Supplementary

Figure S1. Correlations between the SW Greenland temperature record and NEEM summer $\delta^{18}O$ (a) and NEEM winter $\delta^{18}O$ (b) for variously defined choices of seasonal centered fraction of year in the ice core data. Correlations are calculated for period 1949-2004. The 95% confidence level is marked as dashed line (T-test).

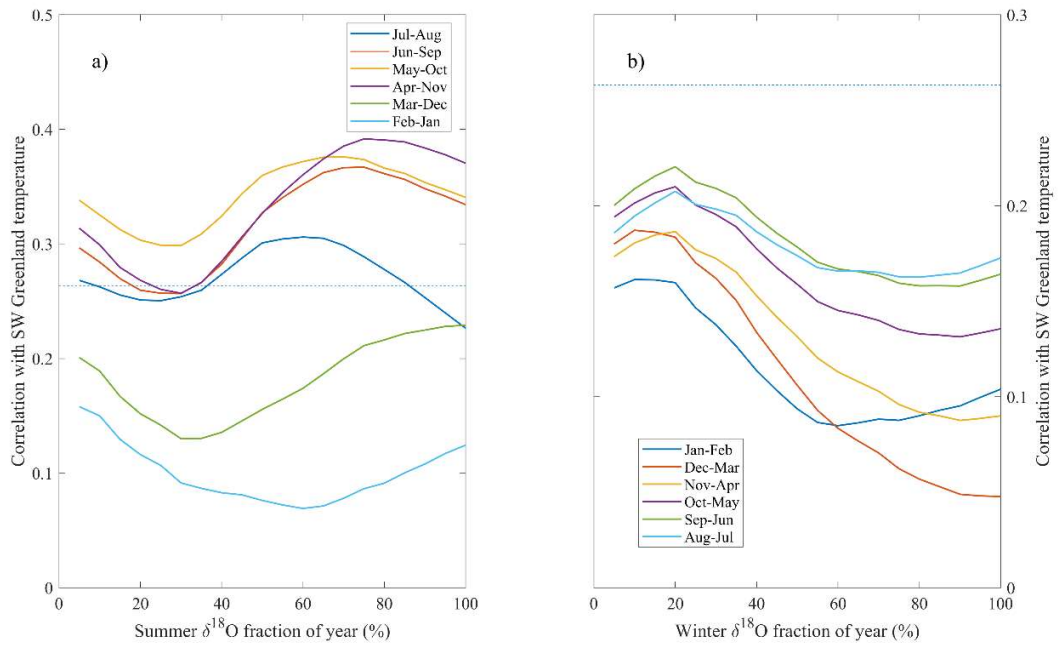



Figure S2. An example of dating and definition of summer and winter seasons in the NEEM08S2 ice core based on a 70% summer and 30% winter deposit fraction center on the appropriate season. The dashed lines are the depth of the onset of annual layers defined by Masson-Delmotte et al.,(2015). The dotted lines are the depth where $\delta^{18}O$ reaches the maxima within the year.

