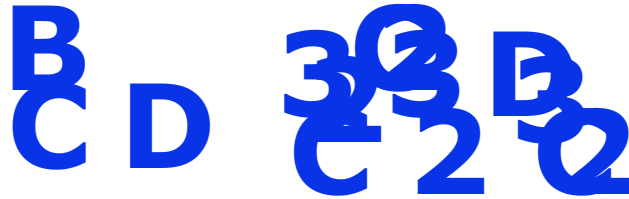


Depa

University of Hawai'i at Mānoa
2525 Correa Road, HIG 350; Honolulu, HI 96822 956-8775

Dr. Norbert Schörghofer

Associate Astronomer
Institute for Astronomy
University of Hawai'i at Mānoa



Abstract:

The upper slopes of Hawaii's tallest volcanoes, Maunakea and Maunaloa, are stone deserts where annual mean temperatures are well above freezing. Due to microclimates, perennial ice is found in a few exceptional craters and caves. Here, we explore the microclimates of cinder cone craters on Maunakea and of lava tubes on Maunaloa. Electrical Resistivity Tomography and Ground Penetrating Radar surveys reveal that two ice bodies are still present on Maunakea, but one has retreated in volume by an order of magnitude between 1973 and 2015. Cold air occasionally pools in the two craters with permafrost and is responsible for the lowest temperature ever measured in Hawaii (-20°C), but this phenomenon is not frequent enough to significantly affect annual mean temperatures. On the other hand, nocturnal cold air entrained between boulders might play a significant role in cooling the surface. We have also reconstructed the history of snow cover from historical records, and identified recent time periods when the permafrost may still have been in equilibrium with the climate. In terms of annual mean temperature, the coldest (-0.7°C) was measured at the distal end of a spectacular cave on Maunaloa. The cooling mechanism at this ice cave involves a multi-stage process. These ice reservoirs have also begun to degrade.