



Air temperature variability in NE Greenland in 1927–2017

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The paper presents the long-term air temperature variability of NE Greenland in the period 1927–2017. Before now, the longest air temperature series for this area had come from Danmarkshavn (1949–2017). For the present work this was extended by 22 years using observational data from Myggbukta, where in the years 1926–1958 there was a meteorological station founded by the Norwegians. Monthly data from Danmarkshavn for 1993–2017 were collected from the Danish Meteorological Institute (Cappelen 2018), while daily data for 1949–1992 were gathered as part of a habilitation dissertation by Przybylak (1996). Original reports with meteorological observations from Myggbukta were found in storage at the Norwegian Meteorological Institute in 2016. The data has now been digitised and quality checked. The series from Danmarkshavn was taken as the main series, from which Myggbukta data was interpolated out by least squares method (Nordli et al. 2014). Additionally, day-long gaps were supplemented with data from version two of the 20th-Century Reanalysis (20CRv2c, Compo et al. 2011).

The air temperature series from NE Greenland starts from the early years of the Early 20th-Century Warming (ETCW, 1921–1950), then includes the cooling of the 1960s and 70s and the present warming period. In the ETCW, the decade of 1927–1936 was warmest, but was 0.6°C colder in terms of annual averages than the most recent decade of the present warming (2008–2017). For the entire analysed period of 1927–2017, no statistically significant trends in seasonal or annual air temperature changes were identified (0.02 to 0.06°C/decade). Using the regime shift detection test (Rodionov 2015), there were two changes in thermal regime; the first occurred at the turn of the 1960s – the end of ETCW and the onset of a cooling; the second occurred in the mid-1990s, when there was a significant increase in the pace of climate warming in the Arctic (including in NE Greenland). The ETCW was characterised by a more oceanic climate than the contemporary period; the K-index (Ewert 1972) was about 2–3% lower. Conversely, in the cooler period, the climate was more continental. The reconstructed NE Greenland temperature range correlates best with the air temperature from the Jan Mayen, Svalbard Lufthavn and Bjørnøya stations. Average annual, winter and autumn air temperatures correlate at $r=0.63$ to $r=0.76$. Meanwhile, no correlation was found with the temperature series reconstructed for SW Greenland by Vinther et al. (2006), except for the summer season, for which it is statistically significant, at $r=0.49$.

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