# Mustafa Kemal Emil, Ph.D.

Kalamazoo, MI, USA | +1-352-870-8786 | mustafakemal.emil@wmich.edu | ORCID: 0000-0001-5579-0386 | Website: mkemalemil.github.io

## PROFESSIONAL SUMMARY

Remote sensing scientist and geospatial researcher with 15+ years of experience in Earth Observation, InSAR time-series analysis, satellite gravimetry, imaging spectroscopy, and geospatial decision support systems. Specialized expertise in geohazard monitoring, mineral mapping, water resources management, aquifer sustainability, and climate resilience in arid environments. Track record of leading interdisciplinary research projects, operationalizing satellite-based monitoring systems, developing scientific web applications, and translating research into practical outcomes for environmental planning and water management.

## EDUCATION

**Ph.D., Geological and Environmental Sciences** 2021
Western Michigan University, Kalamazoo, MI, USA
*Dissertation: Use of InSAR Technologies for Countrywide Monitoring of Ground Deformation in Qatar and Identification of Controlling Factors*

**M.Sc., Mining Engineering** 2011
Middle East Technical University, Ankara, Turkey
*Thesis: Land Degradation Assessment for an Abandoned Coal Mine with Geospatial Information Technologies*

**B.Sc., Mining Engineering (Minor: Remote Sensing and GIS)** 2007
Middle East Technical University, Ankara, Turkey

## APPOINTMENTS

- **Senior Research Associate**, Earth Sciences Remote Sensing Facility, Western Michigan University (2021–Present)
- **Lab Manager**, Earth Sciences Remote Sensing Facility, Western Michigan University (2016–Present)
- **Teaching and Research Assistant**, Department of Geological and Environmental Sciences, Western Michigan University (2012–2017)
- **Teaching and Research Assistant**, Department of Mining Engineering, Middle East Technical University (2007–2011)

## FUNDED RESEARCH SUPPORT

**Current Projects:**

- **Science-PI**, NASA EMIT Science and Applications Team: Lithologic mapping, mineral exploration, and tectonic investigations in arid lands (2024–2027; $518,282)
- **Co-I**, NASA ESI: Active deformation and geohazards in the Suez Rift using InSAR analysis and age dating constraints (2024–2027; $363,952)

- **Co-I**, NASA GRACE: Climatic and anthropogenic contributions to hydrologic systems in arid lands (2024–2028; $675,940)

**Pending Projects:**

- **Co-I**, Mineral Resource Mapping with Imaging Spectroscopy (MRMIS) using EMIT data (NASA COMPASS25) (2026–2028; $399,994)
- **Co-I**, Michigan Copper Mine Waste Characterization and Spectral Library Development(USGS Earth MRI) (2026–2028; $314,281)

**Recent Completed Projects:**

- **PI**, Automated Country-wide Monitoring System for Natural and Anthropogenic Ground Deformation in Qatar (Qatar Ministry of Municipality and Environment) (2023–2025; $136,850)
- **Co-PI**, Michigan Mine Waste Inventory for Critical Minerals (USGS) (2023–2025; $54,000)
- **Co-I**, Assessment of Radionuclides in Groundwater Aquifers (Saudi Geological Survey) (2023–2025; $449,350)
- **Co-PI**, Mapping and Monitoring Sabkhas and Sand Dunes in Saudi Arabia (Saudi Geological Survey) (2023–2025; $441,806)

## RESEARCH AND TECHNICAL COMPETENCIES

- **Earth Observation:** InSAR time-series analysis for deformation monitoring, imaging spectroscopy for mineral mapping, GRACE for aquifer monitoring, SAR coherence change detection for building damage assessment
- **Geospatial Science:** GIS analysis and database design, web GIS application development, decision support workflows, spatial data management, geodetic methods
- **Custom Web Application Development:** Full-stack design and deployment for scientific and decision-support platforms, interactive visualization frameworks, geospatial web services
- **Machine Learning and Data Science:** Deep learning for high-dimensional (spectral, timeseries) Earth observation data analysis
- **Programming and Software:** Python, ISCE, Mintpy, ArcGIS Pro, QGIS, GDAL, ENVI, SARscape, Experience Builder (developer edition) for ArcGIS
- **Systems Administration:** Linux and Windows system administration, high-performance computing, ESRI site license administration, ESRI Enterprise multi-machine deployment
- **Instrumentation:** ASD FieldSpec spectroradiometer for lithological mapping and mineral exploration
- **Field Experience:** Groundwater sampling for noble gas analysis, terrestrial laser scanning, geologic mapping, surface water contamination assessment

## PROFESSIONAL OUTPUTS AND ACHIEVEMENTS

- Operationalized country-scale satellite monitoring systems for operational decision support (Qatar deformation monitoring)
- Developed custom web applications for visualization, analysis, and dissemination of scientific data (SpectralViewer, Qatar Ground Motion Service)

