UNITED RESEARCH FORUM
(CONNECT WITH RESEARCH WORLD)

4th International Congress on Earth and Geological Sciences

July 21-22, 2025 | Paris, France

Zaina El Kamel and Ahmed Akhssas

Mohammed V University in Rabat, Morocco

Application of Remote Sensing and Artificial Intelligence for Aquifer Unit Detection in the Beni-Mellal Atlas, Morocco

The Beni-Mellal Atlas, part of Morocco's Atlas Mountain range stretching from northwest to southeast, consists predominantly of sedimentary rocks such as limestone, sandstone, and clay, formed across various geological periods. Carbonate formations in this region play a vital role in recharging aquifers, supplying drinking water to local communities, and supporting agricultural activities. Consequently, understanding the spatial distribution, connectivity, and dynamics of these aquifers is essential for sustainable water resource management.

This study focuses on integrating remote sensing and artificial intelligence (AI) to detect and characterize aquifer units in the Central High Atlas, with a particular emphasis on the Beni-Mellal Atlas. Addressing the challenges of water scarcity in semi-arid regions, the research aims to identify groundwater reservoirs through radar imagery-based lineament extraction and structural analysis. By utilizing Sentinel-1 and ALOS PALSAR imagery alongside geological datasets, a structural model is developed to investigate the relationship between faults, thrusts, and aquifer distribution. Advanced machine learning algorithms are employed to enhance the identification of hydrogeological features and validate structural correlations.

The findings highlight the critical role of tectonic features in groundwater localization and contribute to the creation of a detailed geological map, which is instrumental for sustainable water resource management. This multidisciplinary approach provides innovative tools for hydrogeology, offering solutions to pressing regional challenges related to water scarcity.

Keywords: remote sensing, radar, aquifers, tectonics, structural analysis

Biography

I am a second-year Ph.D. student at the Mohammadia School of Engineers (EMI) at Mohammed V University in Rabat, deeply passionate about structural geology. My research focuses on integrating remote sensing, artificial intelligence, and geophysics to analyze tectonic and hydrogeological relationships. Specialized in aquifer unit detection, I aim to contribute to the sustainable management of water resources in arid regions. With strong expertise in GIS and cartographic software, I actively engage in interdisciplinary projects, leveraging my skills to address critical environmental challenges.

ISBN: 978-1-917892-13-1