Beyond paleoclimate ping pong

Nils Weitzel¹, C. Brierley², J. Bühler², M. Chevalier³, B. Ellerhoff³, V. Skiba⁴ and K. Rehfeld¹,⁵

Heidelberg, Germany, and online, 5-7 July 2021

A key question of the paleoclimate community is how paleoclimate data can be used to evaluate long-term predictability in climate models. How can we improve estimates of past climate variability and our understanding of the state and timescale dependency of Earth’s climate? “Ping pong” serves as a metaphor to describe the back-and-forth in comparing paleoclimate data with model simulations. This is a core challenge in climate research, which requires a better understanding of proxies as well as the consequences of neglected or poorly simulated processes in climate models.

To address this question, this Climate Variability Across Scales (CVAS; pastglobalchanges.org/cvas) workshop (pastglobalchanges.org/calendar/26970) brought together a diverse pool of ~60 scientists, ranging from early-career scientists to experienced experts from various fields and different working groups, including CVAS, Speleothem Isotopes Synthesis and Analysis (SISAL; pastglobalchanges.org/sisal), 2k Network (pastglobalchanges.org/2k), and the PAGES-endorsed Paleoclimate Modelling Intercomparison Project (PMIP; pmip.lsce.ipsl.fr). One half participated online and the other half gathered at the “Internationales Wissenschaftsforum” in Heidelberg, Germany. Keynote talks focused on the spatial correlation structures in reported agreement of global mean temperature variability in models and proxies on decadal-to-centennial scales (e.g. Neukom et al. 2019), whereas reconstructed local surface temperature variability is higher than in simulations (e.g. Laepple and Huybers 2014). The group reviewed the literature, with a focus on the spatial and temporal scales of interest. Finally, the group collected and assessed potential reasons to explain the conundrum, including effects from an overestimation of spatially uncorrelated variability in temperature reconstructions, misspecification of the spatial correlation structures in models, and the suppression of variability by climate field reconstruction methods. The group plans to expand the literature review and develop research protocols to quantify the contributions of identified potential explanations.

For most participants, the workshop was the first experience with a hybrid conference format, and the feedback was quite positive. We emphasize the importance of an appropriate technical infrastructure on site and the prior set-up of a clear workshop structure. The use of a virtual communication platform and shared working documents helped to connect virtual and on-site participants.

AFFILIATIONS
¹Institute of Environmental Physics, Heidelberg University, Germany
²Department of Geography, University College London, UK
³Institute für Geowissenschaften, University of Bonn, Germany
⁴Potsdam Institute for Climate Impact Research, Germany
⁵Geo- and Umweltforschungszentrum, Tübingen University

CONTACT
Nils Weitzel: nweitzel@iup.uni-heidelberg.de

REFERENCES
Bührer J et al. (2021) Clim Past 17: 985-1004
Comas-Bru L et al. (2020) Earth Syst Sci Data 12: 2579-2606
Konecky BL et al. (2019) Earth Syst Sci Data 12: 2261-2288
Laepple T, Huybers P (2014) Proc Natl Acad Sci USA 111: 16682-16687
Neukom R et al. (2019) Nat Geosci 12: 643-649
PAGES2k Consortium (2017) Sci Data 4: 170088

Figure 1: Key components and challenges of data-model comparison. The relevant tools, variables, intercomparison projects, and challenges (in orange) are illustrated with respect to the targeted time ranges. The workshop specifically addressed the overarching question of how paleoclimatology can contribute to solving research questions on future climate scenarios.