ALEXANDROS SAVVAIDIS, MSc, PhD

Research Professor, Lead Seismologist and Manager of Texas Seismological Network (TexNet)

CONTACT INFORMATION

Bureau of Economic Geology
Jackson School of Geosciences
University of Texas at Austin
University Station, Box X
Austin, TX 78712-8924

Tel: (+1) 737 202 8750
Fax: (+1) 512 471 0140
E-mail: alexandros.savvaidis@beg.utexas.edu
www: http://texnet.beg.utexas.edu

OVERVIEW

Manager of the Texas Seismological Network and Seismology Research (TexNet). Extensive 30 years experience in Seismology and Applied Geophysics both through my research position as a Senior Researcher and collaboration with Industrial partners in multidisciplinary European and US funded projects. I currently manage the seismic network of Texas with 210 seismic stations providing ground motion data in real time. In addition, I managed the largest Seismographic Network in Greece, numbering 100 real time seismometers and 150 offline installations. My research activity and technical expertise is focused on, earthquake physics (natural and induced seismicity), engineering seismology, Earth observation and disaster risk reduction, exploration, engineering, and environmental geophysics. My research on Seismology includes the study of causal factors of induced seismicity (Oil and Gas operations, water production, geothermal, CCUS, mining etc.), source characteristics, the wave path and site characterization in case of an earthquake event, the real time acquisition of ground motion data, Shakemaps implementation and data fusion for disaster risk mitigation. Additionally in Applied Geophysics my attention is directed towards acquiring, processing, and modeling geophysical data using passive and active seismic and electromagnetic techniques in urban and free field areas to reveal 1D, 2D and 3D earth models and to improve the knowledge in exploration, mining and three dimensional basin structure using geophysical methods. Also, I am an expert of surface wave data acquisition, processing and inversion for crustal modeling. For this I have applied different inversion algorithms through the Texas Advanced Computing Center (TACC) in passive and active data in order to minimize the computational time.

- Study of seismic signals and their automatic processing.
- Study of earthquake clusters (trends, relocation, improving earthquake location etc.) and its causal factors.
- Induced seismicity characterization due to hydraulic stimulation and salt water disposal using probabilistic and semi-empirical (physics based) methods.
- Prevention and mitigation of induced seismicity in Oil and Gas operations, geothermal reservoirs and Carbon Capture and Storage projects.
- Development and implementation of innovative techniques in the application of Microtremor Array Measurements for calculating the shear wave velocity with depth in both one and three dimensions.
- Structural and geotectonic characteristics of Earth's crust by using different geophysical methods: Seismic, Magnetotelluric, Direct Current, Time Domain Electromagnetic, Potential Field and Earthquake Tomography.
- Application of geophysical techniques for revealing shallow structure for geological, environmental, mining, geotechnical and archaeometric applications.
- Studies on the radiation and attenuation pattern of seismic waves, using macroseismic and instrumental data.
- Study and simulation of the propagation of seismic waves, as well as their influence of the local site conditions in the strong ground motion using instrumental (earthquakes and ambient noise) and simulation data.

Education

Aristotle University of Thessaloniki - AUTh.,
Department of Geology and Geophysics, Thessaloniki, Greece

PhD Geophysics, July 1998

Savvaidis A., *"Geophysical investigation of the North-West part of the Chalkidki Peninsula."* PhD Thesis, pp.196, 1998
Advisor: Prof. Gregory Tsokas (AUTh), Prof. M. Fytikas (AUTh) and Prof. P. Lagios (University of Athens)

MSc., Geophysics, November 1997

Savvaidis A., *"Noise Analysis on the Magnetotelluric Data of the area of Epanomi."* Master of Science Diploma Thesis, pp117, 1997

Advisor: Prof. G. Tsokas (AUTh.), Prof. L. Pedersen (University of Uppsala), and Dr. C. Papazachos (AUTh)

BSc., Geology, October 1992

Projects

Texas Seismological Network and Seismology Research (TexNet) (January 2016 - present). The budget allocation for this project has been $3.4M per biennium up to 2023. Since 2023 the budget has increased to $6.064M per biennium. In this project I am the Manager and PI of the Texas Seismological Network and Seismology Research `http://texnet.beg.utexas.edu/`. The State of Texas tasked the Bureau of Economic Geology (BEG) to locate and determine the origins of earthquakes in Texas, and where they may have been caused by human activity. Through the TexNet earthquake monitoring program we install seismic stations across Texas to gather real time earthquake data. I have designed and developed TexNet starting from January 2016. Up to September 2024, the TexNet seismic stations in the State of Texas numbered 180 real time systems. The fundamental purpose of my ongoing research is to identify the causes of induced seismicity in Texas, in order to mitigate the associated hazard and risk for the community and provide data to the State regulator to monitor the safety of industrial Oil and Gas activities (hydraulic fracturing and salt water disposal for unconventional production).