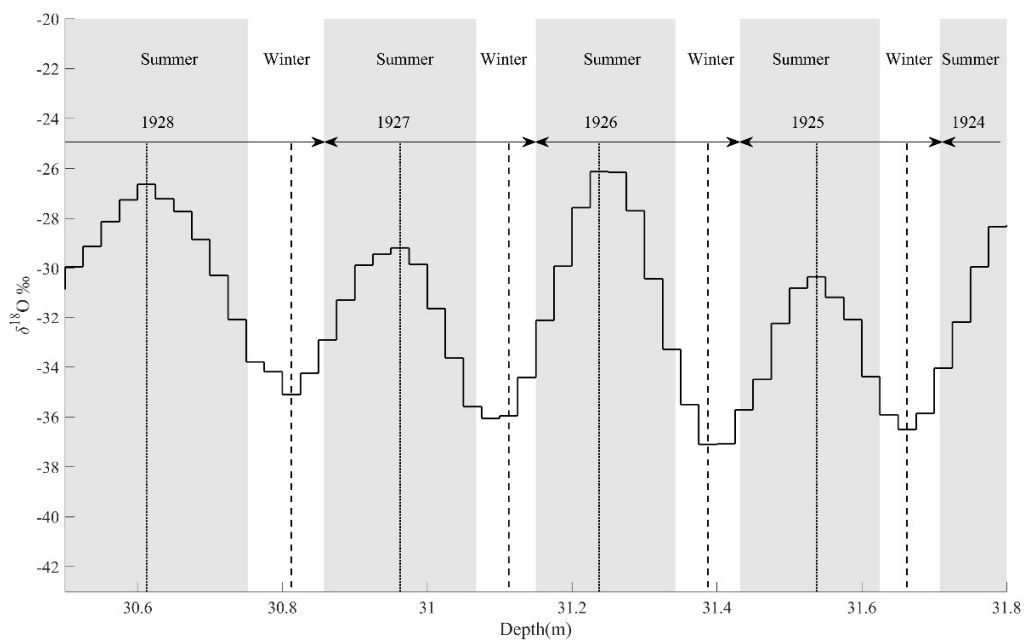



Figure S3. The spatial correlation maps between seasonal NEEM δ^{18}O signal and SAT for two subperiods (1855-1930 & 1931-2004). The red solid lines mark the significant correlations at 95% confidence level. (T-test)

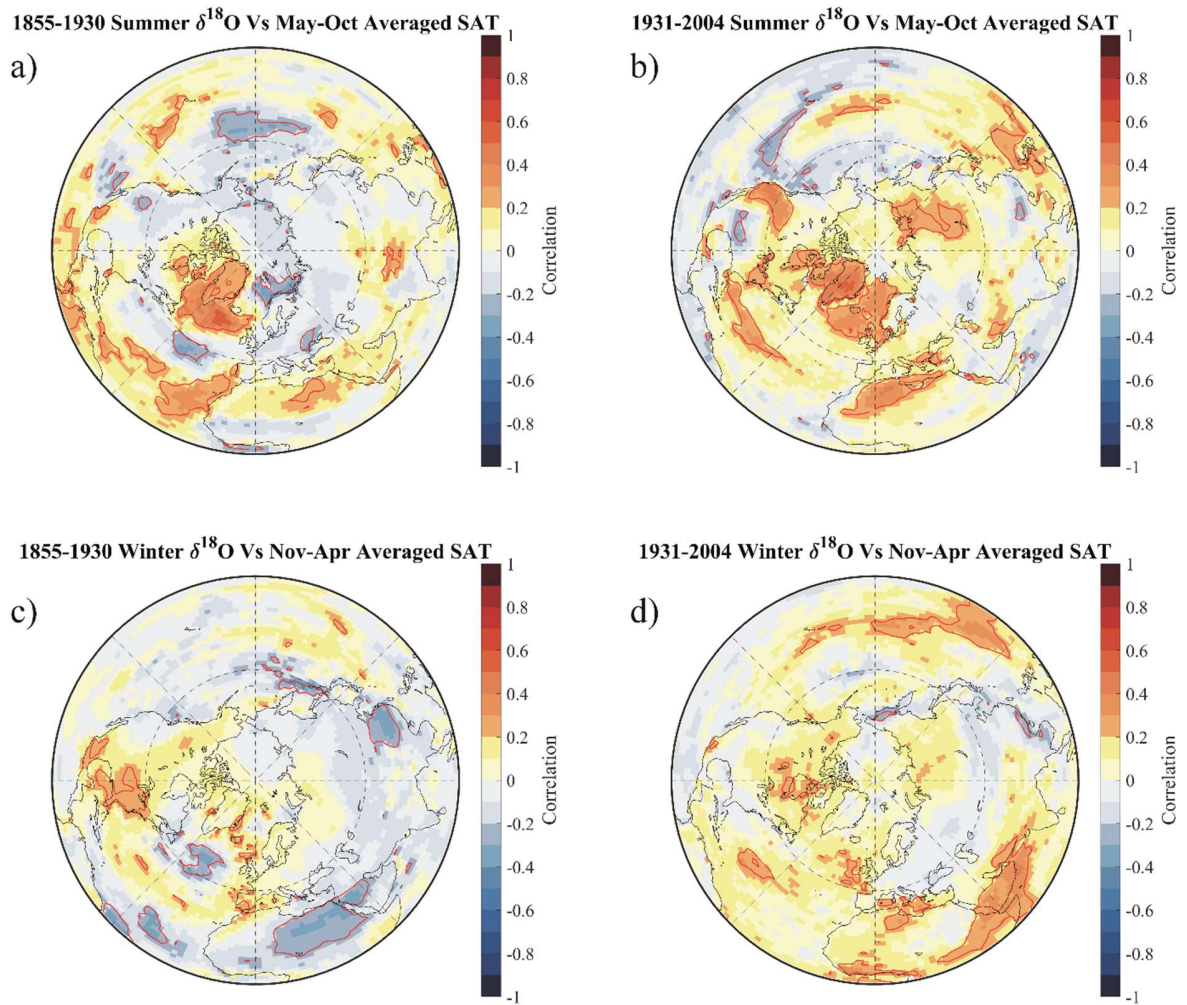
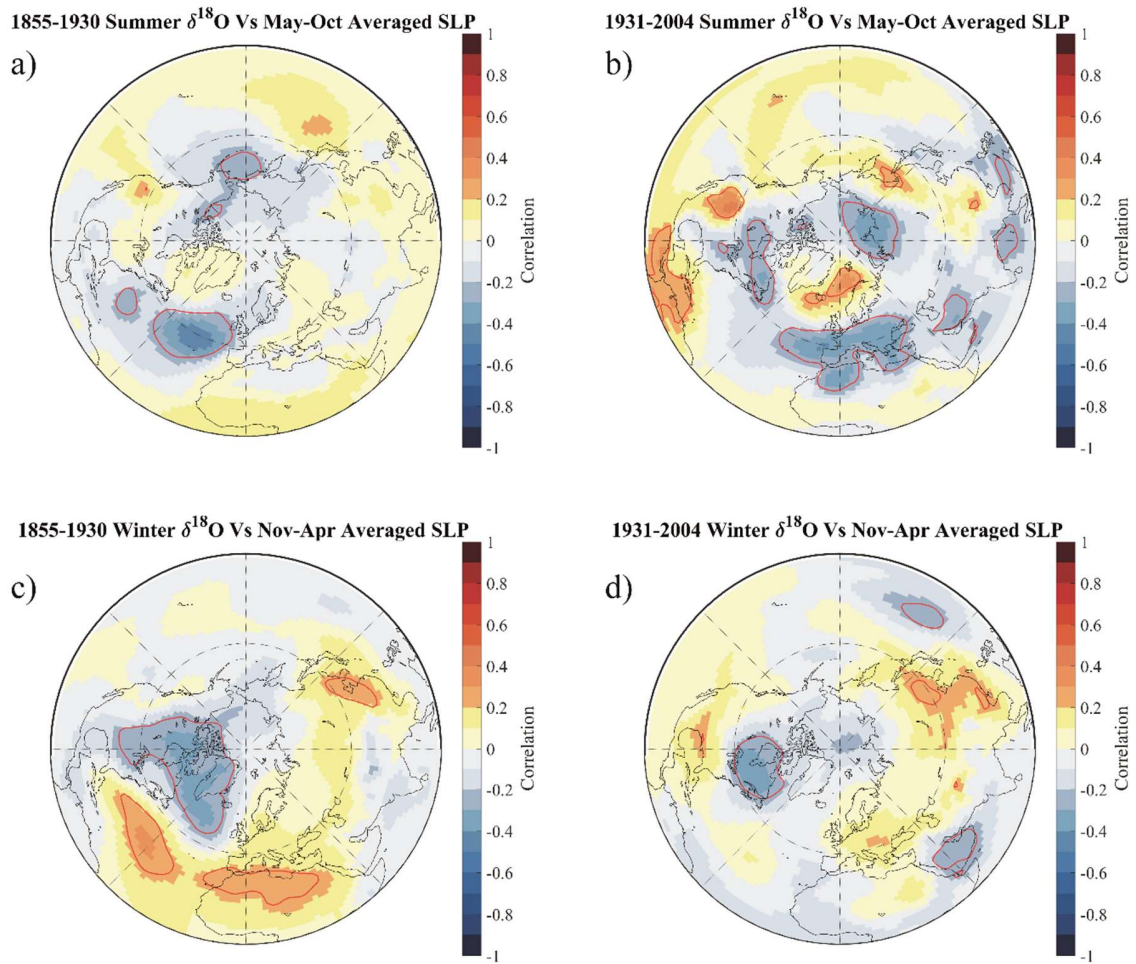



Figure S4. The same as Fig. S3 but showing the relationships with SLP from 20CR reanalysis data. The red solid lines mark the significant correlations at 95% confidence level. (T-test)

Masson-Delmotte, V., H. C. Steen-Larsen, P. Ortega, D. Swingedouw, T. Popp, B. M. Vinther, H. Oerter, A. E. Sveinbjornsdottir, H. Gudlaugsdottir, J. E. Box, S. Falourd, X. Fettweis, H. Gallée, E. Garnier, V. Gkinis, J. Jouzel, A. Landais, B. Minster, N. Paradis, A. Orsi, C. Risi, M. Werner, and J. W. C. White. 2015. 'Recent changes in north-west Greenland climate documented by NEEM shallow ice core data and simulations, and implications for past-temperature reconstructions', *The Cryosphere*, 9: 1481-504.