

La Faculté des Sciences de Tétouan de l'Université Abdelmalek Essaâdi  
et le Département de Géologie

Organisent en partenariat avec  
L'Association Marocaine des Sciences de la Terre (A.M.S.T.)  
et Le Groupe Office Chérifien des Phosphates (Groupe OCP)

# Les Quatrièmes Journées Jeunes Chercheurs en Géosciences

4<sup>èmes</sup> JJCG - 2022



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Faculté des Sciences  
de Tétouan

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**Thème 2 :**  
**Géomatériaux, Hydrogéologie et Prospection Géophysique**

## **Communications orales**

## ASSESSMENT OF SUBSIDENCE AND COLLAPSE HAZARDS USING ELECTRICAL RESISTIVITY TOMOGRAPHY: CASE STUDY OF IDA OUAZZA SALT MINE, ESSAOUIRA PROVINCE – MOROCCO

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This study is concerned with the Ida Ouazza area that is located approximately 40 km in the south of Essaouira city, Morocco. This region corresponds to a topographic depression in the hinge of the Jbel Amsitaine anticline (western High Atlas). It is formed by a sedimentary series ranging from Triassic (saliferous clay formation) to Plio-quadernary (marl and aeolian sandstones) and has long been known for its intensive salt mining activities. Salt extraction frequently causes surface deformations that are responsible of serious problem of ground instabilities, both because of the frequency and magnitude of their occurrence and the threat that they pose to the population, infrastructures, and land activities.

This work presents the results on land subsidence and collapse susceptibility due to overexploitation of resources in salt in the study area. The first step was to identify the conditioning and triggering factors using physically based methods, including those related to geology, hydrogeology and geophysical data.

The geological data include geology maps and borehole lithological analysis, while hydrogeological data includes physicochemical characteristics from runoff and water table samples. The geophysical data was acquired using electrical resistivity tomography (ERT) measurements carried out along four profiles. An ERT device of 96 electrodes was spread over 480 m for each profile and the Wenner-Schlumberger electrode array was used to perform the geoelectrical survey.

The obtained results highlight the different hydrogeological and lithological components related to land subsidence and proved that salt mining activities in this area has led to significant changes or collapses of ground surface. Such deformations are a source of problems for the local population. Susceptibility analysis also revealed that built areas are also prone to land subsidence.

**Keywords:** Halite, Trias, Geology, hydrogeology, collapse, subsidence, ERT method, hazard, Ida Ouazza, Western High Atlas, Essaouira, Morocco.