- Designed and delivered training and capacity-building programs for applied research and government personnel
- Translated complex remote sensing analyses into actionable intelligence for stakeholder communities
- Led multidisciplinary research teams across international collaborations
- Published 20+ peer-reviewed articles with comprehensive Earth Observation methodologies

## PEER-REVIEWED PUBLICATIONS

1. Alshakr, A., Sultan, M., **Emil, M.K.**, Alharbi, H., Alshehri, F., Alotaibi, A.A., Mohammad, A.T., Yildirim, A., Sturchio, N.C. (2026). Hyperspectral fingerprinting of dune sediments across the Arabian Peninsula: Insights into sediment provenance and transport pathways from NASA's EMIT data. *Geophysical Research Letters*, 53(12), e2025GL121122. [DOI]

2. Mohammad, A.T., Sultan, M., Abotalib, A.Z., Voice, P., Saleh, H., Karimi, H., Emil, M.K., Elhaddad, H. (2025). Coupled control of tectonic and surface processes on the inception and evolution of the East Saharan mega-depressions. *Geomorphology*, 110025. [DOI]

3. Karimi, H., Sultan, M., Yan, E., Elhaddad, H., Saleh, H., Abdelmohsen, K., **Emil, M.K.** (2025). Climate-extreme modeling framework for sustainable flood management in the Arabian Peninsula. *Journal of Environmental Management*, 393, 127074. [DOI]

4. Saleh, H., Sultan, M., Yan, E., Save, H., Elhaddad, H., Karimi, H., Abdelmohsen, K., **Emil, M.K.**, Qamshouai, S.A. (2025). Intensifying tropical cyclones in the Arabian Sea replenish depleting aquifers. *Communications Earth & Environment*, 6(1), 536. [DOI]

5. Elhaddad, H., Sultan, M., Yan, E., Abdelmohsen, K., Mohammad, A.T., Badawy, A., Karimi, H., Saleh, H., **Emil, M.K.** (2024). Optimization of floodwater redistribution from Lake Nasser could recharge Egypt's aquifers and mitigate excessive floods. *Communications Earth and Environment*, 5, 385. [DOI]

6. Abdelmohsen, K., Sultan, M., Yan, E., Abotalib, A.Z., Save, H., **Emil, M.K.**, Elhaddad, H., Abdelmalik, K. (2024). Watching the Grand Ethiopian Renaissance Dam from a distance: Implications for sustainable water management of the Nile water. *PNAS Nexus*, 3(7). [DOI]

7. Ahmad, S.M., Sadhasivam, N., Lisa, M., Lombardo, L., **Emil, M.K.**, Zaki, A., et al. (2023). Standing on the shoulder of a giant landslide: A six-year long InSAR look at a slow-moving hillslope in the western Karakoram. *Geomorphology*, 444, 108959. [DOI]

8. Sahour, H., Sultan, M., Abdellatif, B., **Emil, M.K.**, Abotalib, A.Z., Abdelmohsen, K., et al. (2022). Identification of shallow groundwater in arid lands using multi-sensor remote sensing data and machine learning algorithms. *Journal of Hydrology*, 614, 128509. [DOI]

9. Sataer, G., Sultan, M., **Emil, M.K.**, Yellich, J.A., Palaseanu-Lovejoy, M., Becker, R., Gebremichael, E., Abdelmohsen, K. (2022). Remote Sensing Application for Landslide Detection and Monitoring along Eastern Lake Michigan. *Remote Sensing*, 14, 3474. [DOI]

10. **Emil, M.K.**, Sultan, M., Alakhras, K., Sataer, G., Gozi, S., Al-Marri, M., Gebremichael, E. (2021). Countrywide monitoring of ground deformation using InSAR time series: A case study from Qatar. *Remote Sensing*, 13(4), 702. [DOI]

11. Aljammaz, A., Sultan, M., Izadi, M., Abotalib, A.Z., Elhebiry, M.S., **Emil, M.K.**, et al. (2021). Subsidence induced by rapid urbanization in arid environments: A remote sensing-based investigation. *Remote Sensing*, 13, 1109. [DOI]

12. Pankratz, H.G., Sultan, M., Abdelmohsen, K., Sauck, W.A., Alsefry, S., Alharbi, H., **Emil, M.K.**, et al. (2021). Use of Geophysical and Radar Interferometric Techniques to Monitor Land Deformation Associated with the Jazan Salt Diapir. *Surveys in Geophysics*, 42, 177–200. [DOI]

13. Elhebiry, M.S., Sultan, M., Abu El-Leil, I., Kehew, A.E., Bekiet, M.H., Abdel Shahid, I., et al. (2019). Paleozoic glaciation in NE Africa: field and remote sensing-based evidence from the South Eastern Desert of Egypt. *International Geology Review*, 62(9), 1187–1204. [DOI]

14. Sultan, M., Sturchio, N.C., Alsefry, S., **Emil, M.K.**, Ahmed, M., Abdelmohsen, K., et al. (2019). Assessment of age, origin, and sustainability of fossil aquifers: A geochemical and remote sensing-based approach. *Journal of Hydrology*, 576, 325–341. [DOI]

