

Reconstruction of the climatic changes in Kamchatcka from temperature-depth profiles.

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The distribution of subsurface temperature is affected by both heat advection with groundwater flow and variation of surface temperature. The object of this study is to reconstruct the past climatic change from subsurface temperature in Kamchatcka, Russia.

There is little urbanization in this area, therefore it can be expected that the distribution of subsurface temperature is not disturbed by the local human activity.

Subsurface temperature was measured with some boreholes at Malkinsky and Petropavlovsk-Kamchatsky on September to October 2000, and September 2001. In addition to these temperature measurements, groundwater and surface water samples were collected around the boreholes. Stable isotope ratios and chemical components of the groundwater samples were analyzed to estimate the effects of the groundwater flow system on subsurface temperature.

Subsurface temperature profiles observed in the study area showed 'inversion curve' which might be caused by the effect of global warming. According to the long-term air temperature records at meteorological station in Kamchatcka, the annual mean temperature has increased by about 1.0K for past 100 years.

The inversions in subsurface temperature exist in relatively shallow layer, which might be caused by the groundwater flow system. This is because these boreholes are located in the discharge area of groundwater flow system, where the upward flow makes shallow the inversion depth.