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2D REFRACTION OF HEAT FLOW IN GEDIZ GRABEN, TURKEY

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Thermal regime and heat flow distribution within the earth have crucial importance of understanding geodynamics of the lithosphere. Heat transfer in the crust is considered as a differential equation with initial and boundary conditions. A two dimensional thermal model for the Gediz graben has been studied in our research. The model is based on conductive heat transfer assumption. Heat refraction effect caused elevated heat flow values at the range of Gediz Graben. A high thermal conductivity contrast between bedrock and sediment induce the heat refraction effect. In Gediz Graben, high thermal conductivity basement rocks are underlined a blanket of low thermal conductivity sediments; heat is refracted away from the areas of lower thermal conductivity and preferentially channeled toward domains of high thermal conductivity. Extremely heat flow values are obtained around the valley range contact due to the refraction effect.
To analyze the effect of vertical heat refraction, the 2D gravity and seismic cross sections based modeled solved using by finite elements methods. Depending on magnitude of the thermal conductivity contrast, regional elevated temperatures interpret to low heat flow values. Temperature distribution in the Gediz graben is determined as function of sediment fill geometry. The geometry of $\sim$3 km thick sediment fill causes refraction of heat flow due to the thermal conductivity differences between range and valley fill. Consequently, average heat flow in Gediz Graben is 90 $\pm$ 20 mWm-2 can be due to refraction effect and may not be caused by geothermal systems.