



Characteristics of Styx glacier firn cores from northern Victoria Land, Antarctica

Yalalt Nyamgerel (1,2), Yeongcheol Han (2), Songyi Kim (1,2), Sang-Bum Hong (2), Jeonghoon Lee (1), and Soon Do Hur (2)

(1) Dept. of Science education, Ewha Womans University, Seoul 120-750, Korea (jeonghoon.d.lee@gmail.com), (2) Division of Paleoenvironment, Korea Polar Research Institute (KOPRI), Incheon 406-840, Korea

Ice core records offer a way to explore the past climatic and environmental condition based on its potential fingerprint of atmospheric temperature, sea ice extent, air mass origin, transport pathway, and known climate events. In this study, two firn cores (upper 0-20 m part of a 210.5 m long ice core and 8.84 m firn core) obtained from Styx glacier, East Antarctica ($73^{\circ} 51.10'S$, $163^{\circ} 41.22' E$; 1623 m a.s.l) during 2014-2015 austral summer period and the high-resolution water stable isotopic and major ionic compositions were examined. We aim to investigate the snow accumulation manner and the contribution of the potential influencing factors on water stable isotopic signals based on examination of direct and indirect climate measurement data. The principal component analysis, correlation analysis, and the air mass backward trajectory model were effectively applied to propose the probable statements on the air mass origin and air mass transportation process. The standardized profiles of the seasonal time markers ($\delta^{18}O$, δD , MSA, and $nssSO_4^{2-}$) reveal approximately 25 (1990-2015) and 62 (1953-2015) annual signals with the average accumulation rate of $142 \text{ kg m}^{-2}\text{y}^{-1}$ and $168 \text{ kg m}^{-2}\text{y}^{-1}$ for the 8.84 m and 20 m firn cores, respectively. The results show the primary precipitation derived from the neighboring ocean and the dominant influence of oceanic sources. The significant shifts in $\delta^{18}O$ (δD) peak values show a reasonable correlation ($r=-0.51$) to the Southern Annular Mode index. Moreover, the mismatching between the two cores was discussed and indicated the localized accumulation manner. These results are practically applicable for the future networking researches on the reconstruction of the paleoclimate and paleoenvironmental changes in Pacific margin of Antarctica.