Geophysical Research Abstracts
Vol. 13, EGU2011-10007, 2011
EGU General Assembly 2011

Criticality of the isolation choices of the underground building to the ground

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The study focuses on the evaluation method of heat loss of buildings underground or on the quantification of heat loss through the elements in contact with the soil in order to carry out the assessment of the energy performance of the entire building.

Referring to the most advanced U.S. law, characterized by multiple approaches seek to evaluate the heat flow through the underground elements (stationary analytical models, models based on "correlation" transient analytical models, combining analytical and numerical models, numerical models) was have found that no instrument is adoptable to allow detailed analysis and sufficiently reliable for the purposes of the calculation, due to limitations of computational tools in the definition of the configurations on the geometry of the building, the characteristics and location of isolation and conditions to the boundary, the properties of the soil.

The underground buildings represent more than any other building type that allows for a high energy saving: on the one hand it uses the high heat capacity of the land is used as a filter between the building and the external environment, on the other hand, the contact with the ground itself and the depth of the burial of the building (coupled with the presence or absence of isolation and positioning of the insulator) is used to optimize the heat flows and change the quality of buildings.

In relation to the two different and conflicting requirements to prefer the winter heating or summer cooling, in a perspective of overall thermal balance, the study shows that the objective of heating or cooling the underground building is achieved by changing the depth of burial especially that by varying the placement of insulation and its thickness.

It was also shown, as in economic terms, for temperate climates of the Mediterranean type, is more convenient to focus the design of the summer cooling than for heating in winter.