



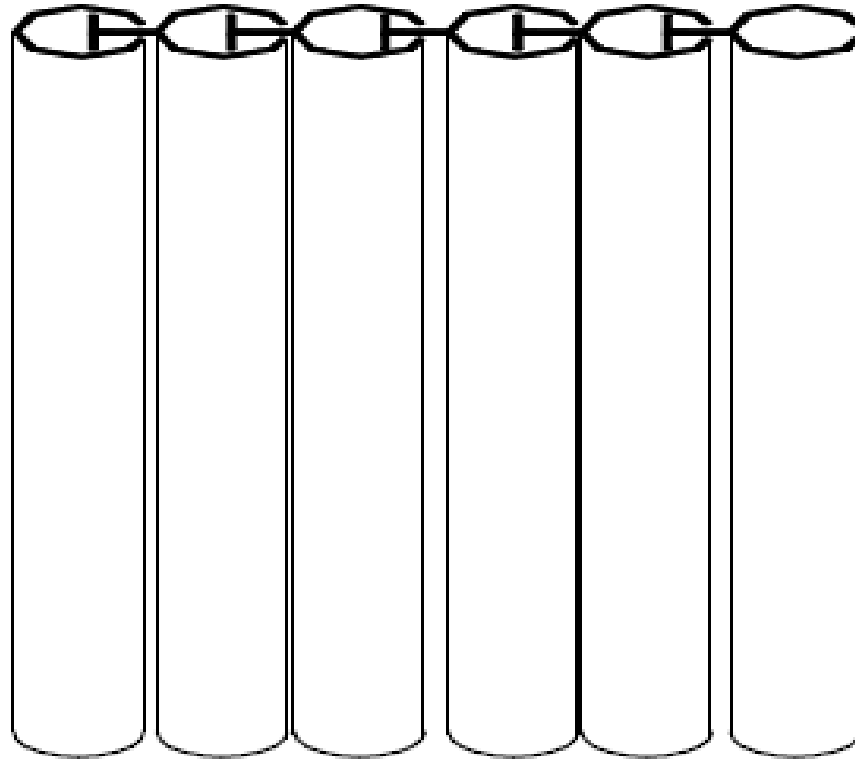
Jouko Lehtonen

MICROPILE WALL - AN OPTION TO DEVELOP ENERGY BARRIERS

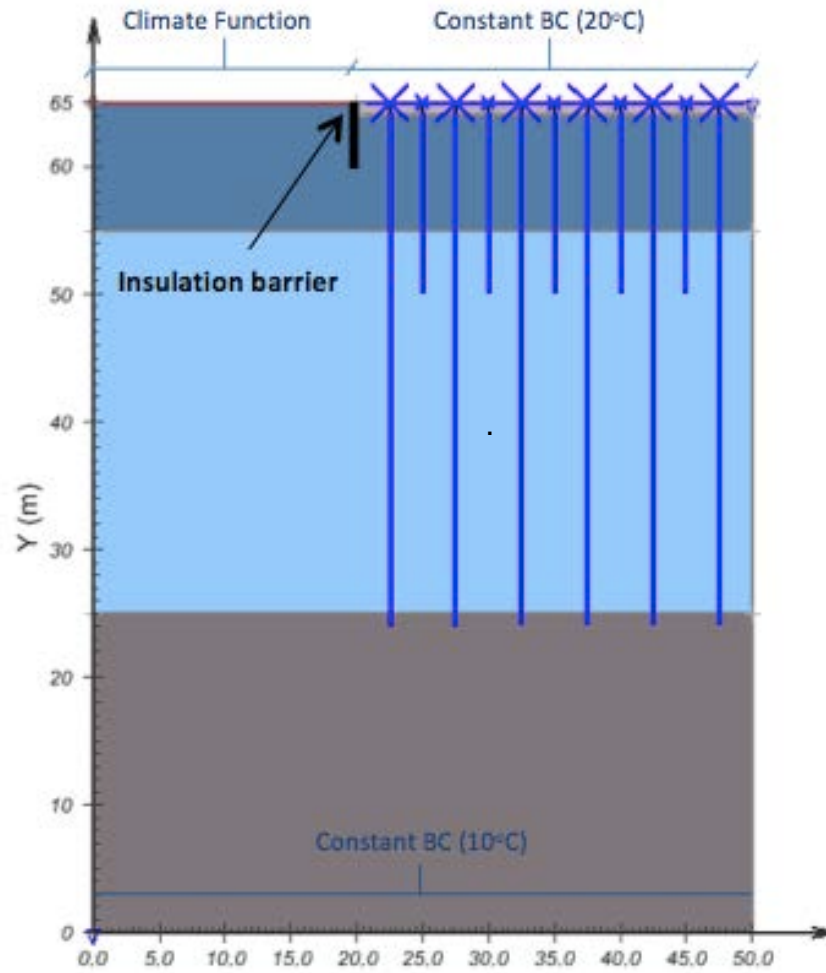


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- Long piles: Modelled as a *well boundary condition* pumping heat to the ground during summer operation and extracting during winter. Length of the piles was 40m and the distance between them is 5m (25m² per pile).
- Short piles: Modelled as a *well boundary condition* pumping the additional solar energy collected to the ground in summer time. Length of the piles is 15 m. They were located in the middle point between long piles only in one direction (distance 2.5m) and the distance between short piles is 5m (25m² per pile).
- Ground: The ground was divided into three layers:
 - Silty-Clay: Upper 0-10 m depth
 - Granular material (calcio-fluvial sand and gravel): 10-40 m depth
 - Bedrock (granodiorite)



