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Research Article

## Air temperature changes in the arctic from 1801 to 1920

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First published: 28 April 2009

<https://doi.org/10.1002/joc.1918>

Citations: 15

### Abstract

In this paper, the results of an investigation into the thermal conditions in the Arctic in the period from 1801 to 1920 are presented. For this 'early instrumental' period limited meteorological data exist. Generally, the first meteorological stations in the Arctic were established in the second half of the 19th century and almost all of them were located in the coastal parts of Greenland. In order to get at least a rough idea of thermal conditions in the Arctic in the study period, data from different land and marine expeditions were collected. A total of 118 temperature series of monthly means have been gathered. Although the area and time periods covered by the data are variable, it is still possible to describe the general character of the temperature conditions.

The results show that the areally averaged Arctic temperature in the early instrumental period was 0.8 °C lower than the next 60-year period (1861–1920). In comparison to present-day conditions, winter and autumn were significantly colder (winter by 1.6 °C and autumn by 0.9 °C) than were summer (colder by 0.4 °C) and spring (colder by only 0.2 °C). The air temperature in the real Arctic during the first International Polar Year (IPY) was, on average, colder than today by 1.0–1.5 °C. Winter was exceptionally cold with the average temperature being lower by more than 3 °C in all months except February. On the other hand, spring (March–May) was slightly warmer than today, and April was exceptionally warm (1.1 °C above present norm).

The temperature differences calculated between historical and modern mean monthly temperatures show that majority of them lie within one standard deviation (SD) from present long-term mean. Thus, it means that the climate in the early instrumental period was not as cold as some proxy data suggest. Copyright © 2009 Royal Meteorological Society

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