Paleoclimatic and Hydrologic Changes in the Dry Valleys of Antarctica

THE UNIVERSITY OF MAINE
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Lakes in the Dry Valleys of Antartica have fluctuated dramatically over the past 30,000 years

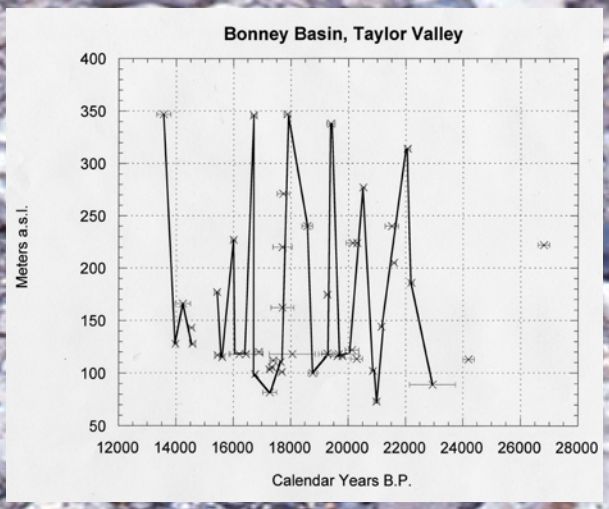
Map showing past (light blue) and present (dark blue) locations of Dry Valley lakes.

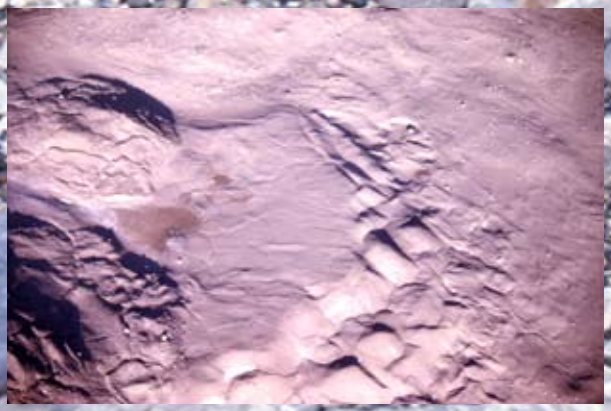
Our work from the Dry Valleys of Antarctica

indicates order-of-magnitude variations in the area and volume of closed-basin lakes on a millennial timescale. Major changes in water level point to climate and hydrologic conditions vastly different from those of today. The paleoclimate record derived from these water-level fluctuations will be used to test hypotheses of the global synchrony of climate change and, ultimately, the cause of ice ages.

Main Discoveries

- During the height of the last glaciation, the Dry Valleys were filled with lakes that were up to forty times larger than those that exist today.
- These lakes fluctuated hundreds of meters on a millennial timescale.
- A significantly different climate and hydrologic regime existed in the Dry Valleys during times of global cooling. The cause for this is still under examination, but may relate to alteration in the location of storm tracks in the Ross Sea region.





Lake-level changes are derived from radiocarbon-dated ancient deltas and shorelines that are perched on the valley walls, well above the levels of the present-day lakes. Over two hundred and fifty dates from such features constrain lake-level curves for four basins.

Our work on lakes also has contributed to the discovery (with Dr. C. Hendy) of the lake-ice conveyor - a mechanism by which glacial debris can be transported on the surface of a perennially ice-covered proglacial lake far beyond the glacier grounding line. This discovery has led to the reinterpretation of the surficial geology of the eastern Dry Valleys.

Water-level fluctuations for Lake Bonney (Top)

Aerial view of 8000-yr-old delta in Wright Valley (Bottom)

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