15. Karki, S., Sultan, M., Alsefry, S., Alharbi, H., **Emil, M.K.**, Elkadiri, R., Alfadail, E.A. (2019). A remote-sensing-based intensity-duration threshold, Faifa Mountains, Saudi Arabia. *Natural Hazards and Earth System Sciences*, 19, 1235–1249. [DOI]

16. Abdelmohsen, K., Sultan, M., Ahmed, M., Save, H., Elkaliouby, B., **Emil, M.K.**, et al. (2019). Response of deep aquifers to climate variability. *Science of the Total Environment*, 677, 530–544. [DOI]

17. Gebremichael, E., Sultan, M., Becker, R., El Bastawesy, M., Cherif, O., **Emil, M.K.** (2018). Assessing land deformation and sea encroachment in the Nile Delta: A radar interferometric and inundation modeling approach. *Journal of Geophysical Research: Solid Earth*, 123, 3208–3224. [DOI]

18. Alharbi, T., Sultan, M., Sefry, S., Elkadiri, R., Ahmed, M., Chase, R., Milewski, A., Abu Abdullah, M., **Emil, M.K.**, Chounaird, K. (2014). An assessment of landslide susceptibility in the Faifa area, Saudi Arabia, using remote sensing and GIS techniques. *Natural Hazards and Earth System Sciences*, 14, 1553–1564. [DOI]

19. Yenilmez, F., Kuter, N., **Emil, M.K.**, Aksoy, A. (2011). Evaluation of pollution levels at an abandoned coal mine site in Turkey with the aid of GIS. *International Journal of Coal Geology*, 86, 12–19. [DOI]

20. Demirel, N., Düzgün, H.S., **Emil, M.K.** (2011). Landuse change detection in a surface coal mine area using multi-temporal high-resolution satellite images. *International Journal of Mining, Reclamation and Environment*, 25, 342–349. [DOI]

21. Demirel, N., **Emil, M.K.**, Duzgun, H.S. (2011). Surface coal mine area monitoring using multi-temporal high-resolution satellite imagery. *International Journal of Coal Geology*, 86, 3–11. [DOI]

## BOOK CHAPTERS

1. Sultan, M., Ahmed, M., Wahr, J., Yan, E., **Emil, M.K.** (2014). Monitoring Aquifer Depletion from Space: Case Studies from the Saharan and Arabian Aquifers. In: *Remote Sensing of the Terrestrial Water Cycle*. Wiley Blackwell, pp. 347–366. [DOI]

## SELECTED WEB APPLICATIONS AND SOFTWARE

1. **SpectralViewer** (2025). A web application for interactive visualization of imaging spectroscopy data and spectral library references (v0.0.1). [GitHub] | [Zenodo]

2. **Qatar-Ground-Motion-Service** (2025). A web application for Qatar Ground Motion Service (v0.0.1). [GitHub] | [Zenodo]

# CONFERENCE PRESENTATIONS

**First-Author Presentations:**

1. **Emil, M.K.**, Sultan, M., Raising, H., Yildirim, A., Alshakr, A., Kattamuri, V. (2025). A Web-Based Interactive Viewer for NASA EMIT Surface Reflectance and Mineralogy Data. *American Geophysical Union Fall Meeting*, Chicago, December.

2. **Emil, M.K.**, Sultan, M., Algahtani, B., Alsefry, S. (2022). Sinkhole formation in relation to nearby wastewater storage in abandoned quarries, southeastern Riyadh, Saudi Arabia. *American Geophysical Union Fall Meeting*, Chicago, December.

3. **Emil, M.K.**, Pankratz, H.G., Sultan, M. (2021). Rapid assessment of Surfside condo collapse using InSAR time series analysis and geospatial technologies. *American Geophysical Union Fall Meeting*, New Orleans, December.

4. **Emil, M.K.**, Pankratz, H.G., Sultan, M., Al-Akhras, K., Abdelmohsen, K., Al-Marri, M. (2021). Continuous monitoring of ground motion using Sentinel-1 InSAR time series: A case study from Doha, Qatar. *American Geophysical Union Fall Meeting*, New Orleans, December.

5. **Emil, M.K.**, Sultan, M., Al-Akhras, K., Gebremichael, E., Izadi, M., Karki, S. (2018). Detecting and monitoring ground deformation using InSAR time series in arid environments. *American Geophysical Union Fall Meeting*, Washington D.C., December.

6. **Emil, M.K.**, Sultan, M., Al-Harbi, T., Al-Bassam, A.M., Abuabdullah, M., Al-Sefry, S. (2018). Geochemical evidence from fossil aquifers of central Arabia for cooler environments during aquifer recharge. *Geological Society of America Annual Meeting*, Indianapolis, November.

