

Exploration of Ice Caves on Mauna Loa, Hawaii

Andreas Pflitsch¹, Norbert Schörghofer², Stephen Smith³

Abstract: The Mauna Loa shield volcano, one of two high summits on the Big Island of Hawaii (20°N), has a high density of lava tubes and mean annual temperatures are well above freezing. We have visited and surveyed two ice caves on the north flank of Mauna Loa.

One of the caves is known as “Mauna Loa Ice Cave” since at least 1979. We re-located and visited this cave in November 2011 and found that the ice is still present, but has retreated.

Another ice cave has been discovered in 2009 by Stephen Smith, and is named “Arsia Cave”. Two side passages within this lava tube have frozen lakes. One of the ice chambers has a ~2 m high ice stalagmite. Water drips from the ceiling and freezes in the ponds, which contain large bubbles. The discrete levels of the bubbles suggest the ice is layered. Although we could not directly measure the depth of the ice lakes, we estimate it to be up to several meters.

All of the ice caves are of “ice cellar” type; the lava tube leads downward from a single entrance. The caves are at ~3'400 m and ~3'600 m elevation, respectively, still ~700 m below the summit. The lava flows they are in are 0.2 ka–1.5 ka old, which represents a maximum age for the ice.

The massive ice lakes may contain a climate record, and, given the lack of other century-scale paleoclimate records in the Pacific, they are potentially extremely valuable scientifically. Moreover, the ice caves on Mauna Loa are the world's most isolated ice caves, and thus interesting in terms of microbial communities. We have begun monitoring air temperature and humidity and will continue to characterize the field sites physically and climatologically in upcoming field work.

* * *

¹ Department of Geography, Ruhr-University Bochum, 44780 Bochum, Germany (andreas.pflitsch@rub.de)

² NASA Astrobiology Institute, University of Hawaii, Honolulu, Hawaii 96822, USA (norbert@hawaii.edu)

³ Cave Conservancy of Hawaii, Hilo, Hawaii, USA (amygdala1881@yahoo.com)