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What should the research questions and priorities in paleoscience be for the next ten years?

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Global Challenges for our Common Future: a paleoscience perspective

The vision of the future of paleoscience shared by PhD students and postdocs who attended PAGES 3rd Young Scientists Meeting (YSM) in May 2017 centered on five key elements: interdisciplinarity, accessibility, creativity, innovation and progress. All of the top research questions identified could be traced back to these principles and reflected the group's desire for the field of paleoscience and its community to be barrier-free, engaging and strengthened by international partnerships.

Interdisciplinarity was mentioned frequently during group discussions. Many participants asked: how can I combine my research with someone's work from another field to solve a problem important to paleoscience? How can I build or strengthen collaborations with ecologists, social scientists or statisticians outside of the paleo community? Many participants expressed the need to avoid reinventing the wheel when it came to data analysis. Interdisciplinarity was of particular interest to participants struggling with data-model comparisons. The participants insisted on the importance of combining skills and academic disciplines.

Accessibility was often discussed, but in more ways than one. First, paleo research needs to be more accessible to the general public, and results communicated in a way that is inviting, easy to understand and consistent. The big question was: how best can we accomplish this? How do we get the public and policymakers more interested in our work? How do we highlight the importance of paleo research in the media? Put simply, we need to strengthen the link between science, policy, media, and the public. Second, paleo research needs to be more accessible to paleoscientists! We are all working towards a common goal and proper data sharing needs to be a priority. Initiatives like the PAGES Interactive Activity on Data Stewardship, the Coalition for Publishing Data in the Earth and Space Sciences (COPDESS), open-access journals like *Scientific Data* and *Open Quaternary*, and global databases like the Canadian Archaeological Radiocarbon Database (CARD) and the Global Charcoal Database (GCD) are helping to make this possible. Third, paleoscience needs to be integrated into high school curricula. High school graduates can no longer begin university without a basic knowledge of the evolution of the Earth system and the ways paleo data can inform predictions of the future.

Fortunately, participants where not afraid to express their *creative* side and admit that paleoscience is and should be portrayed as a fun endeavor! After all, curiosity is a feeling that connects all humans regardless of whether or not they are academics. Therefore, we owe it to ourselves and our peers to continuously ask ourselves: how can I pique the interest of someone not as excited about the topic as I am? Among the most popular suggestions were creating apps where paleo data could be viewed and 'played' with, and taking a friend or fellow scientist out for a "pint of knowledge" to discuss research in a general way. Creativity powers science, thus the group proposed that creative thinking should be both a personal and collective priority over the next ten years.

With creativity comes *innovation*. Many discussions focused on innovative research topics, including geogenomics, pollen sensitivity to ultraviolet light, ancient DNA, and multiproxy reconstructions, and their importance to the evolution of paleoscience over the next ten years. Participants agreed that the next suite of innovative projects would likely require state-of-the-art methods and multidimensional thinking. The most pressing questions seemed to be: are Bayesian methods preferable to the Frequentist approach for paleo data analysis? How do we address no-analogue climates and communities? How can we better incorporate sophisticated statistical and spatiotemporal models in the paleosciences and correct for factors like topography and altitude? How can we better integrate the Northern and Southern Hemispheres?

The discussion culminated in a unanimous desire to drive and maintain *progress* in the field of paleoscience. This progress should include increased high-resolution climate records from all hemispheres, improved climate sensitivity and time uncertainty studies, refined paleo data-model comparisons, linking marine and terrestrial datasets, identifying and amassing data from key regions currently lacking data, and an overall interdisciplinary approach. The next generation of researchers should combine their expertize, foster successful partnerships at home and abroad, and collectively work towards advancing the field of paleoscience.

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What issues will the paleoscience community be focusing on during the next ten years?

