# Antarctic Dry Valleys haven't always been dry, study suggests

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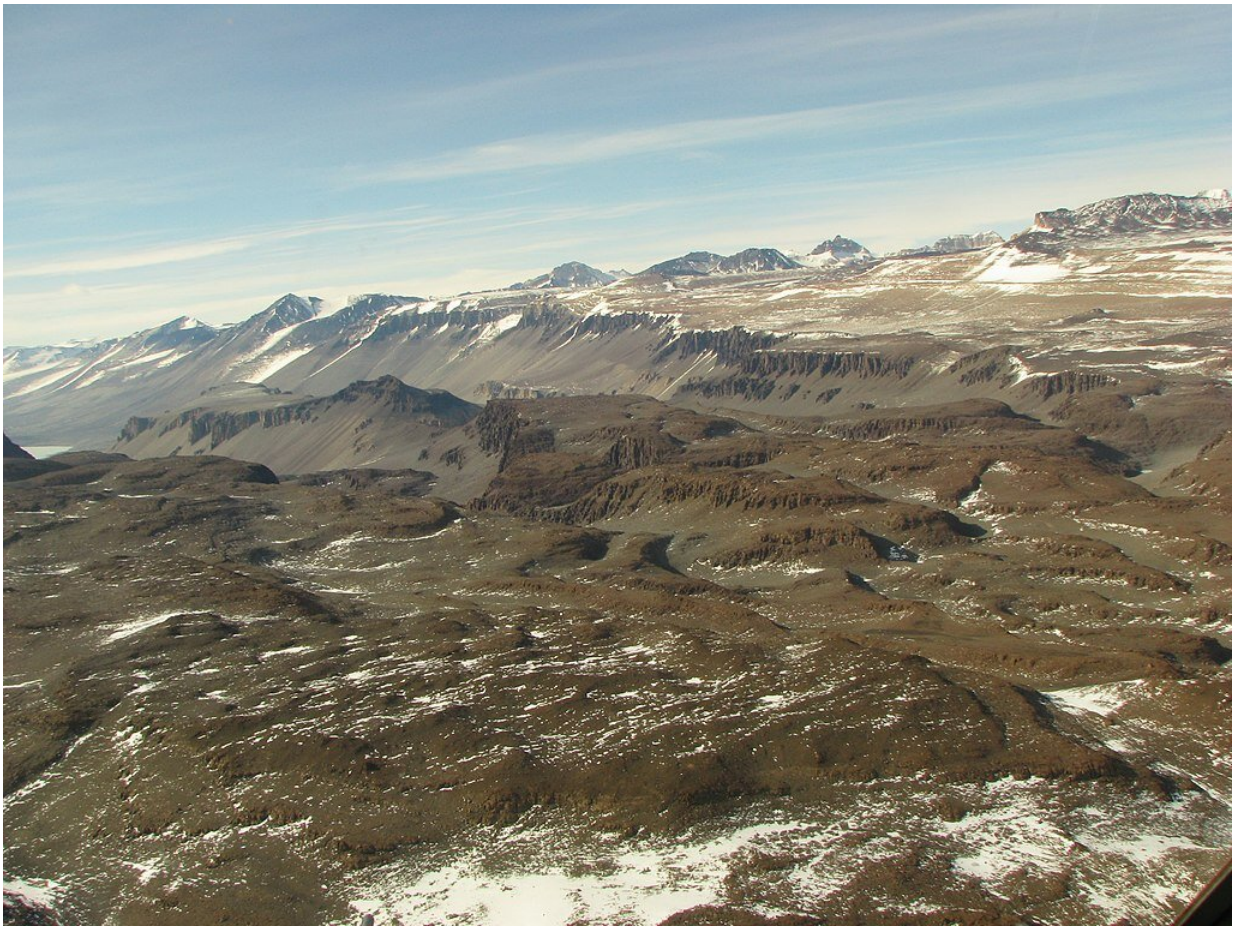

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When were the Dry Valleys of Antarctica last wet?

It's a question that's long puzzled Antarctic researchers, but Te Herenga Waka—Victoria University of Wellington adjunct lecturer Dr. Marjolaine Verret may now have the answer.

"Past data has shown with certainty that the mountains around the McMurdo Valleys held life until 14 million years ago. But we now have evidence that liquid water, the base requirement for life, persisted there for much, much longer—up to about six million years ago."

Dr. Verret holds a Ph.D. in Permafrost Geochemistry completed at Te Herenga Waka—Victoria University of Wellington's Antarctic Research Centre (ARC), supervised by the ARC's Dr. Warren Dickinson.

"Today, the high elevations of the McMurdo Dry Valleys are among the most inhospitable environments on Earth. But they were once warm and wet enough to support liverworts, mosses, and shrubby trees," Dr. Verret says.

In a paper published in *Nature Geoscience*, Dr. Verret explains how studying concentrations of beryllium-10 has enabled scientists to date when the Valleys last held water.

"Meteoric beryllium-10 is formed in the upper atmosphere and delivered to the surface of the Earth through rain. So we analyzed concentrations of this chemical in 64 samples collected from 10 different boreholes in the Dry Valleys."

Previous studies suggest the Dry Valleys began cooling during the Middle Miocene Climate Transition about 15 million years ago, with plant life disappearing entirely approximately one million years later. From that time onwards it was thought that the high regions of the Dry Valleys remained permanently frozen and arid until the present day.

"Our study provides strong evidence that the climate in the Valleys did not remain stable during this time. We found that water infiltrated the ground until the late Miocene, much later than previously suggested, and the Valleys shifted in intervals between a warm-wet climate and the dry polar aridity we recognize today."

"Determining when this landscape became arid is critical to our understanding of the response of glacial systems in Antarctica to changes in surface temperatures. Most importantly, this finding implies the McMurdo Dry Valleys are not a landscape frozen in time—they are much more susceptible to climate change than previously anticipated."

The samples used in Dr. Verret's research were collected as part of the Friis Hills Drilling Project, led by the ARC's Professors Richard Levy and Tim Naish, GNS Science, and supported by Antarctica NZ.

The team collected sediment cores from three locations in the Friis Hills, that were then wrapped and stored in ice-core boxes, before being transported to a "freezer lab" at Scott Base where they were X-rayed. All cores were later shipped to and re-examined at an ice-core facility at GNS Science.

Professor Levy, who is also the Environment and Climate theme leader at GNS, says the research is the result of the significant long-term collaboration between GNS, Te Herenga Waka, and Antarctica NZ.

"The cores we drilled on the summit of Friis Hills contain valuable insights into the past. Dr. Verret's findings underscore how the ongoing examination of these frozen rocks can help guide and inform our future."

Dr. Verret agrees. "Science in Antarctica is all about collaboration, and as such, our finding is an added piece to the complex puzzle about

climate evolution in Antarctica."

**More information:** Marjolaine Verret et al, Late Miocene onset of hyper-aridity in East Antarctica indicated by meteoric beryllium-10 in permafrost, *Nature Geoscience* (2023). DOI: 10.1038/s41561-023-01193-4

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