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Contemporary (1979-2014) climate variability recorded in Styx-M ice core from northern Victoria Land, East Antarctica

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Historical climate variability reconstructed from ice cores is important for future prediction. In recent decades, a large influence of the changes in atmospheric circulation over Antarctica has been reported. However, the variability over East Antarctica is still under debate due to its vastness and complexity, particularly in coastal areas. This study examined the ice core (Styx-M) records from northern Victoria Land, Antarctica with instrumental records. This study aims to evaluate the depositional characteristics of the ice core records (water isotopes, ions, and trace elements) covering up to the recent 36 years (1974-2014) and the restoration capacity of climate variability. The dominant intrusion of ocean-sourced moisture and its temporal consistency was observed. The annual mean of $\delta^{18}O$ shows no correlation with the temperatures from nearby automated weather stations (AWS). However, weak correlations can be found with the standard deviations of temperature ($r = 0.37$, $p < 0.05$) and pressure ($r = 0.43$, $p < 0.05$) in the nearest AWS. Although it is difficult to expose the temperature changes on annual scale, the relationship ($\delta^{18}O = 0.66 \times T - 13.02$, $r = 0.82$) was suggested by combining the temporal mean of $\delta^{18}O$ and temperatures with the previous records. The approximately 12-year difference in the large $\delta^{18}O$ peaks corresponded to years with the low sea ice extent (SIE) in annual scale. Moreover, the correlation ($r = -0.37$, $p < 0.05$) between the $\delta^{18}O$ and the SIE only in austral summer is likely to indicate the detectability of the contribution of oceanic vapor. The SIE also shows the correlation ($r = -0.42$, $p < 0.01$) with the snow accumulation rate. Moreover, the evidence of climate indices of ASL (on the snow accumulation, MSA, $nssSO_4^{2-}$) and SAM (on the $\delta^{18}O$) was also found. However, the most pronounced feature is suggested as the transfer of moisture and heat linked to sea ice changes. We doubt that the restoration capacity of the Styx-M core is more efficient in the inter-annual or decadal scale. This study will be supportive for interpreting the longer records in this location and the calibration of climate models.