolas, N.**, Balafoutis, A., Zalidis, G. & Bochtis, D. 2019, "Remote sensing techniques for soil organic carbon estimation: A review", *Remote Sensing*, vol. 11, no. 6. doi.org/10.3390/rs11060676
  14. **Tziolas, N.**, Tsakiridis, N., Ben-Dor, E., Theocharis, J. & Zalidis, G. 2019, "A memory-based learning approach utilizing combined spectral sources and geographical proximity for improved VIS-NIR-SWIR soil properties estimation", *Geoderma*, vol. 340, pp. 11-24. doi:10.1016/j.geoderma.2018.12.044
  15. Tsakiridis, N.L., **Tziolas, N.V.**, Theocharis, J.B. & Zalidis, G.C. 2019, "A genetic algorithm-based stacking algorithm for predicting soil organic matter from vis-NIR spectral data", *European Journal of Soil Science*, vol. 70, no. 3, pp. 578-590. doi:10.1111/ejss.12760

## GRANTS AND AWARDS

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- 2021-2023 PI, irisTECH: Develop an integrated system for variable rate fertilizer application, through the use of an innovative AI system, developed for row crops (cotton). General Secretariat of Research and Innovation, Grant Agreement T2EDK-02936. **Funding: € 102,250**
- 2021-2023 PI, e-graze: Novel livestock management model via the utilization of Earth Observation technologies. General Secretariat of Research and Innovation, Grant Agreement T2EDK-00866. **Funding: € 132,380**
- 2021-2022 PI, Re-source: Providing services for management of natural resources, Interreg V-B "Balkan-Mediterranean 2014-2020". **Funding: € 90,525**
- 2018-2019 PI, Combine2Protect: Common plans for biodiversity conservation and sustainable targets for the development of a bilateral network of protected areas, Interreg IPA-CBC, Greece – North Macedonia. **Funding: € 7,525**
- 2016 PI, ESA Programme "Maximize yields" EOEI (v05), CT-16-0172-MCA-A. **My Funding: € 15,000**
- 2015 PI, Determination of riverine, lakeside and alpine areas utilizing relevant geo-data, Greek Ministry of Rural Development and Food. **Funding: € 90,000**

\*Contributed significantly to the development of proposals for major projects (>15 projects with an average Laboratory's budget of **€ 250,000**; e.g., H2020 DIONE, H2020 EIFFEL, ESAWORLDISOILS etc.) on behalf of the Remote Sensing, Spectroscopy, and GIS Laboratory at Aristotle University of Thessaloniki, offering expertise in project planning, research design, and grant writing

## AWARDS

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- 2022 European Commission Innovation Radar Recognition: Hyperspectral imaging and artificial intelligence for automatic identification of grapes' maturity level
- 2021 European Commission Innovation Radar Recognition: Low cost in-situ soil scanning system (spectroscopy) for ground truth soil observations
- 2016 Nominated in ESA Earth Observation Entrepreneurship Initiative
- 2016 2<sup>nd</sup> place in Copernicus Master Award
- 2007 Scholarship from the Greek National Institute of Scholarships, success of high-entry 10%

## WORKSHOPS

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- 2021-2022 Laboratory Assistant at Biosystems Management and Earth Observation Systems M.Sc. course, Spring Semester, Aristotle University of Thessaloniki
- 2020-2022 Laboratory Assistant at Quality, Pollution and Restoration of Soil Ecosystem M.Sc. course, Spring Semester, Aristotle University of Thessaloniki

## WORKSHOPS

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2021 Organizing Committee on the Re-source Interred Project workshop of Region of Thessaly in support of public bodies, Online due to COVID-19, Larissa, Greece

## PROFESSIONAL SERVICE

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2011-2012 Member of Board of the Directors, School of Agriculture, as a student representative, Aristotle University of Thessaloniki, Greece  
2009-2012 Member of General Assembly, School of Agriculture, as a student representative, Aristotle University of Thessaloniki, Greece

**Manuscript review** (2020-2022, the number of reviews is listed in parentheses)

Remote Sensing (17), Remote Sensing of Environment (3), Geoderma (2), Geoderma Regional (1), Agronomy (2), Applied Sciences (1), ISPRS International Journal of Geo-Information (2), Land (2), IEEE transactions on geoscience and remote sensing (1), Neurocomputing (1), Catena (1), Computers and Electronics in Agriculture (1)

## Proposal review

2021 Ad-hoc review for the Hellenic Ministry of Agricultural Development and Food, Research, and extension program 16.1-16.2.

