

MIS013-11

Room: Exhibition hall 7 subroom 3

Time: May 28 16:30-17:00

## Accurate magnitude of long-term warming in Japan obtained by correcting temperature data

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Temperature data measured at meteorological stations have errors due to various causes: e.g., changes in methods/ instruments, and the sunny spot effect due to weakened ventilation at the measurement sites. The accurate value for the background temperature increase (i.e., the global warming) in Japan obtained after correcting these factors is 0.67 degC/100 y during the period of 1881-2007. In this period, four sudden jumps in temperature were found, their magnitude being larger for higher latitudes. Correlations between the temperature and solar spot number as well as large volcanic eruptions were observed. While impacts of droughts, a main cause of past disasters in Japan, have been overcome in recent 300 years, cold weather damages still remain a problem. The temperature increases in many large/medium-size cities due to urbanization (heat-contamination) were found to be larger than those due to the global warming by CO<sub>2</sub> increases.

Keywords: temperature, global warming, sunny spot effect, solar spot, volcano