



## Variability and trends of extreme temperatures in Finland

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Extreme heat waves and cold spells can have serious effects on human health but also on infrastructure. In order to detect potential past trends in the occurrence of very high or low temperatures in Finland, the longest available time series (75-165 years) of annual maximum and minimum temperatures have been analyzed at 30 weather stations. In addition, warm spells lasting for at least six or 24 hours or seven days, and temperatures exceeding a threshold were examined at a number of stations. The daily maximum temperature data included the three highest ever recorded air temperatures in Finland: 37.2°C and 36.8°C in eastern part of the country in 2010, and 35.9°C in southwestern Finland almost a century earlier, in 1914.

The annual maximum temperatures did not reveal any statistically significant trends except at a few stations, regardless of whether the long time series or observations since 1961 were considered. Nonetheless, statistically significant increasing trends during the period 1961-2010 were found for the annual frequency of daily maximum temperatures higher than 23°C at 10 out of 30 weather stations and for the temperatures of the 7-day heat waves in summer at 5 out of 8 stations.

Compared to the annual maximum temperatures, the warming trend has been clearly more pronounced for the annual minimum temperatures. Half of the stations had a statistically significant positive trend in the long time series, and almost as many in the 50-year long time series. The average slope across all the stations was 0.36 °C/decade in the long time series and almost twice, 0.75°C/decade, during the period 1961-2011. However, although cold weather has become less likely in time, severe frost still occurs. The lowest ever recorded temperature in Finland, -51.5°C, was measured rather recently, in 1999.