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A lithium anomaly observed in the North GRIP ice core

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Resent isotopic analyses of the aerosol dust material in Greenland ice cores have shown that the origin of this material is the deserts of Eastern Asia [1]. Chemical analysis of soluble ions in the North GRIP ice core has revealed a lithium anomaly around the 8.2 ka BP cold event [2]. This anomaly is characterized by an up to 100 times increase in lithium concentrations and is a unique event in the ice core. We have no evidence for the source to this anomaly, but since lithium is a very mobile element in geochemical processes, we consider such processes in the dust source area as the best candidates.

The scenario around Owens dry lake in California, North America, might lead us to an understanding of the processes behind the lithium anomaly seen in the North GRIP ice core. At Owens dry lake high lithium contents in wind eroded material from the lake bed contribute to enriched lithium concents in dust aerosol from this area [3].

We here propose that the lithium anomaly observed in the North GRIP ice core around the 8.2 ka BP cold event is a signature from a dry lake bed in the dust source area.

References

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Stable isotopic composition of precipitation in South Korea

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The IAEA/WHO stable isotopic data from various locations in Northeast Asia were evaluated to examine the climatic factors controlling the temporal and spatial variations in stable isotopic compositions of precipitation. To further understand these factors, stable isotopic data of monthly precipitation were obtained over a three-year period at Jeju Island, Korea. During the study period, the amount of precipitation in southern side of Hala Mt. In Jeju Island was about 37 percent higher than that in northern side. Overall, the oxygen isotopic composition of precipitation did not correlate with surface air temperature. However, the amount effect was clearly observed in summer rains. In both sides, oxygen isotopic compositions decreased with increasing altitude, showing altitude effect. On the basis of monthly weighted means of precipitation, north-side samples were isotopically more depleted in ^{18}O (about 0.5 permil) than south-side samples, resulting from a rain shadow effect. It is believed that the more depleted isotopic compositions of north-side groundwaters relative to those at corresponding elevations in other sides are not the result of relatively fast rate of groundwater flow in north-side, as have interpreted by previous authors. We consider that this isotopic difference is the cause of direct reflection of the original isotopic composition of precipitation recharged to groundwater. The temperature appears to be the main factor controlling the stable isotope composition of precipitation in the northwestern (inner continental) region of the study area, whereas the amount effect for summer rains is overshadowing the temperature effect in the southeastern (coastal) region. The deuterium excess values at Jeju Island show a distinct seasonal variation with higher d-values in winter and lower values in summer. This work was supported by a grant (code 3-2-1) from the Sustainable Water Resources Research Centre of 21st Century Frontier Research Program.