

## Reconstruction of the ground surface temperature history from borehole temperature data in Bangkok

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The effect of temperature change at the ground surface propagates into the underground and disturbs the subsurface temperature structure. Analyzing disturbances in the subsurface temperature structure, we can reconstruct the past ground surface temperature (GST) change, which is closely related to the past climate change. This method can be applied to studies of thermal environment evolution in urban areas, including the development of 'heat islands'. As part of an international multidisciplinary research project 'Human Impacts on Urban Subsurface Environments', we have been investigating GST histories in and around several large cities in East Asia.

In the city of Bangkok and its surrounding area, we conducted measurements of temperature profiles in groundwater monitoring wells at 27 sites in July 2004, at 19 sites in June 2006, and 16 sites in March 2008. We examined the shapes of the temperature profiles and selected ones that are not much disturbed by groundwater flow. Reconstruction of GST history for the last several hundred years was made at eight selected sites. We used a multi-layer model for the reconstruction analysis taking account of lithological information on the formations around the wells. All of the obtained GST histories show surface warming in the last century. The amount of the temperature increase ranges from 0.4 to 2.6 K and is larger in the Bangkok city than in the area to the west of Bangkok and in the northern rural area. This difference may result from human activities in the city area. Our results should be combined with other information on development of the city to investigate the main cause of the surface warming, e.g., increase in the surface air temperature and land use change. We should also evaluate a possible effect of advective heat transfer by groundwater flow on GST reconstruction analysis.