## PROFESSIONAL SOCIETIES

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Since 2016 European Geophysical Union  
Since 2016 Greek Society of Agricultural Engineering  
Since 2020 Institute of Electrical and Electronics Engineers Working Group P4005 – Standards and protocols for soil spectroscopy  
Since 2020 European Soil Observatory Working Group for Soil Erosion

## RECENT CONFERENCE PROCEEDINGS

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1. Chabrilat S., R. Milewski, K. Ward, S. Foerster, S. Guillaso, C. Loy, E. Ben-Dor, **N. Tziolas**, T. Schmid, B.V. Wesemael, J.A.M. Demattê, “Monitoring Soil Properties Using EnMAP Soil Artificial Intelligence Laboratory | Progress report, January 2023 2 Spaceborne Imaging Spectroscopy Mission”, 2023, *IEEE International Geoscience and Remote Sensing Symposium IGARSS*, Pasadena, USA, 2023 2. (accepted)

2. Kalopesa E., N. Tsakiridis, G. Boletos, G. Zalidis, **N. Tziolas**, “The Greek Soil Data Cube in Support of Generating Soil Related Analysis Ready Data”, 2023, *IEEE International Geoscience and Remote Sensing Symposium IGARSS*, Pasadena, USA, 2023 3. (accepted)
3. Milewski R., A. Abdelbaki, S. Chabrillat, **N. Tziolas**, B.V Wesemael, “Simulation of Spectral Disturbance Effects for Improvement of Soil Property Estimation”, 2023, *IEEE International Geoscience and Remote Sensing Symposium IGARSS*, Pasadena, USA, 2023 4. (accepted)
4. Samarinas N., **N. Tziolas**, G. Zalidis “Assess land degradation status based on Earth Observation driven proxy indicator”, 2023 *24th EGU General Assembly*, 23-28 April, 2023 5. (accepted)
5. Kokkas S., K. Karyotis, N. Samarinas, N. Tsakiridis, **N. Tziolas**, G. Zalidis, “Topsoil Organic Carbon Estimations in Greece via Deep Learning and Open Earth Observation Data”, 2023 *IEEE International Geoscience and Remote Sensing Symposium IGARSS*, Pasadena, USA, 2023 (accepted)
6. **Tziolas, N.**, Heiden, U., Dvorakova., K, Angelo, P., Zepp, S., Wesemael, B., 2022. Convolutional neural networks for soil organic carbon mapping from Sentinel-2 satellite imagery; a case study in Bavaria state. *European Space Agency Living Planet Symposium*
7. Heiden, U., Schwind, P., Angelo, P., Mueller, R., Zepp, S., **Tziolas, N.**, Gholizadeh, A., Dvorakova, K., Wesemael, B., 2022. Employing data-driven threshold derivation to build temporal bare soil reflectance composites from multispectral data across Europe. *European Space Agency Living Planet Symposium*
8. Ballester, M.J.Y., Diaz, A., Poggio, L., Wesemael., B., **Tziolas, N.**, Chabrillat, S., Heiden, U., Gholizadeh, A., Ben Dor, E., 2022 WORLDSOILS Monitoring system. *European Space Agency Living Planet Symposium*
9. Milewski, R., Chabrillat, S., Angelopoulou, T., Brell, M., **Tziolas, N.**, Zalidis, G., Ben Dor, E., 2022. Synergies of VNIR-SWIR and LWIR Hyperspectral Remote Sensing Data for Soil Property Mapping in an Agricultural Landscape of Northern Greece. *12th European Association of Remote Sensing Laboratories – Workshop in Imaging Spectroscopy*
10. Francos, N., **Tziolas, N.**, Brell, M., Chabrillat, S., Romano, N., Nasta, P., Zeng, Y., Szabó, Y., Manfreda, S., Ciraolo, S., Mészáros, J., Zhuang, R., Su, B., Ben-Dor, E. 2022. Estimation Of Water Infiltration Rate In Mediterranean Soils Using Airborne Hyperspectral Sensors. *12th European Association of Remote Sensing Laboratories – Workshop in Imaging Spectroscopy*
11. Coblinski, J., Bartsotas, N., **Tziolas, N.**, Tsakiridis, N., Kontoes, C., Zalidis, G., 2022. Prediction of soil organic carbon content using multitemporal Sentinel-2 imagery data and NWP-derived soil moisture over Greek croplands. *European Geoscience Union* [doi.org/10.5194/egusphere-egu22-3873](https://doi.org/10.5194/egusphere-egu22-3873)
12. Milewski, R., Chabrillat, S., Loy, C., Brell, M., **Tziolas, N.**, Angelopoulou, T., Zalidis, G., Ben-Dor, E., 2021. Advantages using combined VNIR-SWIR and LWIR hyperspectral remote sensing for estimation of soil properties in the Amyntaio agricultural region, Northern Greece. *European Geoscience Union* [doi: 10.5194/egusphere-egu21-12612](https://doi.org/10.5194/egusphere-egu21-12612)
13. **Tziolas, N.**, Tsakiridis, N., Ben-Dor, E., Theocharis, J., Zalidis, G., 2021. A multi-dimensional Sentinel-based Soil Monitoring Scheme (S2MoS) for soil clay content estimation. *European Geoscience Union* [doi:10.5194/egusphere-egu2020-13549](https://doi.org/10.5194/egusphere-egu2020-13549)
14. Chabrillat, S., Milewski, R., Christophe, I., Brell, M., **Tziolas, N.**, Angelopoulou, T., Zalidis, G., Ben-Dor, E. 2021. Advantages using combined VNIR-SWIR and LWIR hyperspectral

