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Geological and geomechanical characterization of volcanic rocks in the subsurface of Tenerife (Canary Islands) by means of borehole geophysical measurements

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In the frame of TECTOTENE, a research project funded by the Spanish government to investigate the structure of the volcanic island of Tenerife (Canary Islands), borehole logging surveys were carried out to study the geology and structures in the subsurface. Borehole logging data were acquired in fifteen (10 to 800 m deep) existing boreholes drilled for water research and resource management at the island. Given that most of the available deep holes are of large diameter (60 to 80 cm), it was necessary to adjust some of the tools to improve the tool response and to optimize results. Also some holes were logged “through casing”.

The dataset analyzed in this study was acquired in 3 surveys carried out in 2004 and 2005. The logging program was designed for geological and geomechanical characterization of the volcanic rocks in the subsurface and also taking into account specific environmental regulations in protected areas. Logging measurements included oriented optical and acoustic imaging tools, full wave acoustic logs, induction and resistivity logs, temperature and fluid conductivity logs and were acquired with ALT rental pool of slimhole tools and acquisition units.

The most relevant results obtained from the interpretation of the logging data are:

- characterization of the different rock units including petrofacies and rock textures and of successive lava flows.

- fracture patterns
- stress indicators
- geothermal data
- hydraulic and geomechanical rock properties

These results will be used for parametrization of models for slope stability, volcanic and seismic hazard potential in the island.

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