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Assessment of correlation between geophysical and hydrogeological parameters of volcanic deposits at Bandama Caldera (Gran Canaria, Canary Islands, Spain)

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The characterization of the preferential areas of water infiltration through the vadose zone is of paramount importance to assess the pollution vulnerability of the underlying aquifers. Nevertheless, geometry and the hydraulic conductivity of each geological unit which constitute the unsaturated zone are difficult to study from traditional techniques (samples from trenches) and normally do not go beyond a meter depth from of the surface. On the other hand, boreholes are expensive and provide only local information not always representative of the whole unsaturated zone. For this reason, geophysical techniques and among them the electrical resistivity tomography method can be applicable in volcanic areas, where basaltic rocks, pyroclastic and volcanic ash-fall deposits have a wide range of values.

In order to characterize the subsurface geology below the golf course of Bandama (Gran Canaria Island), irrigated with reclaimed wastewater, a detailed electrical resistivity tomography survey has been carried out. This technique has allowed to define the geometry of the existing geological formations by their high electrical resistivity contrast. Subsequently, in representative outcrops the value of resistivity of each of these lithologies has been measured and simultaneously undisturbed samples have been taken measuring the hydraulic conductivity in the laboratory. Finally a statistical correlation between both variables has been established for evaluating the vulnerability to groundwater pollution at different zones of the golf course.