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Bioclimate conditions in SW Greenland in the second half of the 18th century

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The bioclimate in SW Greenland was estimated using two existing series of meteorological observations from stations located in this area: Neu-Hernhut (1st Sep 1767 – 22nd Jul 1768) and Godthab (Jan 1790 – Jun 1792). The first series is the oldest available long-term series of instrumental measurements for this region. Observations of air temperature, atmospheric pressure, and wind direction and force were made twice a day by Christopher Brasen (1738–74) at 8 a.m. and 2 p.m. The second series of measurements covers the period Jan 1784 – Jul 1792, but the lack of bioclimatic utility of the data (the frequent absence of the required wind speed data) limited its use to only the aforementioned 2.5 years. Observations were carried out in accordance with the instructions used by members of the Meteorological Society of the Palatinate, which also provided the necessary tools. Measurements were taken three times a day by the Danish Reverend Andreas Ginges (1754–1812), at 7 a.m., 2 p.m. and 9 p.m. These were included in a manuscript titled *Astronomiske og meteorologisk lagttagelser, anstillede i Godthaab i Grønland 1782–1792* (Det Kgl. Bibliotek in Copenhagen).

In order to present the bioclimatic conditions in this part of Greenland, the following indices and indicators were used: Wind Chill Temperature (WCT), Insulation Predicted (Iclp), and day-to-day changes in air temperature and atmospheric pressure. The obtained results were compared with contemporary conditions (1991–2020).

Wind Chill Temperature values in the 1789–92 expedition years were lower than at present. In the period January–June of the 1767–68 expedition, the threat to human health was less than at present (by 1.7 °C). For a man in motion (metabolism = 135 Wm⁻²) the meteorological conditions of SW Greenland show that the required clothing insulation in 1791–92 (Jan–Jun) was similar to the modern period. During 1789–92, an increase of 0.1 clo in the clothing insulation required to obtain thermal comfort was recorded, while in 1767–68, there was a decrease (of 0.2 clo) relative to the period 1991–2020. Day-to-day variation in atmospheric pressure in the category of strong (8–12 hPa) and very strong stimuli (>12 hPa) most often occurred in the winter and spring months. Under this criterion, the expeditions of 1767–68 and 1789–90 were felt more strongly than in the modern period. During the four historical expeditions in the 18th century, there was found, among

other things, a slight increase (1–5%) in frequency of occurrence of significant (4–6 °C) and severe stimuli (> 6 °C) according to the day-to-day variation of average diurnal air temperature, as compared against the contemporary period.

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