

Application of cellulose oxygen isotopes in sphagnum from the Bekanbeushi mire, eastern Hokkaido to the reconstruction of “Ezo-tsuyu” and the East Asian summer monsoon during the last 2000 years.

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Hokkaido Island is located at the northern margin where the East Asian monsoon influences on climate. Stronger summer monsoon derives a moist air mass from the Pacific Ocean to Hokkaido Island. In this study, we applied the $\delta^{18}\text{O}$ values of *sphagnum* and plant cellulose in a 4-m long peat core from the Bekanbeushi high mire to the reconstruction of the East Asian summer monsoon. The $\delta^{18}\text{O}$ values of *sphagnum* were always lower than those of higher plants, i.e., *Vaccinium oxycoccos* and *Calamagrostis neglecta* var. *aculeolata*. While the $\delta^{18}\text{O}$ values of *sphagnum* reflects more directly those of precipitated water, those of higher plants should be enriched by transpiration. The difference of *sphagnum* and higher plants, thus, is a potential proxy of relative humidity. Temporal variation in the $\delta^{18}\text{O}$ of *sphagnum* indicated that the value was lower around 1500 years ago and higher around 1100 years ago, corresponding to Dark Age Cold Period and Medieval Warm Period, respectively. This suggests that the summer monsoon rainfall was lower around 1500 years ago and higher around 1100 years ago. The difference of the $\delta^{18}\text{O}$ values between plant tissues and *sphagnum* has a negative correlation with the $\delta^{18}\text{O}$ values of *sphagnum*. This suggests that relative humidity was higher in the periods when summer rainfall was more active, which is analogous to a long summer rainfall condition caused by the Baiu front activity in Hokkaido, “Ezo-tsuyu”. Ezo-tsuyu is a typical phenomenon when the East Asian summer monsoon strengthens. We, thus, suggest that a warm and moist climate around 1100 years ago reflects frequent Ezo-tsuyu summers caused by stronger East Asian summer monsoon activity.

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