



Effect of microporosity on the permeability of geothermal systems, case study of Los Humeros geothermal fie

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Los Humeros is the largest silicic caldera complex of the Trans-Mexican Volcanic Belt (TMVB), with an active geothermal field, which is currently producing around 65 MW. It is located in the northern part of the eastern TMVB. Its evolution includes voluminous caldera-forming eruption producing two large caldera structures (Los Humeros and Los Potreros calderas) with alternated episodes of effusive and explosive activity until the Holocene. The geothermal reservoir is located at a depth of about 1,500 m comprising a thick succession of porphyritic andesitic lava flows, and perhaps which overlay in a highly discordant contact a meta-sedimentary basement sequence dominated by altered limestone and skarn rocks. A NW/N-S structural system seems to be the main control of geothermal field distribution within the central part of the youngest caldera. Permeability in the geothermal reservoir has been associated with that system observed on the surficial geology, but also to some hidden secondary faulting and associated fracturing. Primary porosity has been considered negligible due to the low macroporosity observed in the volcanic rocks. However, a detailed analysis of the microporosity determined by X-ray microtomography new developed techniques, allow us to determine precise values of microporosity that were using for numerical simulation to obtain values of effective porosity, which reveals an interesting alternative solution to the permeability of the subsurface of Los Humeros geothermal field that should be taking into account to the final permeability of the system.