Variation in oxygen isotope ratio of plant water in a Mongolian larch forest and its comparison with model estimation

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Oxygen isotope ratios of foliar water (d18Owl), stem water (d18Ows), and soil water (d18Osoil), from a mountain larch forest in Mongolia were investigated in the 2003 growing season. Daily pattern of d18Owl presented a lower value in the early morning and a peak value in the mid afternoon. Daily evaporative enrichment of both sunny and shady leaves exceeded c. 9 per mil. Even at predawn, leaf water and stem water were not isotopically equal and thus leaf water was consistently more enriched in 18O relative to stem water. Shady leaves displayed less enriched in 18O than sunny leaves. The Craig-Gordon evaporation model was used to model daily pattern for d18Owl and gave an overestimation of d18Owl. Seasonal investigation of d18Ows and d18O soil revealed the water strategies by this larch forest.