

Ground surface temperature history reconstructed from borehole temperature data in Awaji Island, southwest Japan

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Reconstruction of past ground surface temperature (GST) from underground temperatures provides information about a change in climate in times before the beginning of measurement of surface air temperature (SAT) and in areas with no SAT record [e.g. Huang et al., 2000; Harris and Chapman, 2001; Beltrami et al., 2003]. To understand regional and global climate changes in the past, it is necessary to reconstruct GST history homogeneously over the world. East Asia is one of the areas where few studies on reconstruction of GST history from borehole temperature data have been made. Although much evidence for climate change recorded in underground temperatures has been presented in Japan [e.g., Miyakoshi et al., 2003; Uchida et al., 2003], reconstruction of GST history by inversion of underground temperatures has not been performed yet.

In this presentation, we present the results of reconstruction of GST history for the past 500 years by analysis of temperature-depth profile in a deep borehole in Awaji Island, southwest Japan. The reconstructed GST history shows a relatively cold period from the 16th century to the first half of the 19th century. The contemporary warming of the GST, which started in the middle of the 19th century, was accelerated in the 20th century (warming rate: 1.3 K/100 years). The pattern of this GST history is similar to those obtained in Northeast Siberia [Pollack et al., 2003] and Kamchatka peninsula [Cermak et al., 2003] but is different from that in southwest China [Huang et al., 1995], suggesting local differences in GST history in East Asia.