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Soil as natural heat resource for very shallow geothermal application: laboratory and test site updates from ITER Project

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Nowadays renewable energy resources for heating/cooling residential and tertiary buildings and agricultural greenhouses are becoming increasingly important. In this framework, a possible, natural and valid alternative for thermal energy supply is represented by soils.
In fact, since 1980 soils have been studied and used also as heat reservoir in geothermal applications, acting as a heat source (in winter) or sink (in summer) coupled mainly with heat pumps.
Therefore, the knowledge of soil thermal properties and of heat and mass transfer in the soils plays an important role in modeling the performance, reliability and environmental impact in the short and long term of engineering applications.
However, the soil thermal behavior varies with soil physical characteristics such as soil texture and water content. The available data are often scattered and incomplete for geothermal applications, especially very shallow geothermal systems (up to 10 m depths), so it is worthy of interest a better comprehension of how the different soil typologies (i.e. sand, loamy sand...) affect and are affected by the heat transfer exchange with very shallow geothermal installations (i.e. horizontal collector systems and special forms).
Taking into consideration these premises, the ITER Project (Improving Thermal Efficiency of horizontal ground heat exchangers, http://iter-geo.eu/), funded by European Union, is here presented.
An overview of physical-thermal properties variations under different moisture and load conditions for different mixtures of natural material is shown, based on laboratory and field test data. The test site, located in Eltersdorf, near Erlangen (Germany), consists of 5 trenches, filled in each with a different material, where 5 helix have been installed in an horizontal way instead of the traditional vertical option.