PISCES' Lunar & Planetary Analogue Sites Catalogue. M. Adams[1,2] and C. Andersen[1,2],
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Introduction: The Island of Hawaii has long been recognized as a terrestrial analog for the Moon and Mars. [1] The recent discoveries of lava tubes, skylights, and pit craters on the Moon and Mars have increased Hawaii's potential as a premier terrestrial test site.

In 2008 and 2010, PISCES hosted NASA and CSA tests at Pu`u Haiwahine on Mauna Kea, Hawaii. In 2012, PISCES hosted the NASA MMAMA and RESOVLE field tests at Pu'u Hawahine and "Apollo Valley" on Mauna Kea. Though these two sites are well-known and have been used extensively in the lunar and planetary sciences community, there is a dearth of knowledge regarding other potential sites and their characteristics.

Site Characterization: In the summer of 2013, PISCES assembled its first cohort of interns to identify and characterize potential analogue sites. The cohort consisted of a geologist, environmental scientist, geographer/GIS, and a physics/astronomy student.

The second cohort, in the summer of 2014, continued the identification and characterization of analogue sites. This second cohort consisted of 4 geologists, an archaeologist, and a civil and environmental engineer.

Visual site evaluations for the variety of analog sites present on the island of Hawai`i are necessary for establishing ground truth and comparisons to orbital surface data. Both cohorts were tasked with assessing the accessibility, physical, geological, and ecological aspects of each analog site.

Accessibility. Accessibility information gathered for sites addressed logistic issues that included: the type of land use district; land ownership; proximity to food, gas, and lodging; maximum supportable field test size; and the ease of ingress and egress to the site.

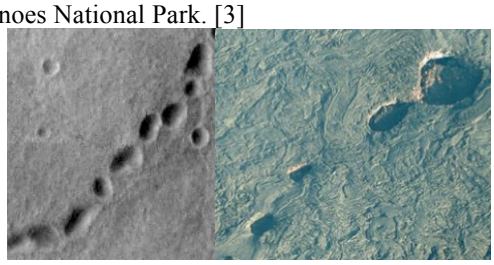
Physical characterizations. Physical characterization included data on altitude measurements, global positions of the areas with accompanying gps tagged photos, average & localized incline measurements, and percentages.

Ecological characterizations. Vegetation maps of local flora and fauna were generated with a focus on identification of indigenous and invasive plants. Culturally sensitive archeological sites and artifacts were also taken into consideration.

Geologic characterizations. Geologic characterization included assessing the mineralogy, geomorphology, and petrology of each site.

Lava tubes, skylights, and subsidence pits: Recent discoveries made by LRO and MRO confirmed the existence of features that resemble lava tubes, skylights, and subsidence pits on Mars and on the Moon. These features have produced new areas of interest and the need for data that will allow for new types of exploratory technologies. Hawai`i offers high-fidelity science analog sites to these features.

Lava tubes and skylights. Lava tubes form when channelized lava flows crust over and continue to flow within the newly covered channel. The continued supply of magma causes the downward erosion of the regolith below the original channel creating tube like structures. Subsequently skylights form when parts of the lava tube ceiling collapses in on itself and expose the interior. The image below on the left is from MO/THEMIS shows a series of subsidence pits and skylights. [2] The Bing image on the right shows a series of skylights on Mauna Iki located in Hawaii Volcanoes National Park. [3]



Subsidence craters. Subsidence craters form when dikes that are filled with magma drain and leave unsupported voids which collapses and forms pits.

The picture below on the left, generated by HiRISE camera, captured the image of a subsidence pit on Tractus Fosseaon, Mars. [4] The image on the right is of twin subsidence pits located in Hawaii Volcanoes National Park. [5] Both structures have similar features and volcanic terrains.

References: [1] Greeley, R. (1974) *GEOLOGIC GUIDE TO THE ISLAND OF HAWAII. A Field Guide*

for Comparative Planetary Geology. [2] "Lava Tube Collapse Pits." *Mars Odyssey Mission THEMIS*. N.p., n.d. [3] "Bing Maps." *Bing Maps*. N.p., n.d. Web. [4] "HiRISE | Collapse Pit in Tractus Fossae (ESP_011386_2065)." *HiRISE | Collapse Pit in Tractus Fossae (ESP_011386_2065)*. N.p., n.d. Web. [5] "Bing Maps." *Bing Maps*. N.p., n.d. Web.