First of a kind EarthStore Installation in South Texas (September 2024 - August 2026). The budget allocation for this project is $140,049.06. In this project im at PI and we will deploy 4 broadband seismic stations in the Area of Interest (SMECI facility at Atascosa County, TX) to identify down to M0 earthquakes close to the well of injection for Energy Earth-Storage. Our systems will record ground motion continuously for two years. We will apply the Machine Learning (ML) approach that we developed in house and is successfully used in Texas, to detect seismicity and manually review any detected events. Any findings will be manually reviewed and provided in quarterly reports and during the testing period (injection period) on the next business day. Results can be used to identify earthquake hazard related to fault slip at the vicinity of the well and in operational plans to mitigate the earthquake hazard.

Center of Injection and Seismicity Research (CISR) (January 2016 - 2022). The budget allocation for this project is $500K per year. In this project I was PI in Seismology for the Center of Integrated Seismicity Research (CISR). CISR is sponsored from the Industry, and our partnership include most of the Oil & Gas operators in Texas.

State of induced seismicity in CCS (Carbon Capture and Storage) projects (February - October 2020). The aim of this project is to propose a set of best practices for managing seismic risk during the site-selection phase of a CCS project and the operational phase of the injection. Since the number of CO_2 storage projects with relevant data is small, we present the best-practices on data collection for seismicity, seismicity management and mitigation measures related to large volume saltwater injection and geothermal energy pro-

duction. By analyzing the available data, we propose a guideline applicable to site selection of CCS projects and seismicity monitoring to mitigate any possible hazard due to induced seismicity.

Permanent Greek Geohazard Supersite (May 2016 - April 2018). Co-ordinator of the Greek Geohazard Supersite at the GEO GSNL Initiative in Geneva, Switzerland (Group of Earth Observation - Geohazard Supersite and Natural Laboratories). The main objectives of this project are: (a) to collect and provide in an open data policy all the in situ information for the Supersite area of study and (b) manage the research of the Supersite group following data fusion of in situ and satellite imagery information:

`http://www.earthobservations.org/gsnl.php`.

A Scientific Network for Earthquake, Landslide and Flood Hazard Prevention-SciNetNatHazPrev, funded by the European Union (EU) - Black Sea Cross Border Cooperation (2013-2015). The budget allocation is 100k€ for IESEE out of 700k€ total project budget. In this project I am working on the natural hazard assessment in both regional (transnational) and local scale due to earthquakes and landslides and its impact on the environment and risk mitigation for the local community.

Estimation of seismic vulnerability of building stock of the town of Serres, (2013-2015). The project is implemented through EU Funding (85k€). In this project until now I have worked on facilitating the seismic hazard assessment from rock, as it is original calculated to the soil surface through earth models of the town of Serres, Greece. Further to that the seismic hazard model will be incorporated with the vulnerability of the structural environment for the final risk assessment.

INnovative multi-sensor network for DEformation and Seismic Monitoring of Urban Subsidence-prone Areas - INDES-MUSA, funded by EU Funds through the Greek-China co-operation program (2013-2015). The budget allocation is 131k€ for IESEE out of 473k€ total project budget. Through this project I have participated in the design and implementation of a multi-sensor (accelerometers, GPS, tide-gauge, LiDAR and water level) network. This network is established in four different types of land use: (a) Urban, (b) Industrial, (c) Special (Oil Tanks) and (d) Free Field. Accelerometer data are acquired in both ground level (urban free field) and structural (top and center of the building) environment. After an earthquake event I provide for each station, further to acceleration, also displacements from both the accelerometer network and also the GNSS collocated permanent network. I am also working on the soil transfer functions for each area using geophysical data, ambient noise and earthquake recordings. Finally, I am involved in the design and development of a Web GIS platform for data demonstration.