7. **Emil, M.K.**, Sultan, M., Abdellatif, B., Fathy, K., Sahour, H., Sataer, G., et al. (2017). Temporal Analysis of Multi-sensor Data to Identify and Monitor Natural Groundwater Discharge in Arid Environments. *American Geophysical Union Fall Meeting*, New Orleans, December.

8. **Emil, M.K.**, Sultan, M., Sturchio, N.C., Ahmed, M., Chouinard, K. (2014). Understanding the paleohydrological setting of the Arabian Peninsula: An integrated approach. *American Geophysical Union Fall Meeting*, San Francisco, December.

9. **Emil, M.K.**, Sultan, M., Farag, A.Z.A., Abouelmagd, A., Ahmed, M. (2015). Timing and Nature of Wet Climatic Periods in North Africa and in the Arabian Peninsula: Inferences from Isotopic, Chronologic, and Remote sensing data. *American Geophysical Union Fall Meeting*, San Francisco, December.

10. **Emil, M.K.**, Sultan, M., Alharbi, T., Albassam, A.M., Chouinard, K., Abuabdullah, M. (2016). Nature, timing, and origin of wet climatic periods in Arabia from geochemical (stable isotopes, noble gas thermometry, geochronology) and geomorphological data. *American Geophysical Union Fall Meeting*, San Francisco, December.

11. **Emil, M.K.**, Sultan, M., Sefry, S., Ahmed, M., AboAbdallah, M., Chouinard, K., Krawczyk, M. (2012). Radar Interferometric Applications for a Better Understanding of the Distribution, Controlling Factors, and Precursors of Large Earthquakes in Turkey. *American Geophysical Union Fall Meeting*, San Francisco, December.

## CO-AUTHORED CONFERENCE PRESENTATIONS

1. Karimi, H., Sultan, M., Yan, E., Abdelmohsen, K., **Emil, M.K.**, Elhaddad, H., Saleh, H. (2025). Utilizing Extreme Precipitation to Mitigate Water Scarcity in Arid Areas: A Hydrological Approach for Natural and Artificial Recharge. *AGU Annual Meeting*, Washington DC.

2. Karimi, H., Sultan, M., Elhaddad, H., **Emil, M.K.**, Abdelmohsen, K. (2025). Data-Driven Framework for Quantifying Dryland Water Storage Patterns and Near-Future Projections. *AGU Annual Meeting*, Washington DC.

3. Sultan, M., Elhaddad, H., Saleh, H., Karimi, H., Hegazy, D., Mansouri, R., Abdelmohsen, K., Save, H., **Emil, M.K.** (2025). Integrated GRACE and Model-Based Analysis of Hydrologic Systems in Present and Future Climates. *AGU Annual Meeting*, Washington DC.

4. Yildirim, A., Sultan, M., **Emil, M.K.**, Raising, H., Alshakr, A., Mohammad, A.T. (2025). EMIT contributions to Rare Earth Element Detection over the Arabian and Nubian Shields. *AGU Annual Meeting*, Washington DC.

5. Mohammad, A.T., Sultan, M., Forman, S.L., **Emil, M.K.**, Farag, A.Z.A., Elhebiry, M.S. (2025). Tectonic Readjustment, Not Rift Failure: A Re-evaluation of the Dynamics of Suez Rift, Egypt. *AGU Annual Meeting*, Washington DC.

6. Sultan, M., **Emil, M.K.**, Alshakr, A., Yildirim, A., Mohammad, A.T. (2025). EMIT Contributions to Red Sea Rifting, and Dune Sources, Sabkha Types, and REE mineralization in the Arabian Peninsula. *AGU Annual Meeting*, Washington DC.

7. Abdelmohsen, K., Sultan, M., Yan, E., Save, H., **Emil, M.K.**, Famiglietti, J.S. (2024). Monitoring Seepage from the GERD and Implications for Sustainable Water Management. *AGU Annual Meeting*, Washington DC, December 9–12.

8. Alshakr, A., Sultan, M., **Emil, M.K.**, Mohammad, A.T., Alshehri, F., Alharbi, H., Sturchio, N.C., Yildirim, A., Alotaibi, A. (2024). Origin of the Inland Sabkhas in the Arabian Peninsula: Evidence from EMIT, Isotopic, Structural, and Field Data. *AGU Annual Meeting*, Washington DC, December 9–12.

9. Alshakr, A., Sultan, M., **Emil, M.K.**, Yildirim, A., Sturchio, N.C. (2024). Use of NASA's EMIT Hyperspectral and Landsat 8 Multispectral Data to Constrain the Source and Provenance of the Arabian Peninsula Dunes. *AGU Annual Meeting*, Washington DC.

10. Elhaddad, H., Sultan, M., Yan, E., Abdelmohsen, K., Mohammad, A.T., Badawy, A., Karimi, H., Saleh, H., **Emil, M.K.** (2024). Strategic Management of Excess Lake Nasser Waters for Sustainable Aquifer Recharge and Flood Mitigation. *AGU Annual Meeting*, Washington DC, December 9–12.

