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Reconstruction of environmental and climatic change during the late Pliocene and early Pleistocene in northwestern North America based on a new drill core from paleo-Lake Idaho

Frederik Allstädt[1], Andreas Koutsodendris[1], Erwin Appel[2], Wolfgang Rösler[2], Alexander Prokopenko[3], Tammo Reichgelt[4], and Jörg Pross[1]

[1]Institute of Earth Sciences, Ruprecht-Karls-Universität Heidelberg, Heidelberg, Germany (frederik.allstaedt@geow.uni-heidelberg.de)

[2]Department of Geosciences, University of Tübingen, Tübingen, Germany

[3]Institute of Geology and Mineralogy, University of Cologne, Cologne, Germany

[4]Department of Geosciences, University of Connecticut, Storrs, CT 06269, United States of America

The Pliocene to early Pleistocene yields a close analogy to near-future climate, with atmospheric pCO_2 between pre-industrial and anthropogenically perturbed levels as they may be reached in few decades. A sedimentary archive that is well suited to study Plio-Pleistocene climate dynamics in the terrestrial realm has recently become available through the ICDP-sponsored HOTSPOT project on the evolution of the Snake River Plain (Idaho, USA). At the Mountain Home site, HOTSPOT drilling has yielded the MHAFB11 core that comprises 635 m of fine-grained lacustrine sediments (Shervais et al. 2013). Based on the yet available paleomagnetic age control, these sediments span from the late Pliocene to the early Pleistocene, which makes them the first archive in continental North America that covers this time interval at one site. Based on their geographic position, the sediments from paleo-Lake Idaho can contribute to a better understanding of climate variability across the Plio-Pleistocene transition in western North America, notably with respect to the hypothesis that enhanced moisture transport into the higher latitudes of North America from ~2.7 Ma onwards allowed the initiation of Northern Hemisphere glaciation (Haug et al., 2005).

To gain insight into the paleoclimatic evolution of northwestern North America during the late Pliocene to early Pleistocene, we have palynologically analyzed 131 samples from the 732–439 m depth interval (corresponding to an age of ~2.8 to ~2 Ma) of the MHAFB11 core. The obtained palynological dataset, which has a mean temporal resolution of ~7 ka, documents that a *Pinus*-dominated coniferous forest biome prevailed in the catchment area of paleo-Lake Idaho throughout the study interval. However, percentages of pollen from conifer taxa decrease in the latest Pliocene before reaching consistently lower values in the early Pleistocene at ~2.4 Ma. In contrast, pollen taxa representing an open vegetation (e.g., *Artemisia*, Asteraceae) and deciduous trees (e.g., *Quercus*, *Betula* and *Alnus*) become increasingly abundant in the early Pleistocene (at ~2.4 Ma). We interpret this vegetation shift to an open mixed conifer/deciduous forest to be caused by wetter climate conditions. This interpretation is supported by quantitative climate estimates, which show a gradual increase in mean annual precipitation in the early Pleistocene.

This trend towards wetter conditions supports the notion that enhanced moisture transport to northern North America from the subarctic Pacific Ocean contributed to the onset of Northern Hemisphere glaciation at ~2.7 Ma (Haug et al., 2005).

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