Processing of Surface Wave Data and Tutoring in Surface Wave Data Analysis and Inversion funded by University of Uppsala (2,5k€) Uppsala, Sweden (2015). In this project I coordinated the processing of different active and passive Surface wave data acquired in Sweden. Additionally, I delivered a one week workshop at Uppsala University on Introducing Surface Wave Data Analysis and Inversion Techniques.

Geotechnical Characterisation of selected sites in Crete Island by Using Geophysical and Geotechnical Methods funded by EU Funds (2012-2015). As a principal investigator for this project, out of the total project budget of 600k€ I negotiated a total contribution of 125k€ to be directed towards the IESEE. Through this project I have acquired, processed and modeled the geophysical data for site characterization, evaluated the theoretical and experimental site effects in the ground motion stations in the Island of Crete and compared the normalized elastic spectra with seismic codes. Both shallow (normal and thrust

faults) and deep subduction zone earthquake recordings were used. I am currently working on an empirical relation between geophysical and geotechnical data for engineering purposes. Finally, I co-ordinate the design and development of a GeoDatabase with ground motion recordings, geo (geological, geophysical and geotechnical data) and building information.

Comparative evaluation of Surface Geophysical Methods for the Specification of the Dynamic Properties of Soil at Sites of Earthquake recordings and Utilization for the Ground Motion Prediction Equations, funded by EU Funds (85k€) (2012-2015). As a principal investigator for this project I was responsible for the acquisition, processing and modeling of geophysical data at strong motion sites. Moreover, I have calculated the theoretical and experimental soil transfer function utilizing both dedicated geophysical models and ground motion earthquake data.

EuroseisTest Verification and Validation Project Phase 2 (2012-2015) implemented through funding (68k€) by the CEA (French Alternative Energies and Atomic Energy Commission). In this project using the GoCad Software and based on all available geological, geophysical and geotechnical data for the Mygdonian basin (Northern Greece) I have incorporated a synthesis of a 3D geo-model. An updated model is re-constructed along with its uncertainties. This basin geo-model is to be used in 3D ground motion simulation.

INspired GEOdata CLOUD Services INGEOCLOUDS, (2012-2014) supported through EU funding. As a principal investigator for this project, out of the total project budget of 1.5M€ I negotiated a total contribution of 135k€ to be directed towards the IESEE. In this work I have incorporated the framework, for running the service of Shakemaps for the broader Aegean Region (Greece) using the real time ground motion data (100 accelerometer stations) of the IESEE. Through this framework local information on Ground Motion Prediction Equations (for different type of faults, and soil conditions), and proxies of site characterization (based on geology, slope and terrain) are integrated. I have participated as a Senior Researcher in a group of interdisciplinary researchers for developing local proxies for site characterization.

Network of European Research Infrastructures for Earthquake Risk Assessment and Mitigation NERA, (2011-2014) funded by the EU. Out of the total project budget of 12M€ a total contribution of 106k€ was directed towards the IESEE. In this project I have applied different engineering geophysical methods (active and passive seismic wave data) for the calculation of the earth model in the test area of study in Koutavos Basin, Cephalonia, Greece .

Geophysical and Geotectonic properties of the Upper Crust using the Magnetotelluric Sounding Method in the area of Delvino, Albania (2013). As the principal coordinator of this project I negotiated a budget of 30k€ for the total duration of the project which was funded by the SEISMOTECH Company. In this project I have coordinated the acquisition and processing of more than 300 sounding data acquired in order to reveal the three-dimensional resistivity structure of the area. Additionally, I have proposed a strike analysis model that reveals the regional and local tectonic features along with 2D geophysical modeling of the area. Furthermore, the implementation of the proposed model provided valuable information on the crustal structure.

Efficient high-frequency surface wave tomography for seismological site characterization funded by National Funds (5k€) under the Greek-German Co-operation DAAD-IKYDA (2011). For this project I was the coordinator in addition to participating as a lead scientist. In this project we established a novel measurement strategy and modeling for efficient structural imaging of shallow and medium depth sedimentary environments using noise correlation tomography. This strategy is one of the few developed and applied for

shallow depths producing a 3D earth model through the use of ambient noise data.

