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Temperature increase is accelerating in the past five years in Greenland

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Understanding the change of Greenlandic temperature is important for assessing and predicting Greenland ice sheet mass, which plays an important role in sea level rise. In this study, we analyze the annual and seasonal coastal Greenlandic temperature during period 1952 ~ 2017 based on the dataset obtained from Danish Meteorological Institute (DMI), focusing on the last five years. Overall, the annual coastal Greenlandic temperature increases during period 1952 ~ 2017 with a rate of $0.23 \text{ }^\circ\text{C decade}^{-1}$, especially in the south-eastern ($0.70 \text{ }^\circ\text{C decade}^{-1}$) and northern ($0.42 \text{ }^\circ\text{C decade}^{-1}$) region of the island. From seasonal coastal Greenlandic composite temperature (CT) change, winter has the largest change rate ($0.28 \text{ }^\circ\text{C decade}^{-1}$), and summer increases $0.25 \text{ }^\circ\text{C decade}^{-1}$, while spring warms $0.17 \text{ }^\circ\text{C decade}^{-1}$ with a smaller variation. And temperature increase is accelerating during period 2013 ~ 2017 according to Mann-Kendall test, especially in the north-eastern and northern region of the island; And the order of seasonal temperature change of the whole island is as follows: annual > autumn > summer > winter > spring. And Pearson correlation analysis was used to determine the teleconnection relationship between coastal temperature and large-scale atmospheric-ocean climate indexes, and we have found that Greenland Blocking Index (GBI), Atlantic Multi-decadal Oscillation (AMO), Tropical Northern Atlantic Index (TNA), North Tropical Atlantic Index (NTA), Caribbean Index (CAR), Atlantic Meridional Mode (AMM), East Atlantic (EA) and Western Hemisphere warm pool (WHWP) have a significant positive correlation relationship with coastal temperature in most months except February and May. But North Atlantic Oscillation (NAO), Arctic Oscillation (AO) and Eastern Asia/Western Russia (EAWR) show a significant negative correlation relationship with temperature. On the whole, there exists time lag effect between climate indexes and temperature except GBI, AO and NAO. And from Randomforest model result, we find that GBI, NAO, CO₂, AMO, N₂O, SF₆, CH₄, and Northern Oscillation Index (NOI) are most important variables that influence CT change during period 1979 ~ 2017. Finally, we calculated the contribution rate of important variables to temperature change during period 1979 ~ 2017, showing that contribution rate of GBI, CO₂ and NOI to temperature change is 48.85%, 36.85%, and 17.58%, respectively.