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Geoelectrical Survey for Grounwater Exploration in Golpayegan Plain (Northwest Isfahan Province), one of the most arid zone in Iran

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The problem of water scarcity is one of the most important issues in the world. Iran is located in the arid zone and it is currently experiencing critical water shortage. The water in many aquifers drew down and caused wells to yield less and less water and even ran dry in some cases due to over abstraction. The province of Isfahan falls into very arid zone and like much of the Iranian plateau suffers from shortage of water. The groundwater levels have been dropping thirty meters for the last thirty years and the rate of depletion is accelerating. In this area, using geophysical survey and data interpretation is very important to find the best point for drilling a water well.
Geoelectrical resistivity surveys were carried out to investigate the groundwater potential of Khushe Golpa company in Golpayegan city, northwest of Isfahan. Dynamic water level from open wells was used to select the suitable electrode spread distance. Eleven vertical electric soundings, using Schlumberger array with a maximum electrode spread of 1000 m were carried out to survey the maximum depth of 220 m in this area. Sounding data were interpreted using RES1DINV software with 1-D horizontal layering resistivity model assumption. The result indicates that the area is generally consist of twelve geoelectric layers. The twelfth layer is bedrock which is almost at a depth generally more than two hundred and base on the rocky outcrop in the upstream region the bedrock is probably Orbitolina Limestone. The resistivity model related to a well located at the study area presence a layer at a depth of 150 to 180 m with a resistivity of 29 Ωm. The depth of water in the well is as same as this layer depth so the layer shows a real aquifer. Individual resistivity models had been compared with well resistivity model and three points showed almost similar resistivity in same depth. These points were the best choices for drilling the new well and according to the detail of data interpretation of each point they have been offered respectively.