International Transfer of Seismological Advanced Knowledge and Geophysical Research (ITSAK-GR), supported by EU funds of total budget 1M€, (2006-2010). I have coordinated this project funded by a Marie Curie Actions European Funding Initiative. On a technical level, in this project I had the opportunity to focus on all aspects of seismic-hazard assessment such as spatiotemporal seismicity patterns and earthquake interactions, geotectonic properties of the Earth's crust. In addition, I studied in detail earthquake source properties, seismic-wave propagation and attenuation as well as local site effects on strong-ground motion, deterministic and stochastic assessment of strong-ground motion, earthquake scenarios and shake maps. This research project had eight co-operating partners, from which six are located in Europe and two in the United States of America . During the same project I have co-operated with a group of fourteen incoming researchers and I have visited three of the co-operating partners for a total period of 12 months.

Cost Effective Geophysical Technology for Petroleum Exploration in non-seismic areas (2001) implemented by European Union funds. Out of the total project budget of 464k€ I negotiated a total contribution of 211k€ to be directed towards the AUTh. Through this project as a principal investigator I have participated in testing of advanced processing techniques of magnetotelluric data in areas of high industrial noise. In addition, I applied improved subsurface imaging on near-vertical structures with a strong degree of three-dimensionality. Finally, I have contributed the final geo-model of the area of study incorporating different geophysical data.

Undergraduate Teaching

AUTh, Department of Geology, 3rd and 4th Year Undergraduate Students.

- **Applied Geophysics (II and III)**.
  Through these courses I have introduced the geophysical methods commonly used in applied geophysics, namely potential field methods (gravity and magnetics), resistivity (mapping, sounding, and tomography) and electromagnetic methods (VLF, AFMAG, Turam, Slingram).
- **Theory of Vibrations/Oscillations and Elastic Waves**.
  Through these courses I have introduced vector calculus, mechanical oscillations, elasticity theory, and elastic waves.
- **Analysis and Interpretation of Geological Observations**.
  Through those courses I have introduced, interpolation (in both one and two dimensions), prediction, smoothing, filtering, regression, auto and cross-correlation, uni variate statistics and FOURIER analysis.

Postgraduate Teaching

- **Advanced Applied Geophysics** - AUTh, Greece
  Introduction to the Magnetotelluric method of Geophysical Prospecting.
- **Advanced Seismic Methods in Geophysical Exploration** - AUTh, Greece:
  (a) Surface Wave Methods for Near-Surface Applications, (b) Array Processing Concepts, (c) The Relation between array response and array analysis, and finally (d) Surface Wave data Inversion.
- **Active and Passive Surface Wave Methods in Engineering Geophysics.** - Uppsala University, Sweden (a) providing a fundamental introduction to these methods (b) familiarize the students with the use of the Geopsy open source software (c) deliver a set of practical exercises on synthetic and real data for analysis and inversion of Surface Wave Data.

Undergraduate Supervision

During my Research Activities at the University of Texas at Austin, I have supervised the following students:

- Jake Goins, Undergraduate Honors Project, "Fingerprint and Similarity Thresholding for Earthquake Detection, A West Texas Application", August 2021
- Natalie Lovegreen (URA JSG - Fall 2021, Spring 2022)
- Jennifer Penna (URA JSG - Fall 2021, Spring 2022)
- Davis Hagemeier (URA JSG - Fall 2021)
- Constantinos Skevofilax (URA Computational Engineering - Fall 2023, Spring 2024, Summer 2024)

Postgraduate Supervision

During my Research Activities at the University of Texas at Austin, I have supervised the following student:

- Bethany Rysak (GRA - Spring 2021)

During my Research Activities at the Institute of Engineering Seismology and Earthquake Engineering (IESEE), I have served in the advisory committee of several postgraduate students:

- Two postgraduate students (six months each) from the Department of Environmental and Natural Resources Engineering at the Technical Education Institute of Crete (TEI) in Chania, Greece.
- Three graduate students (2 months each) from the Department of Geology of the AUTh, in Thessaloniki, Greece.
- One MSc student (Mr. M. Anthymidis) and three PhD students (Dr. A. Panou , Dr. I. Papadopoulos , and Mr. M. Anthymidis).
- Three visiting postdoctoral researchers during the period 2006-2010 (Dr. Marcus Gurk, Dr. Heloise Cadet and Dr. Maria-Daphne Mangriotis).

