

## High resolution climate reconstructions in historical times based on the diary weather descriptions and old meteorological records

\*Takehiko Mikami<sup>1</sup>

### 1. Tokyo Metropolitan University

The data and methods for scientific research on climatic variations in historical times should be examined carefully in terms of their reliability and methodology for climatic reconstructions. There exist various kind of proxy documentary series of historical data in Japan, among which continuous records of daily weather descriptions in old diaries since 17th century would give us reliable climatic information with high resolution in time and space. Although the quality and quantity of daily weather records are not unified, some diary records include very detailed weather and wind information with several times in a day.

Old meteorological instrumental data, such as those observed in Nagasaki by Dutch medical doctors during 1820s-1850s, and meteorological observations in several cities (Tokyo, Yokohama, Osaka, Mito et al.) by Japanese people, are also valuable and effective for studying long-term climatic variations in Japan. Also, many Light-house meteorological records observed in Japan during 1870s-1880s have been recovered.

Imaging and digitization of old paper-based instrumental meteorological records must be carried out before these records are lost to decay. This kind of activity called "data rescue" is now taking places all over the world. We have recovered instrumental temperature and pressure data for several locations in Japan from the 19th century, a period for which no instrumental records were believed to exist. The recovered data were collected by Dutch, German, French, British, American and Russian visiting Japan and also by Japanese astronomers trained by the Dutch at the time. The data allow extending the beginning of the instrumental record back from 1872 to 1819. The recovered temperature and pressure data were converted to modern units and digitized into computer readable form. The pressure data were corrected for temperature, height, and gravity where needed. The temperature data were homogenized to compensate for changes in recording location. Then, both data sets were homogenized to account for varying observation schedules.

By combining the proxy data (e.g., diary weather records and old meteorological records) with JMA meteorological data properly, it would be possible to reconstruct long-term temperature time-series which is useful for predicting future climate change.

Keywords: climatic reconstruction, climate variation