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On the precipitation signal in stable isotope ratios of tree-rings

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There is still a considerable gap in knowledge about past precipitation variability, whereas the time-course of past temperature is relatively well known for many regions of the world. Stable isotope ratios of carbon and oxygen of tree-rings could play an important role in filling this gap. Moisture deficits have a direct impact on the stomatal control of photosynthesis and the stable isotope ratio of plant material is therefore strongly related to precipitation variability. We show here that this holds not only for arid regions, but also for more temperate regions as well as Alpine and northern tree-line sites in Siberia, although with a varying strength of the relationship between isotope ratios and precipitation. Mainly the carbon isotope ratio was a good indicator for summer precipitation for a high-elevation Alpine Larix decidua chronology, as well as a high-latitude Siberian Larix gmelinii chronology. The availability of replicated isotope series over the last Millennium makes these new records reliable sources of information about past precipitation.

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