Peer Reviewed Authored Books

Hosseini, S. A., Hovorka, S. D., **Savvaidis, A.,** Kavoura, F., and Nicot, J.-P., 2022, Current state of knowledge regarding the risk of induced seismicity at CO2 storage projects: Cheltenham, UK, IEA Environmental Projects Ltd., IEAGHG Technical Report, v. 2022-02, 63 p. https://ieaghg.org/publications/current-state-of-knowledge-regarding-the-risk-of-induced-seismicity-at-co2-storage-projects/

Journal Publications

For a full publication list visit: `https://scholar.google.com/citations?user=Fk2u3lcAAAAJ&hl=en`

Publications on peer reviewed journals are listed below:

1. Huang, G.-C. D. and **Savvaidis, A.,** 2024, *Reactivated Seismogenic Faults and Earthquake Source Mechanisms in the Snyder Area of Texas*, Seismo. Res. Lett. https://doi.org/10.1785/0220240048
2. Huang, G-C. D., Chen, Y., and **Savvaidis, A.,** 2024, *Complex Seismotectonic Characteristics in the Midland Basin of Texas: Constrained by Seismicity and Earthquake Source Mechanisms*, Seismo. Res. Lett., 2024 95 (3): 1870–1884 https://doi.org/10.1785/0220230269.
3. Pratt L. S., Dugick, F.D., Bowman, D.C., McCabe, C., and **Savvaidis, A.**, 2024, *Proximal Observations of Epicentral Infrasound Generated by Shallow Low-Magnitude Earthquakes in the Permian Basin, West Texas*, Bulletin of the Seismological Society of America 2024, https://doi.org/10.1785/0120240033

4. Saad, O., Hellmy, I., Mohammed, M., **Savvaidis, A.,** Chatterjee A., and Chen. Y., 2024, *Deep Learning Peak Ground Acceleration Prediction Using Single-Station Waveforms*, IEEE Transactions on Geoscience and Remote Sensing, vol. 62, pp. 1-13, 2024, Art no. 5907213, https://doi.org/10.1109/TGRS.2024.3367725

5. Lee, J., Chen, Y., Dommisse, R., Huang, G.-C. D., and **Savvaidis, A.,** 2024, *Basin-scale prediction of S-wave Sonic Logs using Machine Learning techniques from conventional logs*, Geophysical Prospecting, https://doi.org/10.1111/1365-2478.13527

6. Chen, Y., **A. Savvaidis,** O. M. Saad, G.-C. Dino Huang, D. Siervo, V. O'Sullivan, C. McCabe, B. Uku, P. Fleck, G. Burke, Alvarez, N., Dommino, J. and I. Grigoratos, 2024, *TXED: The Texas Earthquake Dataset for AI*, Seismol. Res. Lett. 95, 2013–2022, https://doi.org/10.1785/0220230327.

7. Chen, Ya., Saad, O., **Savvaidis, A.,** Zhang, F., Chen, Yu., Huang, D., Li, H., and Zanzani, F., 2024, *Deep Learning for P-Wave First-Motion Polarity Determination and Its Application in Focal Mechanism Inversion*, IEEE Transactions on Geoscience and Remote Sensing, vol. 62, pp. 1-11, 2024, Art no. 5917411, https://doi.org/10.1109/TGRS.2024.3407060.

8. Breton, C., Shensky, M., and **Savvaidis, A.,** 2024, *Induced seismicity data prep: Automate data processing and data set production in Texas and New Mexico using Python and ArcGIS Pro tools.* Interpretation 12: SC1-SC7, https://doi.org/10.1190/INT-2023-0013.1.

9. Chen, Y., **Savvaidis, A.,** Saad, O.M., Siervo, D., Huang, G.-C.D., Chen, Y., Grigoratos, I., Fomel, S., and Breton, C., 2024, *Thousands of Induced Earthquakes per Month in West Texas Detected Using EQCCT*. Geosciences 2024, 14, 114. https://doi.org/10.3390/geosciences1405011

10. Faith, J. L., Karplus, M. S., Veitch, S. A., Doser, D. I., and **Savvaidis, A.,** 2023, *The Pecos Array: A Temporary Nodal Seismic Experiment in the Pecos, Texas, Region of the Delaware Basin*, Seismol. Res. Lett. 95, 544–555, http://doi.org/10.1785/0220230108.

