

Climate variability over 393 years inferred from tree-ring oxygen isotope records of Tateyama Sugi in Hokuriku of Japan

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The annual oxygen isotope ($\delta^{18}\text{O}$) record covering the period between 1621 and 2013 recovered from the tree-ring cellulose of trees growing in Tateyama in Hokuriku of Japan. The tree-ring $\delta^{18}\text{O}$ chronology was based on samples obtained from four living Sugi (*Cryptomeria japonica*). The tree-ring cellulose $\delta^{18}\text{O}$ record is negatively correlated with relative humidity in summer (particularly in June), and also (though less so) with summer precipitation. However, the correlation coefficient related to relative humidity is variable and has been increasingly robust in nearly three decades. This non-stationary relationship between tree-ring $\delta^{18}\text{O}$ and relative humidity during different periods might be related to the location and moisture supply of Baiu front which can affect the isotope fractionation. Furthermore, compared with the climate influences inferred from oxygen isotope records of trees in southwestern Japan, the different responses of tree-ring cellulose $\delta^{18}\text{O}$ to the precipitation and relative humidity in Hokuriku area and southwestern Japan can be found, and the causes were discussed.

Keywords: Tree-ring oxygen isotope, Tateyama Sugi, Climate variability