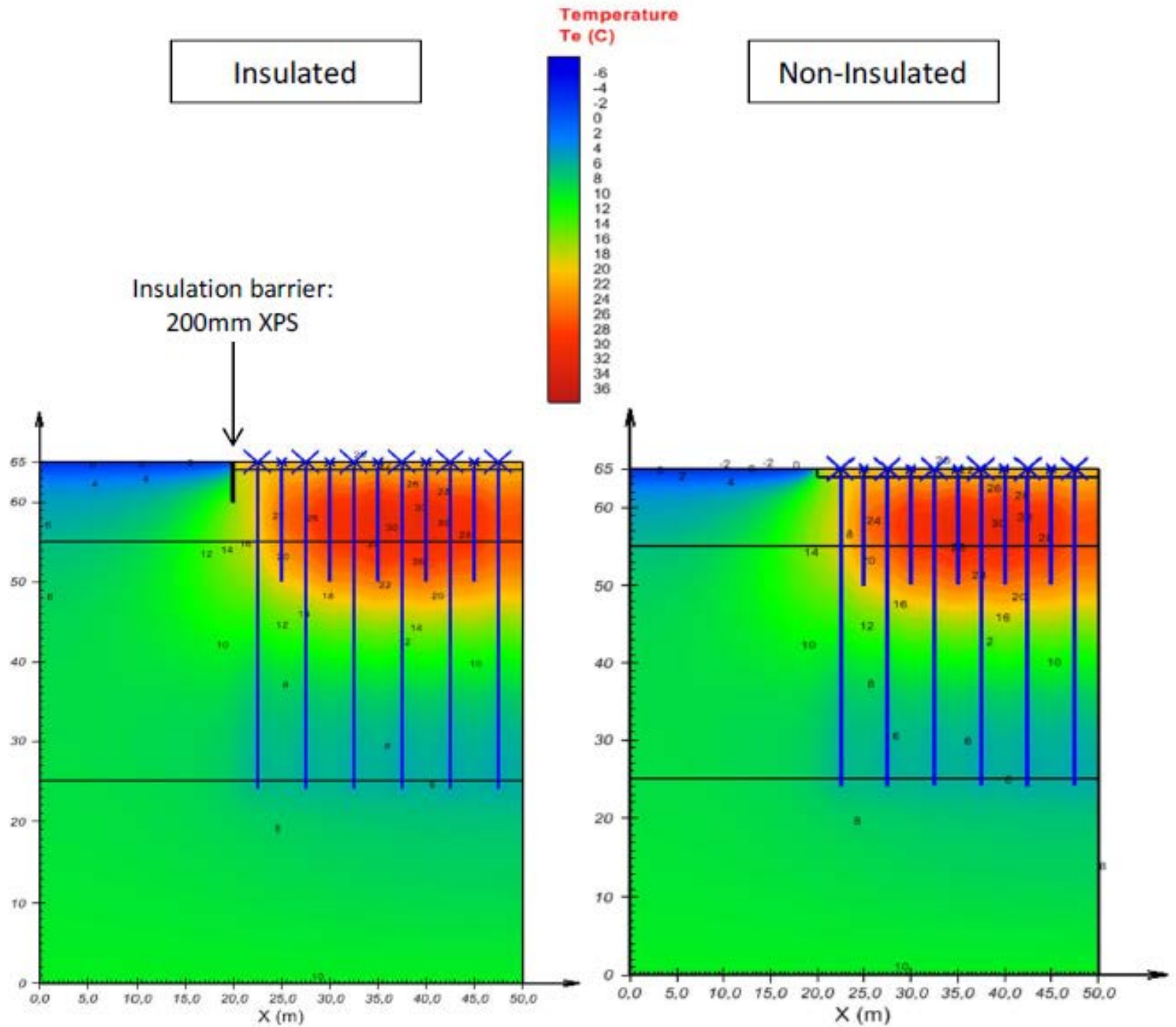
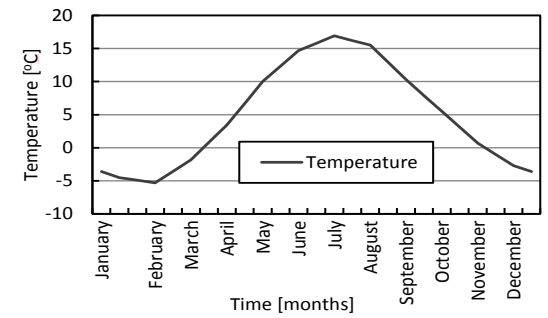
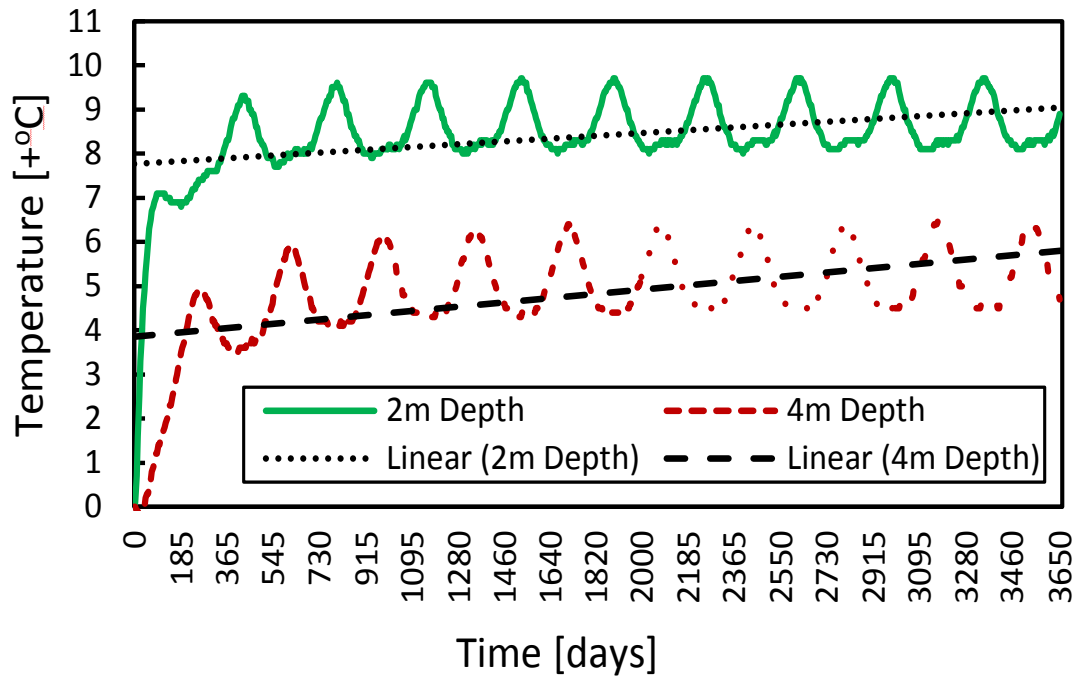


Figure 5-15. Comparison of the ground temperature after ten years with (left) and without (right) insulation



