

Measurement of borehole temperature profiles in Korea and Taiwan -Attempt to reconstruct the thermal environment evolution-

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Temporal variation of the ground surface temperature (GST) propagates into subsurface layers through thermal diffusion, which makes it possible to estimate the past GST history from temperature profiles measured in boreholes. Past climate reconstruction studies with this 'geothermal' method have been extensively conducted since 1980s.

A new research project of the Research Institute for Humanity and Nature entitled 'Human impacts on urban subsurface environment' was started in 2005. As a part of this project, we will study the evolution of the thermal environment in urban areas using the geothermal method for GST history reconstruction. We will investigate formation process of heat islands due to development of mega-cities and try to separate the effects of global warming and heat island based on GST variations reconstructed in urban and suburban areas. Long-term temperature monitoring at shallow depths will be carried out in selected boreholes to detect the ongoing downward propagation of the GST variation.

We conducted preliminary surveys in Korea and Taiwan in 2005. In Korea, temperature logging was made in 14 groundwater monitoring wells in Seoul area. All the temperature profiles were rather disturbed probably by pumping irregularly made for testing water quality.

In Taiwan, we made temperature logging in 14 wells for groundwater monitoring or geophysical observation in Taipei area and in the Pingtung plain. Most of the temperature profiles show the temperature minimum around 40 to 60 m below the ground surface, indicating recent increase in GST. We also installed small temperature recorders in two wells and buried temperature sensors in surface soil in the vicinities of these wells for long-term monitoring.