## 7th European Geothermal Workshop - Characterization of Deep Geothermal Systems



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## RESERVOIR CHARACTERIZATION AND NUMERICAL MODELING OF ALUTO-LANGANO GEOTHERMAL FIELD, ETHIOPIA

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Aluto-Langano geothermal field is located within the central southern portion of the Main Ethiopian Rift (Lake District), approximately 200 km southeast of Addis Ababa. Geothermal explorations began in the mid-1980s with the drilling of eight deep exploratory wells (maximum depth of 2500 m). The full potential of this field has not been fully exploited and therefore there is a need for further study and understand the geothermal reservoir system. Currently, plans are underway to develop fully Aluto-Langano geothermal field. Therefore, to achieve the full development program, further studies of the reservoir system is needed. The main objective of my study is to develop a 3D reservoir model for simulation studies to better reflect and understand the geothermal system of the Aluto-Langano geothermal field.

Characterization requires an understanding of the physical processes that govern the flow of mass and energy through the reservoir. As for most reservoir modeling endeavors, the inability to measure the actual value of the properties in the geothermal system makes it necessary to strike a balance between what is included in the reservoir model and what is known about the physical processes that need to make based on the model. Numerical simulations are important tools for the exploration of the geothermal reservoir since they can predict thermal and hydraulic reservoir conditions and are able to simulate the development of a reservoir while exploitation. However, reliable forecasts are possible only if the subsurface geology of the area is known and the corresponding thermal and hydraulic properties are well defined. Therefore, all information available will be integrated in order to develop a geothermal model. Data from geophysical methods (MT and Gravity) for the heat source and structural investigation, information from existing wells in the Aluto will be collected then analyzed. The numerical model will be based on a conceptual model, which will provide the structures and geometries of the subsurface. Numerical simulation tool (Tough2) will be used to predict the current steady-state conditions as well as their development in time. The expected outcome of this study will be to understand hydraulic and heat transport processes in the reservoir, which is necessary to assess the geothermal potential and to define the optimum exploitation and plant operation strategies for the study area. The long-term environmental impacts of the operation have to be further investigated with the help of reservoir modeling.

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