Ground temperature differences with or without insulation

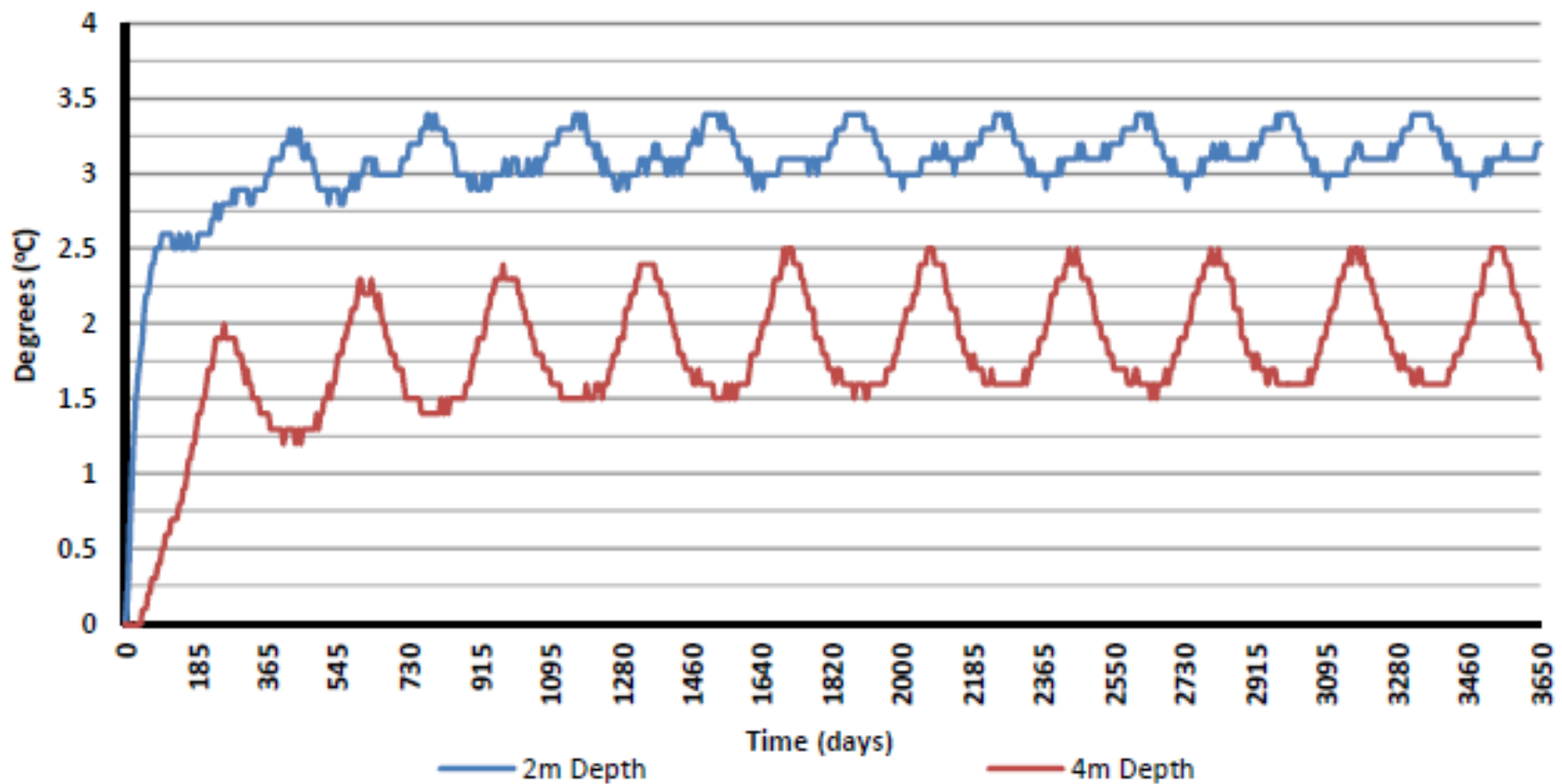


Figure 5-19. Ground temperature differences at different points with and without underground insulation barrier by depth. Point A at 2m depth(X=20.1; Y=63) and Point B at 4m depth (X=20,1; Y=61)



Ground temperature differences with and without the insulation barrier is between 1.5-3.5°C depending on the depth.

With the insulation barrier, temperature differences between the inner and outer part of the insulation barrier decrease with depth.

The temperature difference between the insulation is around 5-10°C, having maximum values in points close to the surface.



Original modelling report at Aalto University:

Carles Pérez Cervera

Ground thermal modelling and analysis of energy pile foundations