- remote sensing for estimation of soil properties in the Amyntaio agricultural region, Northern Greece. *European Geoscience Union* doi:10.5194/egusphere-egu21-12612
15. Chabrilat, S., Ruhtz, T., Zalidis, G., Ben-Dor, E., Brell, M., **Tziolas, N.**, Milewski, R., Berger, D., Foerster, S., Kuester, T., Tsakiridis, N., Liakopoulos, V., Angelopoulou, T., Samarinas, N., Francos, N., Cawse-Nicholson, K., Pignatti, S., 2020, EnMAP airborne soil Greece campaign 2019, European Geoscience Union doi:10.5194/egusphere-egu2020-8988
  16. Angelopoulou T., **Tziolas N.**, Balafoutis A., Zalidis G. and Bochtis D., 2019. preliminary results of multispectral camera mounted on unmanned aerial vehicle for soil properties estimation and mapping. *12th EFITA INTERNATIONAL CONFERENCE*
  17. Ben-Dor, E., Ogen, Y., Tsakiridis, N., **Tziolas, N.**, Zalidis, G., 2019. The Mediterranean Soil Spectral Library: An Example of an Effective Way to Exchange Soil Spectral Libraries Originated from Different Sources. In proceedings, Seventh International Conference on Remote Sensing and Geoinformation of the Environment, RSCy2019 *International Conference on Remote Sensing and Geoinformation of the Environment*
  18. **Tziolas, N.**, Tsakiridis, N. L, Ben-Dor, E., Kalopesa, E., Galanis, G., and Zalidis, G. C., 2018. Novel In Situ System for Monitoring Soil Organic Carbon by Using Mobile Vis-NIR Spectroscopy and Machine Learning Techniques, *AgEng Conference 2018*, Wageningen
  19. A Zouboulis, A Tsirika, E Terzopoulou, G Skoufas, ID Adamakis, S Kyriakidis, V Liakopoulos, **N Tziolas**, G Zalidis. 2018. Earth Observation based monitoring in Natura-2000 sites, providing ecosystem services for their adaptive management. *European Water Resources Association* 58: 185-190, 2017.
  20. Tsakiridis, N. L., **Tziolas, N.**, Galanis, G., Ben-Dor, E., and Zalidis, G. C., 2017. Soil Spectral Libraries for monitoring and reporting on Sustainable Development Goal indicators in Northern Greece. In proceedings, *Global Symposium on Soil Organic Carbon 2017*
  21. Tsakiridis, N.L., **Tziolas, N.**, Dimitrakos, A., Galanis, G., Ntonou, E., Tsirika, A., Terzopoulou, E., Kalopesa, E. & Zalidis, G.C. 2017, "Predicting soil properties for sustainable agriculture using vis-NIR spectroscopy - A case study in northern Greece", *Proceedings of SPIE - The International Society for Optical Engineering*. doi:10.1117/12.2277905