

Characterization of an alluvial fan aquifer system in Bolivia by electrical resistivity tomography and induced polarization parameters
Abstract n°1515

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KEYWORDS: Geo-electrical, conceptual model, alluvial fan

The rapid agricultural development in the alluvial fan of Punata (Bolivia) has caused an increase of demand for water, therefore the drilled wells has increased considerably in the last years. The monitoring of the groundwater level shows a decreasing trend of the water table. Probably the main reason for this decline is due to over-extraction. Additionally, there is a lack of knowledge regarding the geometry and properties of the local aquifer system. Electrical Resistivity Tomography (ERT) surveys coupled with Induced Polarization (IP) measurements were conducted in the alluvial fan of Punata. The aim of these surveys is to obtain detailed information about the geometry of the local aquifer system. A total of 23 ERT surveys were performed covering an approximate length of 22.6 km. Besides ERT surveys, 15 lithology columns and 10 well-loggings were used to support the interpretation of the ERT profiles. The results show a complex structure in the apex region of the fan dominated by fluvial and colluvium deposits, while in the distal area the stratification is smoother and is dominated by lacustrine deposits. The ERT surveys yield valuable information, revealing the existence of two main layers- one is composed mainly by coarse material (boulders, gravel and sand), the other layer has a high clay content. When ambiguities were presented during the ERT interpretation, IP parameters (i.e. chargeability and normalized chargeability) proved to be useful for solving these ambiguities, since the IP response is sensitive to clay content. The results obtained during this investigation provides valuable information for building a conceptual model of the aquifer system in the alluvial fan of Punata. Hence an appropriate estimate of the volume storage, flow direction and recharge discharge process can be done. All this new information can be used for developing policies for a sustainable management of groundwater.