11. Mohammad, A.T., Sultan, M., **Emil, M.K.**, Sturchio, N.C., Elhebiry, M.S. (2024). Geologic and Geodetic constraints on the Flexural Uplifting of the Gabal Zeit block in the Suez Rift, Egypt. *AGU Annual Meeting*, Washington DC, December 9–12.

12. Karimi, H., Sultan, M., Yan, E., Abdelmohsen, K., **Emil, M.K.**, Elhaddad, H., Saleh, H. (2024). Utilizing Extreme Precipitation to Mitigate Water Scarcity in Arid Areas: A Hydrological Approach for Natural and Artificial Recharge. *AGU Annual Meeting*, Washington DC, December 9–12.

13. Karimi, H., Sultan, M., Elhaddad, H., **Emil, M.K.** (2024). Deep Learning for Large-Scale Sand Dune Mapping: A Convolutional Neural Network Approach. *AGU Annual Meeting*, Washington DC, December 9–12.

14. Saleh, H., Sultan, M., Yan, E., Abdelmohsen, K., Save, H., Karimi, H., **Emil, M.K.**, Elhaddad, H. (2024). Quantifying groundwater recharge from tropical cyclones in arid regions. *AGU Annual Meeting*, Washington DC, December 9–12.

15. Yildirim, A., Sultan, M., **Emil, M.K.**, Alshakr, A., Mohammad, A.T., Badawy, A. (2024). Use of NASA's EMIT Hyperspectral and Landsat 8 Multispectral Data to Correlate the Arabian and Nubian Shields Lithologies and Structures in a pre-Red Sea Reconstruction. *AGU Annual Meeting*, Washington DC, December 9–12.

16. Karimi, H., Sultan, M., Abdelmohsen, K., **Emil, M.K.**, Yan, E., Saleh, H., Othman, A. (2023). Water Storage and Dynamics in Arid Region's Hydrologic Systems: Insights from GRACE and GRACE-FO TWS Solutions. *American Geophysical Union Fall Meeting*, San Francisco, December 10–15.

17. Sultan, M., Abdelmohsen, K., Yan, E., Farag, A.Z.A., **Emil, M.K.**, Save, H. (2023). Monitoring GERD's Filling Process: A GRACE-Based Investigation. *American Geophysical Union Fall Meeting*, San Francisco, December 10–15.

18. Sultan, M., Abdelmohsen, K., **Emil, M.K.**, Save, H., Yan, E., Farag, A.Z.A. (2023). GRACE and GRACE-FO for assessing watershed response to climate variability: insights from the Tigris Euphrates and the Nile basin watersheds. *American Geophysical Union Fall Meeting*, San Francisco, December 10–15.

19. Shalifoe, M., **Emil, M.K.**, Yellich, J., Sultan, M. (2023). Identifying Abandoned Mine Surface Features Using Deep Learning, Upper Peninsula of Michigan. *American Geophysical Union Fall Meeting*, San Francisco, December 10–15.

20. Saleh, H., Sultan, M., Abdelmohsen, K., Karimi, H., **Emil, M.K.**, Elhaddad, H. (2023). Assessing Groundwater Recharge from Tropical Cyclones in Southern Arabia. *American Geophysical Union Fall Meeting*, San Francisco, December 10–15.

21. Karimi, H., Sultan, M., **Emil, M.K.**, Sahour, H., Abdelmohsen, K., Saleh, H. (2022). The Impact of Extreme Precipitation Events on The Terrestrial Water Storage in The Arabian Peninsula. *American Geophysical Union Fall Meeting*, Chicago, December 12–16.

22. Mohammad, A.T., Sultan, M., Elhebiry, M.S., **Emil, M.K.**, Hassan, S. (2022). Did the late Miocene witness the failure of the Suez rift and the cessation of extension? *American Geophysical Union Fall Meeting*, Chicago, December 12–16.

23. Sataer, G., Sultan, M., **Emil, M.K.**, Palaseanu, M., Becker, R., Yellich, J.A., Gebremichael, E., Abdelmohsen, K., Karimi, H. (2022). Remote Sensing Applications for Landslide Detection and Monitoring along Lake Michigan Eastern Coastline, Miami Park, Michigan. *American Geophysical Union Fall Meeting*, Chicago, December 12–16.

24. Saleh, H., Sultan, M., Abdelmohsen, K., Save, H., Karimi, H., **Emil, M.K.** (2022). Use of GRACE and GRACE-FO to Monitor the Impacts of Tropical Cyclones on Arabia's Hydrologic Systems. *American Geophysical Union Fall Meeting*, Chicago, December 12–16.

25. Pankratz, H.G., Alharbi, H., Sultan, M., Abdelmohsen, K., **Emil, M.K.**, et al. (2022). InSAR, Geophysical, and Field Investigations to Assess and Monitor Deformation Associated with a Rising Salt Diapir, Jazan City and Surroundings, Saudi Arabia. *American Geophysical Union Fall Meeting*, Chicago, December 12–16.

