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## **(Paleo)climate science for the 21st century**

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Records of past climate trends, variability, and extremes hold key insights into Earth's changing climate, yet their full potential will remain untapped without a concerted effort to surmount several critical challenges, some time-sensitive. In a century defined by accelerating climate change and human disturbance, the climate archive itself is at grave risk given that i) many paleoclimate records end in the late 20<sup>th</sup> century, with no concerted effort to extend them to the present-day, and ii) many paleoclimate archives are disappearing under pressure from climate change and/or human disturbance. Second, many paleoclimate records are comprised of oxygen isotopes, yet the coordinated, multi-scale observational and modeling infrastructures required to unravel the mechanisms governing water isotope variability are as yet underdeveloped. This dramatic oversight exists despite development of technologies that avoid costly analysis via mass spectrometers, and despite the fact that water isotopes may very well be one of the most powerful diagnostic tracers of a changing global water cycle. Lastly, in part owing to the aforementioned deficiencies, paleoclimate data assimilation efforts remain fraught with large uncertainties, despite their promise in constraining many of the most uncertain aspects of future climate impacts, including the evolution of extreme events and hydrological trends and variability. Climate science for the 21<sup>st</sup> century requires deep investments in the full integration of paleoclimate data and approaches into frameworks for climate risk and hazard assessments. In this sense, it is not surprising that paleoclimate scientists have played a key role in the communication of climate change science to decision-makers and the general public alike. Their understanding of the Earth system also equips them to contribute valuable insights to teams comprised of researchers, practitioners, and decision-makers charged with leveraging science to inform solutions, in service to society. It's time to recognize that all climate scientists study climate of the past, and all paleoclimate scientists have insights that are relevant to our climate future.