

Oral traditions and volcanic eruptions in Australia

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Lake Surprise, Budj Bim Volcanic Complex, Victoria, Australia. Credit: Creative Commons.

In Australia, the onset of human occupation (about 65,000 years?) and dispersion across the continent are the subjects of intense debate and are critical to understanding global human migration routes. A lack of ceramic artifacts and permanent structures has resulted in a scarcity of dateable archaeological sites older than about 10,000 years.

Existing age constraints are derived largely from radiocarbon dating of charcoal and/or optically stimulated luminescence (OSL) dating of quartz grains in rock shelter sediments, and there is a need for independent age constraints to test more controversial ages. In southeastern Australia, only six sites (located in Tasmania, New South Wales, and South Australia) older than 30,000 years are considered definitively dated by ^{14}C and/or OSL methods, with ages spanning 37,000-50,000 years.

The strong oral traditions of Australian Aboriginal peoples have enabled perpetuation of ecological knowledge across many generations and can likely provide additional archeological insights. Some surviving traditions allude to different geological events, such as [volcanic eruptions](#), earthquakes, and meteorite impacts. It has been proposed that some of these traditions may have been transmitted for thousands of years.

The Newer Volcanic Province of southeastern Australia contains over 400 basaltic eruption centers, a number of which are thought to have erupted within the last 100,000 years, although precise ages remain elusive for most. Technological improvements over the last decade have firmly established applicability of the $^{40}\text{Ar}/^{39}\text{Ar}$ dating technique (which relies on the natural radioactive decay of ^{40}K in minerals) to archeological timescales, enabling many of these younger volcanoes to be dated by this method.

Rare reported occurrences of archaeological evidence beneath volcanic

ash deposits and [lava flows](#), and the longevity of Aboriginal oral histories, presents an opportunity for novel investigation into the timing of human occupation of this region. In particular, oral traditions surrounding the Budj Bim Volcanic Complex (previously Mount Eccles) in western Victoria have been interpreted to reference volcanic activity.

This new study published in *Geology* presents a new $^{40}\text{Ar}/^{39}\text{Ar}$ eruption age of $36,900 \pm 3,100$ thousand years for the Budj Bim Volcanic Complex and an age of $36,800 \pm 3,800$ thousand years for the nearby Tower Hill Volcanic Complex; the latter is of archaeological significance due to the historical discovery of a stone axe from a sequence of volcanic ash deposits.

These ages fall within the range of ^{14}C and OSL ages reported for the six earliest known occupation sites in southeastern Australia. The age of Tower Hill directly represents the minimum age for human presence in Victoria. If oral traditions surrounding Budj Bim do indeed reference [volcanic activity](#), this could mean that these are some of the longest-lived [oral traditions](#) in the world.

More information: Erin L. Matchan et al, Early human occupation of southeastern Australia: New insights from $^{40}\text{Ar}/^{39}\text{Ar}$ dating of young volcanoes, *Geology* (2020). [DOI: 10.1130/G47166.1](https://doi.org/10.1130/G47166.1)

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