26. Pankratz, H.G., Sultan, M., **Emil, M.K.**, Harbi, H.A., Abdelmohsen, K. (2021). Salt Diapir Hazard Monitoring in the Southwestern Arabian Peninsula. *American Geophysical Union Fall Meeting*, New Orleans, December 13–17.

27. Sahour, H., Sultan, M., **Emil, M.K.**, Abdellatif, B., Farag, A.Z.A., Vazifedan, M., et al. (2021). Use of Multi-sensor Remote Sensing Data and Machine Learning to Locate Shallow Groundwater in the Western Desert of Egypt. *American Geophysical Union Fall Meeting*, New Orleans, December 13–17.

28. Sataer, G., Sultan, M., **Emil, M.K.**, Palaseanu, M., Becker, R., Yellich, J.A., Pankratz, H.G. (2021). Continuous monitoring of Eastern Lake Michigan bluffs using Sentinel-1 and Unmanned Aerial Vehicles (UAVs) data. *American Geophysical Union Fall Meeting*, New Orleans, December 13–17.

29. Pankratz, H.G., Sultan, M., Abdelmohsen, K., Sauck, W.A., Alsefry, S.A., Alharbi, H., **Emil, M.K.**, et al. (2020). Monitoring of Salt Diapir-Related Land Deformation in an Urban Setting. *American Geophysical Union Fall Meeting*, San Francisco, December 1–17.

30. Sahour, H., Sultan, M., Vazifedan, M., **Emil, M.K.**, Farag, A.Z.A., Abdellatif, B., El Bastawesy, M. (2020). Use of machine learning algorithms and remote sensing data to identify shallow groundwater occurrences in the Western Desert of Egypt. *American Geophysical Union Fall Meeting*, San Francisco, December 1–17.

31. Sataer, G., Sultan, M., **Emil, M.K.**, Palaseanu, M., Becker, R., Yellich, J.A. (2020). Developing a Radar-based Landslide Monitoring System (LMS) Along the Eastern Lake Michigan Bluffs. *American Geophysical Union Fall Meeting*, San Francisco, December 1–17.

32. Shaw, N., Sultan, M., **Emil, M.K.**, Yellich, J., Becker, R., Palaseanu, M., Sataer, G. (2019). Investigating groundwater seepage control on bluff failure along Michigan coastline using UAVs. *American Geophysical Union Fall Meeting*, San Francisco, December 9–13.

33. Hassan, S.R., Sultan, M., **Emil, M.K.**, Zahran, K.H., Issawy, E., Abdeldayem, A., Kamh, S., Emam, E. (2019). Monitoring recent land subsidence in the Nile Delta of Egypt using Sentinel-1 InSAR time series. *American Geophysical Union Fall Meeting*, Washington D.C., December 10–14.

34. Sataer, G., Sultan, M., **Emil, M.K.**, Palaseanu, M., Becker, R., Kehew, A., Yellich, J., Kincare, K. (2019). Visualizing and Monitoring Bluff Retreat Using Sentinel 1 Radar Interferometry and UAV Imagery. *American Geophysical Union Fall Meeting*, Washington D.C., December 10–14.

35. Pankratz, H.G., Sultan, M., Sefry, S., Alharbi, H., **Emil, M.K.**, Gozi, S. (2019). Analyzing InSAR time series: Case study on salt diapir intrusions and sabkhas in Southwestern Saudi Arabia. *American Geophysical Union Fall Meeting*, San Francisco, December 9–13.

36. Sahour, H., Sultan, M., Yellich, J., Harrison, W., **Emil, M.K.**, Sataer, G. (2019). Use of Sentinel-1 and GRACE Data to Assess the Distribution, Nature, and Factors Causing Land Deformation in the Lower Peninsula of Michigan. *American Geophysical Union Fall Meeting*, Washington D.C., December 10–14.

37. Sultan, M., Abdelmohsen, K., Elkaliouby, B., Abdellatif, B., **Emil, M.K.**, Ahmed, M., Save, H., Farag, A., Al-Dousari, A., Abdelmalik, K. (2019). Use of GRACE solutions for a better understanding of aquifer recharge sources, connectivity, groundwater flow, sustainability, and response to climate variability. *American Geophysical Union Fall Meeting*, Washington D.C., December 10–14.

38. Sultan, M., Abdelmohsen, K., **Emil, M.K.**, Elkaliouby, B., Save, H., Ahmed, M., Abdelmalik, K. (2018). Fast Aquifer Response: GRACE, Geophysical, and Geochemical Evidence. *American Geophysical Union Fall Meeting*, Washington D.C., December 10–14.

39. Aljammaz, A., Sultan, M., **Emil, M.K.**, Alharbi, T., AlHarbi, H., Alshehri, F. (2018). Using remote sensing and GIS technologies to map progressive urbanization and to identify hazardous areas related to sinkholes in Riyadh city and surroundings, Saudi Arabia. *American Geophysical Union Fall Meeting*, Washington D.C., December 10–14.

