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Evaluation of the Talkhab fault system in the formation of Mighan Arak plain subsidence using electrical resistivity method

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Extended Abstract

Summary

Land subsidence is one of the serious challenges in urban and rural areas that can significantly affect infrastructure and the environment. In the Mighan region of Arak, the subsidence caused by human activities and natural changes, especially around the Talkhab fault System, has caused many concerns. As one of the important geological structures in this region, Talkhab fault System plays a key role in the formation and development of subsidence. In this research, , the location of the Talkhab fault System in the region was identified using electrical resistivity method. In this study, resistivity sounding data were acquired from 30 sounding points along 3 survey lines using the Schlumberger arrangement. Finally, using all the information, the modeling results were evaluated and the locations of discontinuities and faults were determined with a good approximation. Investigations show that the Talkhab fault System, as an active area, can cause changes in water pressure and, as a result, can cause subsidence.

Introduction

As one of the most important plains of Iran, Miqan Arak plain has experienced subsidence in the last few decades. Unfortunately, the amount of rainfall has decreased significantly in the last decade. Moreover, recent expansion of industry and agriculture has created a greater demand for groundwater in this region. In Mighan Arak region, the subsidence was caused by various factors, including climate changes, human activities and geological structures, especially Talkhab fault system. This fault, as a key element of the geological structure of the region, has profound effects on soil behavior and groundwater distribution. This paper examines the geological structure of the Talkhab fault system and its effect on the subsidence in the Mighan region of Arak using geoelectric methods. The results of this research can be used as a useful tool for water resources management and sustainable planning in this region.

Methodology and Approaches

To conduct geoelectric investigations in the study area, first, information, such as general geological studies, construction and topographic maps, was collected. In this study, resistivity sounding data from 30 sounding points along 3 survey lines were acquired using the Schlumberger arrangement, and then, the interpretation of the sounding data was carried out by manual method. Considering geological control and using the results of manual interpretations to obtain general and qualitative information about the condition of the ground surface, the qualitative interpretation of the resulting data was also performed, and finally, for two-dimensional resistivity data inversion, the data was entered into Res2Dinv software, and the subsurface geology situation was also investigated.

Results and Conclusions

In this resistivity sounding study, carried out using the Schlumberger electrode array, the qualitative interpretation of the collected data and two-dimensional modeling resistivity data, the geological layers and anomalies related to lateral changes along the Talkhab fault system were identified as one of the main structures that have played a role in the

formation of Meighan plain subsidence. The results of the interpretation of the resistivity modelled cross sections indicate the existence of faults that were identified during geoelectric operations and were not exposed in the geological maps of the region. These faults are introduced in the Talkhab fault system and include the main Talkhab fault, Talkhab1 fault, and Talkhab2 fault. The function of this fault system has played a role in the formation and development of the graben subsidence in the northern part of Meighan plain.