11. Saad, O., Chen, Yu., Siervo, D., Zhang, F., **Savvaidis, A.,** Huang, H-G D., Igonin, N., Fomel, S., and Chen, Y., 2023, *EQCCT: A Production-Ready Earthquake Detection and Phase-Picking Method Using the Compact Convolutional Transformer*, IEEE Transactions on Geoscience and Remote Sensing, vol. 61, pp. 1-15, 2023, Art no. 4507015, https://doi.org/10.1109/TGRS.2023.3319440

12. Saad, O., Chen, Yu., **Savvaidis, A.,** Fomel, S., Jiang, X., Huang, D., Oboué, I., Yong, S., Wang, X., Zhang, X., and Chen, Ya., 2023, *Earthquake Forecasting Using Big Data and Artificial Intelligence: A 30-Week Real-Time Case Study in China*, Bulletin of the Seismological Society of America, 2023 113 (6): 2461–2478. https://doi.org/10.1785/0120230031

13. Chen, Ya., **Savvaidis, A.,** Fomel, S., Chen, Yu., Saad, O.M., Wang, H., Oboué, Y. A. S. I., Yang, L., and Chen, W., 2023 Denoising of Distributed Acoustic Sensing Seismic Data Using an Integrated Framework, Seismol. Res. Lett. 94, 457–472, https://doi.org/10.1785/0220220117.

14. Chen, Ya., Chen, Yu., Fomel, S., **Savvaidis, A.,** Saad, O.M. and Oboué Y. A. S., 2023, Pyekfmm: A Python Package for 3D Fast-Marching-Based Travel-Time Calculation and Its Applications in Seismology, Seismol. Res. Lett. 94, 2050–2059, https://doi.org/10.1785/ 0220230042.

15. Chen, Y., **Savvaidis, A.,** and Fomel, S., 2023, *Dictionary Learning for Single-Channel Passive Seismic Denoising.* Seismological Research Letters 2023, 94 (6): 2840–2851, https://doi.org/10.1785/0220230169

16. Huang, G., Chen, X., Saad, O. M., Chen, Yunfeng, **Savvaidis, A.,** Fomel, S., and Chen, Yangkang, 2022, *High-resolution and robust microseismic grouped imaging and grouping strategy analysis*, Geophysical Prospecting, v. 70, no. 6, https://doi.org/10.1111/1365-2478.13216

17. Grigoratos, I., **Savvaidis, A.,** and E. Rathje, 2022, *Distinguishing the Causal Factors of Induced Seismicity in the Delaware Basin: Hydraulic Fracturing or Wastewater Disposal?*. Seismological Research Letters, https://doi.org/10.1785/0220210320.

18. **Savvaidis, A.,** Lomax, A., Dommisse, R., Breton C., Shirley M., and V. O'Sullivan, 2022, *Induced seismicity hypocentral depth stability and sensitivity to Vp/Vs in the South Delaware Basin, West Texas*, Society of Exploration Geophysics, https://library.seg.org/doi/10.1190/image2022-3751081.1.

19. Jin, L., Curry, B., Zoback, M., Hussenoeder, S., **Savvaidis, A.,** Nicot JP., Hennings, P., and P., Bhargava, 2022 *Rapid geomechanical analysis of injection-related earthquakes*, Society of Exploration Geophysics, https://library.seg.org/doi/10.1190/image2022-3740083.1.

20. Saad, O. M., Chen, Y., **Savvaidis, A.,** Fomel, S., Chen, Y., 2022, *Real-time earthquake detection and magnitude estimation using vision transformer.* Journal of Geophysical Research: Solid Earth, 127, e2021JB023657. https://doi.org/10.1029/2021JB023657.

21. Lomax, A., **Savvaidis, A.**, 2022. *High-precision earthquake location using source-specific station terms and inter-event waveform similarity.* Journal of Geophysical Research: Solid Earth, 127, e2021JB023190. https://doi.org/10.1029/2021JB023190.

22. Huang, D., Horne, E., Kavoura, F., and **Savvaidis, A.**, 2022, *Characteristics of seismogenic structures and 3D stress state of the Delaware Basin of West Texas as constrained by earthquake source mechanisms*, Seismological Research Letters, v. 93, no. 6, p. 3363–3372, http://doi.org/10.1785/0220220054.

