

## High-precision temperature change at the western Japan during the past 3,000 years and its effect on the human activity

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A continuous record of terrestrial environments is difficult to reconstruct because terrestrial sediments are often eroded and transported away by wind or water. In contrast, marine sediments often provide a continuous record of both marine and terrestrial environments in their sedimentary sequence. Therefore, the continuous reconstruction of paleo-temperature in Holocene was conducted by using coastal marine cores in Hiroshima Bay, which shows very high correlation between the alkenone sea surface temperature (SST) and atmospheric temperature (AT) and enables to estimate a bi-decadal time resolution of record of quantitative temperature in historical period in the western Japan. During the last three millennia, the SSTs (ATs) showed a maximum in 830A.D. (24.3C (25.9C)) and two minima in 780B.C. (22.2C (23.8C)) and 960 A.D. (22.4C (24.0C)) with a mean value of (23.6C (25.2C)), which was comparable to the mean value in mid 20th century natural condition. The low SSTs (ATs) in 800-610B.C. and 990-1190A.D. and relatively low values in 1100-900B.C., 490-320B.C., 550-660A.D. and 1380-1740A.D. corresponded the minima of total solar irradiance (TSI). As TSI change was not sufficient to account for observed temperature amplitude, it is suggested that TSI potentially works as a trigger to drive the other internal forcing in climatic system. Largest volcanic eruptions in 535-536A.D., 1258A.D. and 1452A.D. certainly reduced temperature. Adding instrumental observation records, large shifts in social system such as Hunter-gather to Parry-rice farming and the establishments of Imperial and aristocratic political system, Feudalism and Modern nation, matched large minimal temperatures in cold climate while recovered warm climate afterwards could promote new social systems.

Keywords: Alkenone temperature, Atmospheric temperature, Solar radiation, Historical age, Yayoi People, Japanese