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Connecting long-term changes of tree species with their water competition in Mt. Baegun, Rep. of Korea using stable isotope analysis

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The species composition of temperate forests changes dramatically under various climate change scenarios. Especially, conifer species at the high mountains will lose their habitats and will be replaced by broadleaf species. One of main reasons for these changes in species could be attributed to the water competition among tree species. Therefore, we investigated the differences in water uptake scheme between conifer and broadleaf species from the temperate forests of Korea using stable isotopes. Six study plots with species under high competition (conifers vs. broadleaf species) were chosen based on 15 years of tree survey data in Mt. Baegun, Rep. of Korea. The species-specific water uptake depth was estimated by measuring hydrogen(δ2H) and oxygen(δ18O) ratio from the xylem sap of individual species and by comparing them with those of soil water from 5 depths, (10, 30, 50, 100 and 120 cm), which extracted by lysimeter. The collection was conducted from April 2016 to Nov 2016. Primary results show the stable isotope signatures of soil water was increased from 10 cm to 30 cm, and then decreased gradually until 120 cm. In addition, current dominant canopy species, Chamaecyparis obtusa absorbed majority of their water from 10 to 30 cm depth. In comparison, current mid canopy but one of upcoming dominant species, Styrax obassia's major water source was 30 cm and deeper of soil. Our results could be essential for the prediction of species composition under climate change by providing species-specific adaptation ability connected to its water uptake scheme.