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Science building on synthesis: From standardized palaeoclimate data to climate model evaluation

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Efforts towards standardizing biogeochemical data from palaeoclimate archives such as speleothems, ice cores, corals, trees or marine sediments allow to tackle global-scale changes in palaeoclimate dynamics. These endeavours are sometimes initiated for very specific research questions. One such example is the multi-archive, multi-proxy dataset used in a characterization of changes in temperature variability from the last Glacial Maximum to the current Interglacial [1]. Here, we focused on collecting all published proxy time series for temperature that fulfilled sampling criteria, but we did not include a lot of metadata.

Another, quite prominent, example is the database that grew out of the working group on Speleothem synthesis and analysis (SISAL) in the Past Global Changes (PAGES) network. In its construction, researchers from all over the world collaborated, producing a quality-controlled data product with rich metadata. SISAL v2 [2] contains data from 691 speleothem records published over the decades, for more than 500 standardized age models were established. The design and data collection in the community allowed to draw together metadata and observations to reproduce the age modeling process of individual studies. This database has a rich set of purposes, ranging from the evaluation of monsoon dynamics, to that of isotope-enabled climate models [3].

Contrasting these two approaches I will discuss the challenges arising when multiple proxies, archives, modeling purposes and community standards need to be considered. I argue that careful design of standardized data products allows for a new type of geoscience work, further catalyzed by digitization, forming a basis for tackling future-relevant palaeoclimatic and palaeoenvironmental questions at the global scale.

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