23. O. M. Saad et al., *Machine Learning for Fast and Reliable Source-Location Estimation in Earthquake Early Warning,* in IEEE Geoscience and Remote Sensing Letters, vol. 19, pp. 1-5, 2022, Art no. 8025705, https://doi.org/10.1109/LGRS.2022.3142714.

24. Chen, Y., Saad, O. M., **Savvaidis, A.,** Chen, Y., Fomel, S., 2022, *3d microseismic monitoring using machine learning*, Journal of Geophysical Research: Solid Earth, 127, e2021JB023842. https://doi.org/10.1029/2021JB023842.

25. Horne, E. A., Hennings, P. H., Smye, K. M., Staniewicz, S., Chen, J., and **Savvaidis, A.**, 2022, *Structural characteristics of shallow faults in the Delaware Basin*, Interpretation, v. 10, no. 4, p. T807–T835, http://doi.org/https://doi.org/10.1190/INT-2022-0005.1.

26. Guzman, V., Li, A., and **Savvaidis, A.,** 2022, *Stress Variations in the Delaware Basin from Shear-Wave Splitting Analysis*, Seismological Research Letters 2022 93 (6):3433–3443. https://doi.org/10.1785/0220220118

27. Saad, O. M., Chen, Yunfeng, **Savvaidis, A.,** Chen, W., Zhang, F., and Chen, Yangkang, 2022, *Unsupervised deep learning for single-channel earthquake data denoising and its applications in event detection and fully automatic location*, IEEE Transactions on Geoscience and Remote Sensing, v. 60, no. 5921310, 10 p., http://doi.org/10.1109/TGRS.2022.3209932.

28. Saad, O. M., Huang, G., Chen, Y., **Savvaidis, A.,** Fomel, S., Pham, N., Chen, Y., 2021, *Scalodeep: A highly generalized deep learning framework for real-time earthquake detection.* Journal of Geophysical Research: Solid Earth, 126. https://doi.org/10.1029/2020jb021473.

29. Hennings, P., Dvory, N., Horne, E., Li, P., **Savvaidis, A.,** and Zoback, M., 2021, *Stability of the Fault Systems That Host-Induced Earthquakes in the Delaware Basin of*

West Texas and Southeast New Mexico, The Seismic Record. 1(2), 96–106, https://doi.org/10.1785/0320210020

30. Li., P., Huang, D.-G., **Savvaidis, A.**, Kavoura, F., and Poritt R., 2021, *Characteristics of Seismicity in the Eagle Ford Shale Play, Southern Texas, Constrained by Earthquake Relocation and Centroid Moment Tensor Inversion*, Seismol. Res. Lett. 92 (6), 3504–3615, https://doi.org/10.1785/0220210005.
31. Trugman, D. T., and **A. Savvaidis**, 2021, *Source Spectral Properties of Earthquakes in the Delaware Basin of West Texas*, Seismol. Res. Lett. 92 (4): 2477–2489, https://doi.org/10.1785/0220200461.
32. Li., P., Huang, D.-G., and **Savvaidis, A.**, 2021, *Seismic Features of the Permian Basin Region from Receiver Function Analysis*, Tectonophysics, Volume 801, 2021, 228718, ISSN 0040-1951, https://doi.org/10.1016/j.tecto.2021.228718.
33. Grigoratos, I., Rathje, E., Bazzuro, P., and **Savvaidis, A.**, 2021 *Time-dependent seismic hazard and risk due to wastewater injection in Oklahoma*, Earthquake Spectra. February 2021. https://doi:10.1177/8755293020988020.
34. **Savvaidis, A.** Lomax, A. and Breton C., 2020, *Induced seismicity in the Delaware Basin, west Texas is caused by hydraulic fracturing and wastewater disposal*, Bull. Seismol. Soc. Am., https://doi.org/10.1785/0120200087, 2020.
35. Staniewicz, S., Chen, J., Lee, H., Olson, J., **Savvaidis, A.**, Reedy, R., et al., 2020, *InSAR reveals complex surface deformation patterns over an 80,000 km2 oil-producing region in the Permian Basin*, Geophysical Research Letters, 47, e2020GL090151. https://doi.org/10.1029/2020GL090151, 2020.
36. Merzlikin, D., **Savvaidis, A.**, Whittaker, S., and Bestmann, I., 2020 *Data processing of a local seismological network for West Texas seismicity characterization*, Seismol. Res. Lett., https://doi.org/10.1785/0220190358, 2020.
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Honors and Awards

