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Recent advances in isotope dendroclimatology

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Several studies have demonstrated the unrivalled potential of stable isotopes in tree-rings for quantitative terrestrial palaeoclimatic reconstruction. However, their widespread application has been hindered by laborious technical procedures and relatively high costs. Recent developments in sample preparation and mass spectrometry have enabled stable isotope chronologies to be developed with a degree of replication that was previously not practical. If individual time-series are determined rather than pooling samples before analysis, the signal strength of the resulting chronology may be determined and confidence limits calculated around the mean sequence thereby enhancing the value of any resulting climate reconstructions.

We present initial stable isotope results from Scots pines growing throughout northwestern Europe; bristlecone pines from the White Mountains in California and a dipterocarp growing at a site with an aseasonal climate at Sabah in Borneo. These results illustrate the problems associated with constructing long isotope chronologies and extracting chronological and environmental information from samples without apparent rings. This is the first stage in the construction of annually-resolved isotope chronologies covering several millennia with the ultimate aim of retaining environmental information across all temporal scales.