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# Abstracts

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## Atmospheric pressure changes in the Arctic from 1801 to 1920

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In this paper, the results of an investigation into the atmospheric pressure conditions in the Arctic in the period from 1801 to 1920 are presented. For this period, which can be described as ‘early instrumental’, limited meteorological data exist from a network of regular stations. As a result, in order to get at least a rough idea of pressure conditions in the Arctic in the study period, data from different land and marine expeditions were collected. A total of 94 pressure series of monthly means have been gathered, the duration of which is usually less than two years. While the area and time periods covered by the data are variable, it is still possible to describe the general character of the pressure conditions.

The results show that the areally averaged Arctic pressure in the early instrumental period (1861-1920) was 0.8 hPa lower than today (1961-1990). Lower values of atmospheric pressure were also observed in all study regions, excluding the Atlantic. The greatest negative differences (-2.1 hPa) have been found for the Canadian Arctic. The greatest changes between the historical and present times were noted in all winter months and in winter as a whole (-1.9 hPa), while in summer and autumn they were very small and their average differences came to -0.1 hPa and -0.2 hPa, respectively. Comparison of historical and contemporary annual courses of atmospheric pressure in the whole of the Arctic and in its particular regions reveals general consonance. There is evidence to show that changes in Arctic atmospheric pressure during the whole study period were insignificant.

Atmospheric pressure in the 1<sup>st</sup> International Polar Year (IPY) period (Sep 1882-Jul 1883) was, on average, 1.4 hPa higher than in modern period (1961-1990). The greatest positive seasonal differences between historical and contemporary pressure values occurred in autumn (2.6 hPa), while the lowest were in winter (only 0.2 hPa). Spatial patterns of average annual and seasonal atmospheric pressure in the Arctic were very similar to present-day ones.

The pressure differences calculated between historical and modern mean monthly values show that almost all of them lie within one standard

deviation (SD) from present long-term mean (1961-1990). Thus, this means that the atmospheric pressure in the early instrumental period was not significantly different to that of the present day.

Recent, commonly used gridded datasets of the sea level atmospheric pressure (HadSLP2 and the 20<sup>th</sup> Century Reanalysis Project) reveal quite a large positive bias in the period 1850-1920 in comparison to the real data from the instrumental observations.