Preliminary results of stable water isotopes from an ice core of the Tsambagarav glacier in the Mongolian Altai

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INTRODUCTION Although Ice cores from mountain glaciers in mid-latitude provide shorter timescale compared to both polar ice cores, glacier records from these areas are related to studying anthropogenic impacts on the environments besides paleoclimate and past atmospheric conditions. Since the precipitation isotopes in this area would be mainly controlled by temperature, not precipitation amount, the isotopic composition of ice core in this area will be a good constraint on the studies related to temperature and age estimation. From 7 June to 16 June 2008, we retrieved a 40m ice core and determined the isotopic composition of the 40m of ice core from the Tsambagarav glacier in the Mongolian Altai. A previous study in this area showed that there is no isotopic seasonal variation and they used ammonium concentrations to determine the age of upper 12m (21 years) of an ice core (Herren et al, PSI Annual Report, 2009).

Fig.1. A CRDS (L2120-*i*) for isotopic measurement at KOPRI

METHODS The ice core has been analyzed for stable water isotope (δD and $\delta^{18}O$) using a Cavity Ring-Down Spectroscopy (CRDS, L2120-*i*) analyzer with an accessory vaporizer. The precision of both stable water isotopes were 0.15‰, 0.7‰ for oxygen and hydrogen, respectively.

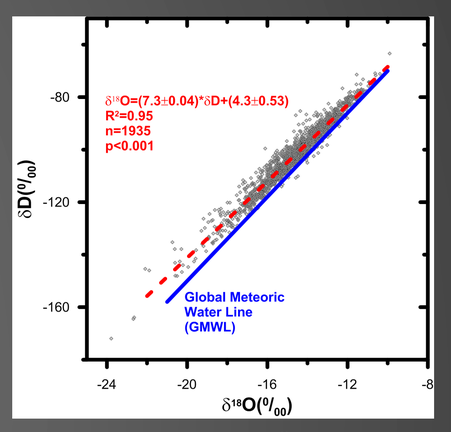

Fig.2. δD vs. $\delta^{18}O$ regression plots of an entire ice core

SUMMARY

1. The linear regression between δD vs. $\delta^{18}O$ indicates isotopic redistribution by meltwater percolation, which is shown by the δD vs. $\delta^{18}O$ slope of the analyzed ice core, 7.3, is less than that of the global meteoric water line of 8 (Lee et al., 2010).
2. The isotopic composition of ice core (δD) show seasonality, which is not consistent with the previous study.
3. The distinct seasonality of stable water isotopes has been used for age estimation for the entire 40 m long ice core where the age of ice is 63 years (2008-1945).
3. Our accumulation rate from the stable water isotopes is 63.4±19.7 cm per year.
4. The isotopic chronology will be confirmed using ^{239}Pu and major ions, such as NH_4^+ (Gabrieli et al., 2011).

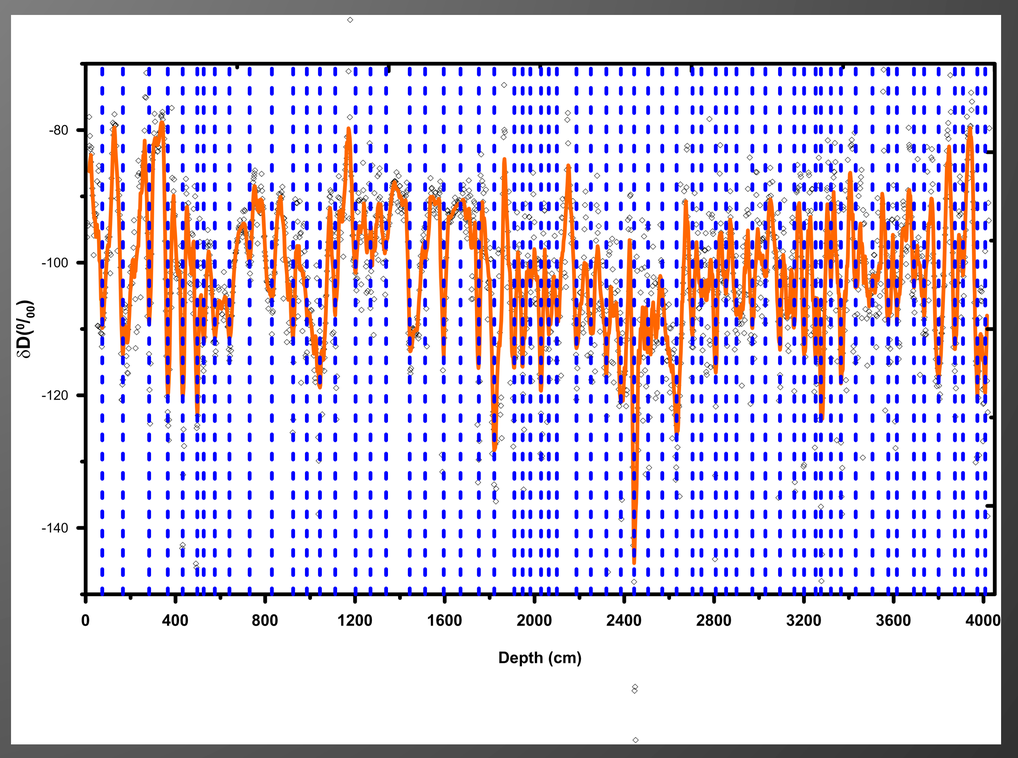

Fig. 3. Isotopic profile of the ice core; dashed lines represent annual layers

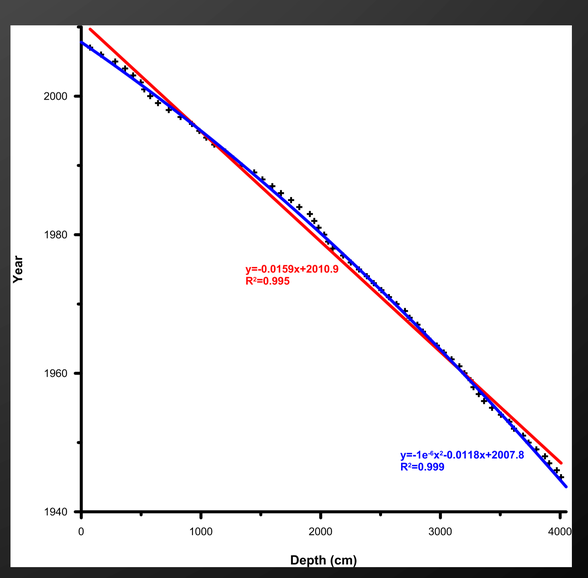

Fig.4. Interpolated relationship between time and depth

REFERENCES

Gabrieli, J. et al. (2011), Contamination of Alpine snow and ice at Colle Gnifeeti, Swiss/Italian Alps, from nuclear weapons test, Atmospheric Environment, 45, 587-593.

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