Proxy records with uncertainties on an absolute (true) time scale

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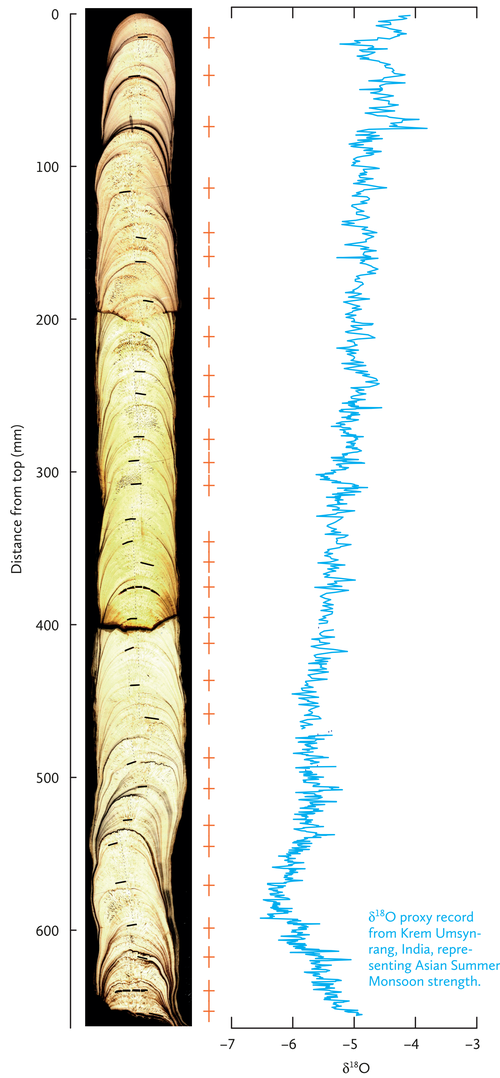
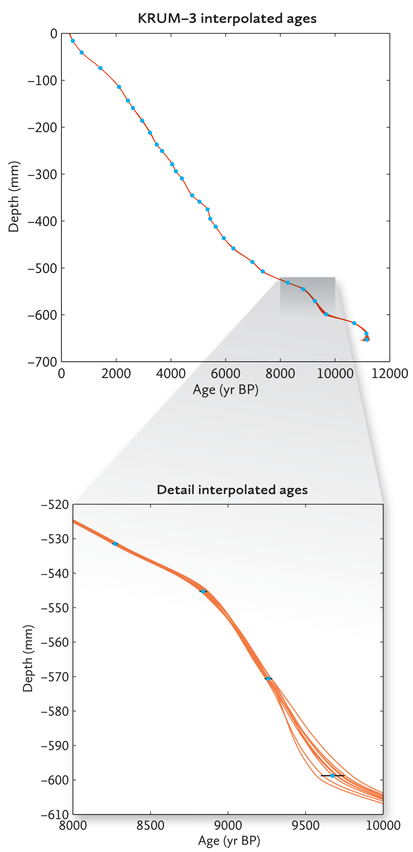
Proxy record with dating



Age-depth model from dating, e.g., U-series dating, with known dating errors.



Uncertainties in dating result in different age-depth relationships.

Transform

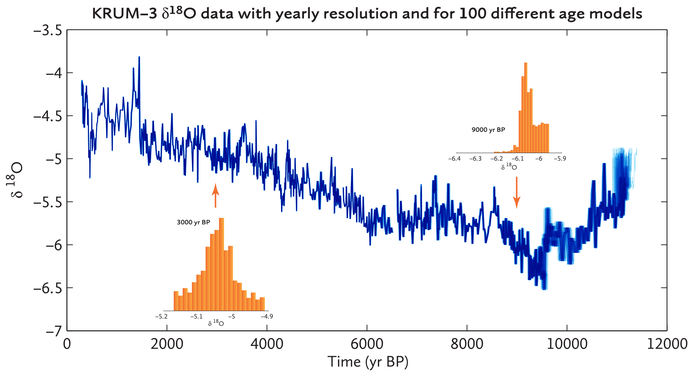
Age distributions for the given proxy values

Monte Carlo simulation
Bayesian approach

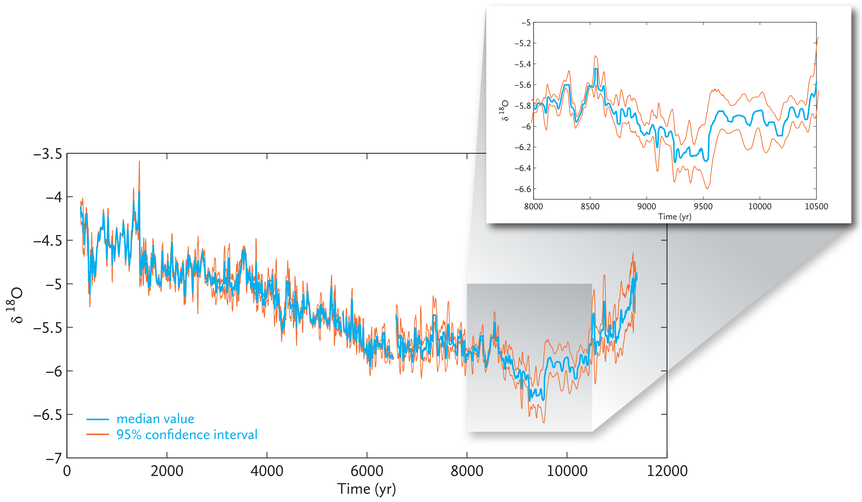
Distributions of the proxy values for a given age

Usually, ages with uncertainties are assigned to the proxy values. However, for comparing different proxy records, their variation has to be compared using an absolute (or true) time scale. Monte Carlo simulation or Bayesian statistics allows the assignement of the most likely proxy values (with their distributions and error margins) to the absolute (true) age.

True ages with proxy values



Ages interpolated to the proxy record using the ensembles of age models; proxy values distribute at a given age.



Proxy values with uncertainties, assigned to an absolute (true) time scale.

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References S. F. M. Breitenbach, K. Rehfeld, B. Goswami, J. Baldini, H. E. Ridley, D. Kennett, K. Prufer, J. Kurths, N. Marwan: COPRA – an approach for constructing proxy-record age models, Climate of the Past, in prep.
S. F. M. Breitenbach, N. Marwan: Acquisition and analysis of grey scale data from stalagmites using ImageJ software, International Journal of Speleology, in rev.