Correlation between two tree-ring d180 chronologies from coastal areas of Pacific and Japan Sea in Hokkaido, North Japan

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We analyzed the tree-ring oxygen isotope ratios (d18O) during last one hundred years for four trees of Picea glehunii in each of North (Teshio) and East (Onnebetsu) Hokkido, Japan. In each of the two sites, there are very good correlations of the tree-ring d18O variations among different tree individuals. However, there is no good correlation between averaged tree-ring d18O variations of Teshio and Onnebetsu, suggesting that the main meteorological factors to determine the tree ring d18O are different between Teshio and Onnebetsu.

We investigated the relationship between the tree-ring d18O and local meteorological parameters. We found that the tree-ring d18O in Teshio has positive correlation with spring temperature and negative correlation with summer precipitation and relative humidity, showing that it can become a good summer precipitation proxy because there is especially large negative correlation with summer precipitation. In contrast, we could not find any significant correlations between the tree-ring d18O in Onnebetsu facing on Pacific Ocean and summer meteorological factors. Because summer hydro-climate in Pacific Ocean side of North Japan is more complex than that in Japan Sea side reflecting the inter-annually varying effects of cold marine fog, we are obliged to conclude that it is difficult to reconstruct paleoclimate using the tree-ring d18O solely in Pacific Ocean side of Hokkaido. However, we found that there are predominant 20-years periodicity in the 11 years sliding correlation between the tree-ring d18O in Teshio and Onnebetsu, which is coincident well with the 11 year running mean of air temperature in Hokkaido. So, the tree-ring d18O in Pacific Ocean side of North Japan can be used as a novel temperature proxy by investigating its correlation with the tree-ring d18O in distant area rather than treating it solely.

Keywords: tree-ring d18O, Hokkaido, Picea glehunii