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Contrasting water use strategies to climate warming in white birch and larch in a boreal permafrost region

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The effects of rising atmospheric CO_2 concentrations (C_a) with climate warming on intrinsic water-use efficiency (iWUE) and radial growth in boreal forests are still poorly understood. We measured tree-ring cellulose $\delta^{13}C$,$\delta^{18}O$, and tree-ring width in *Larix dahurica* (larch) and *Betula platyphylla* (white birch), and analyzed their relationships with climate variables in a boreal permafrost region of northeast China over past 70 years covering a pre-warming period (1951-1979; base period) and a rapid-warming period (1980-2018; warming period). We found that white birch but not larch significantly increased their radial growth over the warming period. The increased iWUE in both species was mainly driven by elevated C_a but not climate. White birch but not larch showed significant positive correlations between tree-ring $\delta^{13}C$,$\delta^{18}O$ and summer maximum temperature as well as vapor pressure deficit in the warming period, suggesting a strong stomatal response in the deciduous birch but not in the conifer larch to climate warming. The climate-warming induced radial growth enhancement in white birch is associated with a more 'conservative' (low g_s, constant A) water use strategy than in larch (constant g_s, high A), suggesting an advantage for the former than the latter in a warming world in the permafrost regions.