



Permafrost on tropical Maunakea volcano, Hawaii

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Maunakea volcano on Hawaii Island is known for one of the most unusual occurrences of sporadic permafrost. It was first documented in two cinder cone craters in the 1970's near the summit of the mountain where mean annual air temperatures are currently around +4 deg. Our study investigates the current state of this permafrost, by acquiring multi-year ground temperature data and by applying electrical resistivity tomography and ground penetrating radar techniques along several survey lines. Both of the previously known ice bodies still exist, but one of them has dramatically shrunken in volume. Based on current warming trends it might disappear soon. In addition insolation modelling, temperature probing, and geomorphological indicators were used to prospect for additional permafrost bodies on the wider summit region, however, none was found. It seems that permafrost preferentially appears in the interiors of cinder cones, even though there are exterior slopes that receive less sunlight annually. We hypothesis that snow cover with its high albedo, and a layer of coarse boulders where cold air settles in the pore space during calm nights, play a significant role in cooling the subsurface. Due to the relatively simple setting, the study site is an ideal model system and may also serve as an analogue to Mars.