

EGU21-12377

<https://doi.org/10.5194/egusphere-egu21-12377>

EGU General Assembly 2021

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Analysis of novel shallow geothermal system in coastal fractured limestone aquifer

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In shallow geothermal systems natural and forced groundwater movement as well as the temperature driven flow plays an important role on the borehole heat exchanger efficiency.

The analysis of the efficiency of innovative heat exchangers installed in a fractured limestone aquifer was carried out through three-dimensional numerical simulations and experimental investigations on physical models.

The coastal fractured limestone aquifer of the industrial area of Bari (Italy) was chosen as benchmark field site in order to identify the aquifer parameter range and the respective combinations. The role of seawater intrusion on the borehole heat exchanger efficiency was deepened.

The results disclosed that the efficiency of the innovative heat exchangers is strictly dependent on the aquifer transmissivity and groundwater flow under natural and forced groundwater conditions.

Discussion on the performance of the seasonal heat storage and the occurrence of the thermal interference between the borehole heat exchanger was presented.