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Climatologic research in the lava tubes on Big Island (HI)

Abstract

Cave ecology is the main reason to investigate cave climatology inside lava tubes (pyroducts). Organisms living there are highly specialized and adapted to the conditions, which is why even small changes (for example induced by anthropogenic interventions) can decimate entire species. In this context, the insularity of Hawai'i is especially important since it allows isolated observations of fauna and flora. Hawaiian pyroducts now provide a research area for numerous sciences. Lacking solar radiation and the relatively constant temperatures underground create conditions well suited to preserving archaeological findings over a long time. The same is true for cave deposits (e.g., cave ice) which can be used in paleo-climatological studies since they can be found inside Hawaiian pyroducts as well.

However, only little is known about the climatic conditions inside lava caves – distinctly less than about similar processes in karst caves. The speleo-climatological research done in Hawai'i addresses this deficit.

As classic primary caves with a comparably short genesis, lava tubes differ clearly from caves developing slowly through dissolution processes. Both types show further distinctive features, e.g., the surrounding bedrock, the covering and entrance structures. Therefore, it is to be expected that there is a notable difference between both the short-term meteorological processes and the climatic characteristics of both cave types.

Presumably, the available results of climate measurements in karst caves can only partly be transferred to lava caves. To close this gap, the research center 'AKEAKAMAI' was founded in 2013 on Big Island, Hawai'i, in order to investigate the meteorological and climatic conditions inside lava caves.

First measurements, however, started as early as 2011 on the Mauna Loa – meanwhile, a measurement series is available for the last four years. During the following years, further measurements were added to the program. Within the scope of the presentation, the different measurements will be presented as well as some first results.