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# The need for new theory in global dendroclimatology

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So much of what we know about the Earth's climate during the past two millennia comes from tree rings. Information gleaned from the physical or chemical properties of growth rings in trees have allowed us to extend hemispheric-scale temperature records back by several centuries, construct annual maps of drought severity that span several continents, and generate proxy estimates for many of the leading modes within the climate system. The theoretical foundation that underpins these products — and most others in dendroclimatology — was fully mature by the early 1990s and set out in detail by Cook and Kairiukstis in their seminal book, 'Methods in Dendrochronology'. Most of the core analytical methods used to infer past climate from tree rings that appear in this reference (as well as prior works) depend on two concepts in particular: first, the idea that patterns common to many trees at many sites are more likely to be related to synoptic-scale climate variability (the principle of replication), and second, the notion that the most useful tree-ring records are found in forests where growth is particularly sensitive to a specific aspect of local climate (the principle of site selection). But because of (i) the gradual expansion, extension, and in-filling of the global tree-ring network and (ii) the emphasis given to atypical or even unique site-specific signals by some novel reconstruction methods, it is a point of debate within our community, at least implicitly, whether these principles remain valid. This presentation will review several recent studies that illustrate the possible advantages offered by a disregard for the usual 'rules' of dendroclimatology but will also discuss the potential pitfalls of placing too much emphasis on apparently optimal records. We hope this talk will encourage the sharing of ideas on how best to extract climate information from the ever-expanding network of tree-ring records across our planet and help open a discussion on the relevance of our standard theoretical framework to contemporary global dendroclimatology.