40. Sataer, G., Sultan, M., Gebremichael, E., Emil, M.K., Kehew, A., Yellich, J.A., Chase, R. (2018). Application of InSAR techniques for monitoring landslide and bluff recession along Lake Michigan's coastal bluff. *American Geophysical Union Fall Meeting*, Washington D.C., December 10–14.

41. Alshehri, F., Sultan, M., Alharbi, H., Alwagdani, E., Emil, M.K., Karki, S. (2018). Assessment of the Distribution and the Factors Controlling the Rise in Groundwater Levels in Mecca Region, Saudi Arabia. *American Geophysical Union Fall Meeting*, Washington D.C., December 10–14.

42. Gebremichael, E., Sultan, M., Al-Akhras, K., Saleh, A., Yellich, J.A., **Emil, M.K.**, Karki, S. (2018). Detecting Sinkhole and Land Deformation Hazards Related to Carbonate Dissolution in Qatar using Geodetic Methods. *American Geophysical Union Fall Meeting*, Washington D.C., December 10–14.

43. Fathy, K., Sultan, M., Ahmed, M., Save, H., **Emil, M.K.**, Elkaliouby, B. (2017). Structural Control and Groundwater Flow in the Nubian Aquifer. *American Geophysical Union Fall Meeting*, New Orleans, December 11–15.

44. Sataer, G., Sultan, M., Yellich, J.A., Becker, R., **Emil, M.K.**, Palaseanu, M. (2017). Shoreline Erosion and Slope Failure Detection over Southwest Lakeshore Michigan using Temporal Radar and Digital Elevation Model. *American Geophysical Union Fall Meeting*, New Orleans, December 11–15.

45. Pankratz, H.G., Sultan, M., Alsefry, S., Fathy, K., Al-Harbi, H., Elkadiri, R., **Emil, M.K.**, Gebremichael, E. (2017). Remote sensing and geophysical constraints on the distribution and deformation associated with salt dome intrusions along the southern Red Sea coastline, Saudi Arabia. *Geological Society of America Annual Meeting*, Seattle, Washington.

46. Karki, S., Sultan, M., **Emil, M.K.**, Harbi, H., Sefry, S., Abuifadhael, E., Elkadiri, R., Chouinard, K. (2016). Development of Early Warning System using Temporal Radar Images for Debris Flows in Jazan Province, Saudi Arabia. *AGU Fall Meeting*, San Francisco, December.

47. Sultan, M., Ahmed, M., Sturchio, N., Sefry, S., **Emil, M.K.**, Abuabdullah, M., Othman, A.G. (2016). A geochemical, geophysical, and remote sensing-based approach for the assessment of the age, origin, and sustainable utilization of fossil aquifers in Saharan Africa and Arabia. *GSA Annual Meeting*, Denver, Colorado.

48. Pankratz, H.G., Sultan, M., Fathy, K., Almogren, S.M., Harbi, H., Sefry, S., **Emil, M.K.**, et al. (2016). Assessment of the extent of land deformation associated with salt domes within the Jazan City and surroundings, Saudi Arabia. *AGU Fall Meeting*, San Francisco, December.

49. Fathy, K., Sultan, M., Bettadpur, S.V., Save, H., Ahmed, M., Zahran, K.H., **Emil, M.K.**, et al. (2016). Integration of satellite gravity data with ground-based geophysical data for a better understanding of the structural control of groundwater flow in the Nubian Sandstone Aquifer System. *AGU Fall Meeting*, San Francisco, December.

50. Gebremichael, E., Sultan, M., Becker, R., El Bastawesy, M., Cherif, O., **Emil, M.K.**, et al. (2016). Investigating the Origin of Natural and Anthropogenic Deformation across the Nile Delta Using Radar Interferometry, GRACE, Modeling, and Field data. *AGU Fall Meeting*, San Francisco, December.

51. Sultan, M., Sturchio, N.C., Ahmed, M., Sefry, S., Mohamed, A., Abuabdullah, M.M., **Emil, M.K.**, et al. (2016). Assessment of the hydrologic setting and mass transport within Saharan and Arabian Aquifers using GRACE, geochemical, geophysical and subsurface data. *AGU Fall Meeting*, San Francisco, December.

52. Othman, A., Sultan, M., Gebremichael, E., Sefry, S., Yanar, R., Alharbi, H., Albalawi, S., **Emil, M.K.**, Pankratz, H.G. (2016). Spatial and Temporal Characteristics of Land Deformation in Northern Saudi Arabia: Inferences from Radar Interferometric Applications. *AGU Fall Meeting*, San Francisco, December.

53. Sultan, M., **Emil, M.K.**, Abotalib, Z.A., Abouelmagd, A., AlZahrani, A., et al. (2015). Nature and timing of the quaternary wet climatic periods in north africa and arabia: isotopic, chronologic, and remote sensing constraints. *GSA Annual Meeting*, Baltimore, Maryland.

