

## Water use pattern in different tree species and $\delta^{18}\text{O}$ variability in the water cycle in heavy rain area

\*Qiqin Zhang<sup>1</sup>, Larry Lopez<sup>1</sup>

1. Yamagata University

Trees are a very important part of forest water cycle, they uptake rain water from soil via the roots and a smaller portion is up taken by trees through transpiration while at the same time release water to the atmosphere through the stomata. Different tree species uptake water from different soil depth, in dry areas, trees can switch from shallower to deeper water sources depending on the soil moisture. Stable isotopes of water ( $^2\text{H}$  and  $^{18}\text{O}$ ) have successfully been used to determine the source of water (rainfall, groundwater, soil water) for transpiration and the depth of soil water uptake by trees over months and among different species. Previous research showed that in north Italy pre-Alpine area, during dry period, beech will switch from accessing shallower to deeper soil water. Until now, most of these studies have been done in dry areas, while the trees water use pattern in wet areas is not well known. This research was conducted in Asahi Mountains, Japan, a humid environment, where the annual precipitation is over 2500mm. samples of precipitation, soil and tree xylem water were analyzed for  $\delta^{18}\text{O}$ . The objective of this research is to determine the water uptake strategy of different trees species within the growing season of cedar (*Cryptomeria japonica*), larch (*Larix kaempferi*) and beech (*Fagus crenata*). The results showed that there was no difference in  $\delta^{18}\text{O}$  between soil depths and months during the growing season, in addition, no significant difference in  $\delta^{18}\text{O}$  in xylem water between tree species was found. The xylem water and precipitation  $\delta^{18}\text{O}$  showed a high correlation for all species. Hence, in heavy rainfall area, the water use pattern does not change among species or months, and more influenced by precipitation. For future work, we will analyze the tree ring cellulose  $\delta^{18}\text{O}$  to determine the relation between xylem water and tree ring cellulose.

Keywords:  $\delta^{18}\text{O}$ , soil water, tree xylem water