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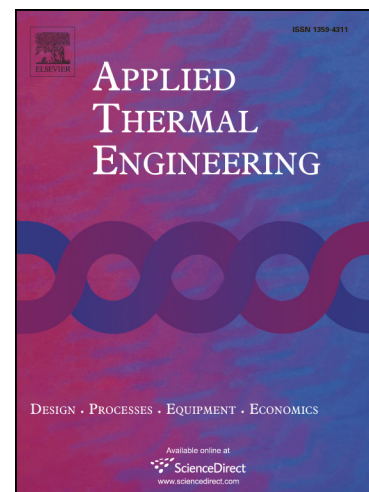
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## The impact of latent heat exchanges on the design of Earth Air Heat Exchangers

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### Abstract:

The work documents the design of Earth-Air Heat Exchangers based not only on sensible heat transfer, but also on latent heat exchanges. We compare the impact of the climate of Brazil and south of France on the relevance of such systems. The duct length is determined in order to obtain maximum underground heat exchanges. A time dependent model combined to actual weather data is developed to show when an underground heat exchanger becomes a good option in a tropical climate. The three-dimensional version of the model accounts for heat transfer in the soil and for heat and moisture transfer along the underground pipe. The comparison with a 1D model allows to propose a straightforward approach to assess the cooling/heating potential of different climatic regions.

**Keywords:** underground heat exchanger, tropical climate, design

### Nomenclature:

Latin Symbols	Description	Unit
A	Cross section	m <sup>2</sup>

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