54. Sultan, M., Becker, R., Gebremichael, E., **Emil, M.**, Ahmed, M., Elkadiri, R., Pankratz, H., Chouinard, K. (2015). Applications of Radar Interferometric Techniques to Assess Natural Hazards and their Controlling Factors. *AGU Fall Meeting*, San Francisco, December.

55. Gebremichael, E., Sultan, M., Becker, R., Emil, M.K., Ahmed, M., Chouinard, K. (2015). Use of Persistent Scatterer Interferometry to Assess Land Deformation in the Nile Delta and its Controlling Factors. *AGU Fall Meeting*, San Francisco, December.

56. Othman, A., Sultan, M., Ahmed, M., Alharbi, T., Gebremichael, E., **Emil, M.K.** (2015). An Integrated Approach for the Assessment of the Natural and Anthropogenic Controls on Land Subsidence in the Kingdom of Saudi Arabia. *AGU Fall Meeting*, San Francisco, December.

57. Pankratz, H., Sultan, M., Elkadiri, R., Almogren, S., Gebremichael, E., Ahmed, M., **Emil, M.K.** (2015). Integrated Approach for the Assessment of Land Deformation in the Jazan City and Surroundings, Saudi Arabia. *AGU Fall Meeting*, San Francisco, December.

58. Othman, A., Sultan, M., Alharbi, H., Youssif, A., Ahmed, M., **Emil, M.K.**, et al. (2014). Assessment of the nature, distribution and causes of land subsidence in Central and Northern Saudi Arabia. *AGU Fall Meeting*, San Francisco, December.

59. Sultan, M., Sturchio, N., Sefry, S., Ahmed, M., AbuAbdallah, M., **Emil, M.K.**, Chouinard, K. (2013). Chemical, isotopic and remote sensing constraints on the age, origin, and groundwater potentiality in the Rub Al Khali aquifer system, Arabian Peninsula. *AGU Fall Meeting*, San Francisco, December.

60. Alharbi, T., Sultan, M., Elkadiri, R., Milewski, A., Ahmed, M., **Emil, M.K.**, et al. (2012). An Assessment of landslides and debris flows distribution in the Jazan area, Saudi Arabia using remote sensing and GIS techniques. *GSA Annual Meeting*, Charlotte, North Carolina, November.

# TEACHING EXPERIENCE

**Specialized Training Programs Designed and Delivered:**

- Aug 2025: Geodatabase and Web Application Development training, Saudi Geological Survey personnel
- May 2024: InSAR time series analyses and Web-GIS automation for Qatar Ground Motion Service, Qatar Ministry of Municipality
- Dec 2019: Hyperspectral Remote Sensing for Geological Mapping and Mineral Exploration, Saudi Geological Survey personnel
- Jul 2018: Assessment of Spatial and Temporal Ground Deformation Patterns in Qatar, Qatar Ministry of Municipality & Environment
- Sep 2017: Investigation of Natural Groundwater Discharge Areas, National Authority for Remote Sensing & Space Sciences (Egypt)

**Western Michigan University Teaching Assistant (2012–2017):**

- GEOS-5600: Introduction to Geophysics (2016)
- GEOS-5350: Geological and Environmental GIS (2015)
- GEOS-1000: Dynamic Earth (2015)
- GEOS-5210: Geological and Environmental Remote Sensing (2014)
- GEOS-4400: Petrology/Petrography (2013)
- GEOS-3350: Mineralogy (2012)

**Middle East Technical University Teaching Assistant (2007–2011):**
Mine Closure and Reclamation, Rock Mechanics, Mine Valuation, Mine System Analysis, Mine Ventilation

## PROFESSIONAL TRAINING RECEIVED

- Aug 2022: InSAR Processing and Time-Series Analysis (ISCE, ARIA-Tools, MintPy) – UNAVCO
- Jul 2022: GIPSYX Training (GPS precise point positioning) – JPL/NASA
- Feb 2018: Advanced ENVI Spectral Analytics – L3Harris Geospatial
- Fall 2013: Remote Sensing and GIS Applications – Western Michigan University
- Sept 2009: ASD Spectroradiometer Training – Istanbul, Turkey
- Sept 2008: International Summer School on Very High-Resolution Remote Sensing – Grenoble, France

## AWARDS AND HONORS

- WMU All-University Graduate Research and Creative Scholar Award (2022)
- WMU Graduate College Research and Creative Scholar Award (2017)
- WMU Graduate College Student Travel Award (2016)
- WMU Research and Creative Activities Poster and Performance Day (2016)

## PROFESSIONAL AFFILIATIONS

- American Geophysical Union (AGU) – 2012–Present
- Geological Society of America (GSA) – 2013–Present
- IEEE Geoscience and Remote Sensing Society (GRSS) – 2011–Present

## LANGUAGES

Turkish (Native), English