- My publication of 2022 in the American Geophysical Union, Journal of Geophysical Research on "SCALODEEP: A highly generalized deep learning framework for real-time earthquake detection" is recognized as a top cited paper among work published in an issue between 2021-2022.
- My publication of 2019 in the American Geophysical Union, Journal of Geophysical Research on "Improving Absolute Earthquake Location in West Texas Using Probabilistic, Proxy Ground-Truth Station Corrections" is among the journal's top 10% most downloaded papers.
- At the recently held Walter Awards ceremony, on 20^{th} of December 2019, as the Principal Investigator of the TexNet Seismic Observatory (TexNet) together with the co - Principal Investigator of the Center for Integrated Seismicity Research (CISR), I jointly received the Jackson School Outstanding Research Award. The Jackson School Outstanding Research Award "recognizes accomplishments by an individual or a team of faculty or scientists" and is presented after an extensive nomination and review process.
- Awarded the position of Geohazard Supersite Co-ordinator for the Greek Supersite in GEO GSNL (Group of Earth Observation - Geohazard Supersite and Natural Laboratories).
- Awarded the position of National Contact Point for the PEOPLE Work Program Marie Curie Actions funding, of the European Commission. Brussels, Belgium, December 2006 until December 2013
- I have been invited from the University of Oulu, to participate in the field campaign (June 2010) as well as in the processing of data under the framework of the poject: "Three-dimensional structure and properties of the Fennoscandian lithosphere from electromagnetic magnetotelluric measurements. Multivariate analysis and three-dimensional inversion of synchronous electromagnetic array data".
- The paper Savvaidis et al. (2013) entitled: "Geo-Characterization according to recent advances of Eurocode (EC8)", Presented in the first Conference of Remote Sensing and Geoinformation of the Environment, (RSCy2013, 8-10th of April 2013, Paphos, Cyprus. Proc. of SPIE Vol. 8795 879513-1) received the title of Best Paper Award.
- I have been invited from the Swedish Geological Institute (SGU) to organise and acquire Magnetotelluric Measurements (2014) and to calculate geoelectrical models (2015) of the mining deposits of Kiruna mines. This project is a collaboration of SGU and LKAB Mining Corporation.
- I have been invited to participate in the project INTERPACIFIC (Intercomparison of methods for site parameter and velocity profile characterization) as an expert scientist in processing and inversion of active and passive surface wave data.
- As from 2005 I participate in the beta testing group of the Geopsy Software.
  `http://www.geopsy.org/contributions.html`
  This is an open source software that the user can process Microtremor, MASW and reflection data in order to reveal the Earth's structure.

Computer Skills

- **Geophysical Software:** Geopsy (`http://www.geopsy.org`), WinGLink, Geotools, GOCAD, Phoenix Geophysics MT Processing Software, RES2DINV, IPI2WIN MT, FDSim (Fortran95/OpenMPI), GEOSOFT OASIS montaj
- **Programming:** FORTRAN, C, Python, Unix shell scripts
- **Applications:** ArcGIS, MATLAB, Microsoft Office - LaTeX, database, spreadsheet, and presentation software
- **Operating Systems:** Unix/Linux, Windows, MacOS

Project Management

- **Texas Seismological Network - TexNet** (January 2016 - Present).
- **Permanent Greek Geohazard Supersite** (May 2015 - April 2018).
- **Processing of Surface Wave Data and Tutoring in Surface Wave Data Analysis and Inversion** (2015)
- **Geotechnical Characterisation of selected sites in Crete Island by Using Geophysical and Geotechnical Methods** (2012-2015).
- **Comparative evaluation of Surface Geophysical Methods for the Specification of the Dynamic Properties of Soil at Sites of Earthquake recordings and Utilization for the Ground Motion Prediction Equations**(2012-2015).
- **INspired GEOdata CLOUD Services INGEOCLOUDS** (2012-2014).
- **Geophysical and Geotectonic properties of the Upper Crust using the Magnetotelluric Sounding Method in the area of Delvino, Albania** (2013).
- **Efficient high-frequency surface wave tomography for seismological site characterization** (2011).
- **International Transfer of Seismological Advanced Knowledge and Geophysical Research (ITSAK-GR)** (2006-2010).