Geophysical Research Abstracts
Vol. 21, EGU2019-2546, 2019
EGU General Assembly 2019

The Holocene climate change in South Siberia and its linkage to the Siberia High

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High latitude region such as Siberia is very sensitive to climate change since the current warming causes significant changes in high latitudes. Few high-resolution Holocene climatic records of Siberia have been reconstructed. The climate of this region is affected by Westerly, polar front and the Siberia High. In this study, we report the first high-resolution (4-20 yr) stalagmite δ^{18}O and δ^{13}C records of late Holocene in Altai-Sayan Mountain region (Nadezhda Cave, 52°39'N, 88°39'E, 550m a.s.l.). Stalagmite HOP-1 is 22 cm long and has pure calcite with milk white color. Very low U content (^{238}U = ~70 ppb) and relatively high Th content (^{232}Th = 2~9.3 ppb) of HOP-1 resulted in unsuccessful ^{230}Th/U dating. The chronology of HOP-1 was established by AMS ^{14}C dating and ^{210}Pb dating methods. The excess ^{210}Pb decay trend in the top part and dripping water activity indicate that the surface of the stalagmite is modern and contains dead carbon influence (DCI) about 400 years. By subtracting this 400 years of initial age and assuming constant DCI, a total of 32 AMS ^{14}C dates were used to construct the age model. The age model shows that this stalagmite grew continously over the last 6,000 years. A total of 972 subsamples were measured δ^{18}O and δ^{13}C, showing heavier δ^{18}O and δ^{13}C values corresponding dark layers with slower growth rates. The HOP-1 record shows 5 cold and dry periods around 4.2-4.9 kyr BP, 1.7-2.3 kyr BP, 1.3 kyr BP, 0.4 kyr BP, and 0.1 kyr BP corresponding to low total solar irradiance. These cold and dry periods might probably be linked to the enhancement of the Siberia High. Our stable isotope records and the nearby pollen record show that the climate of the Altai region was deteriorated at about 2.5 kyr BP which might be the cause of the decline of Scythian Culture.