

Accuracy evaluation of climatic reconstruction with historical daily weather record using old diaries written in the observation period

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Weather records of old diaries are useful source for climate reconstruction in historical times in Japan. Those records have been compiled for since the 11th century for the capital (Kyoto) area, and are widely available for since the 18th century for most part of Japan. Although daily weather records have an advantage of accessibility and high temporal resolution, their description is qualitative and dependent on subjectivity of the author, and therefore evaluation of their accuracy is necessary for reconstructing long-term climatic variation by compiling historical weather records together with modern observed meteorological data. In this study we collected several types of historical daily weather records including private diaries of merchants and scholars and official dairies of temples written in the late 19th to early 20th centuries that parallel meteorological observational records. By comparing weather records with observed data on the daily basis, we found weather descriptions of "light rain", "rain" and "heavy rain" correspond to a broad range of daily precipitation without distinct boundaries and about one fourth of rainy days are missed in weather record of diaries. Referring to plural diaries and using climatic indices derived by accumulating weather descriptions for months or seasons (such as number of rainy days) is essential to enhance reliability and objectivity of climate reconstruction using such subjective and qualitative information. On the other hand, sharp boundary was found between daily temperatures corresponding to weather descriptions "rain" and "snow", which implies rain/snow ratio is a promising proxy for winter temperature in the central part of Japan.

Keywords: historical daily weather record, accuracy evaluation, observation period