



## **Reconstructions of climate over recent millennia: problems and prospects**

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Our perspective on *global* climate variability is extremely limited, due to a very sparse network of paleoclimatic records. Most of the very long-term reconstructions rely on the same data sets which are seasonally biased, geographically limited and have uncertain low frequency characteristics. Major advances in our understanding will require new records—especially from the Tropics and the Southern Hemisphere—and particularly records that retain centennial-scale variability. From the spectrum of potentially useful high resolution proxies, only speleothems, lake and marine sediments, ice cores & a very small number of tree ring records offer *continuous* records that span the last 2000 years (or more), at many possible sites. To make more use of these natural archives of past climate, several improvements are needed: higher resolution sampling and analysis; better calibration of proxy records (aided by process-based *in situ* studies at key sites to provide insight into climate-proxy relationships); duplication of records to minimize noise in the data; more accurate chronologies (e.g. using tephrochronology or TIMS dating where appropriate). New geochemical approaches offer the prospect of additional proxies being obtained from some archives, but careful calibration of these is needed. Although much research has focused on paleotemperature reconstruction, hydrological variability is arguably of more relevance to society and a stronger effort to reconstruct paleohydrological conditions in many regions (including the frequency of extreme events) is needed.