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MARS UNDERGROUND: A LANDSCAPE STRATEGY FOR LONG TERM HUMAN COLONIES ON
THE RED PLANET.

Abstract

On Mars, observations and researches have evidenced the presence of underground conduits of volcanic origin known as “pyroducts” or “lava tubes”, which are also present on Earth and Moon. Despite the highly astrobiological and geological importance, evidenced by numerous studies, channelled underground conduits enjoy little consideration by space architecture literature, if compared to the great amount of designs that have been proposed for its surface. After Earth, Mars is the only planet in the solar system which is known to have had a more benign past in which lifeforms may have existed: this condition makes of it a primary location for questioning the origin of life in the known Cosmos. Nowadays, the Red Planet is a arid and desert place where high radiations, micrometeorites impacts, frigid temperatures and other hazards make its surface inhabitable, if not under heavy shielding. On the other hand, underground environments as lava tubes provide a space that is already protected from these harsh and extreme conditions. Because of the different gravitational acceleration on the planet they are bigger in sizes than they are on Earth. This paper aims to offer lava tubes as an alternative for the location of the habitats of long term colonies on Mars, making the best use of its available resources. This objective is reached with a methodology which merges large scale remote sensing for the individuation of potential sites and available resources and local exploration to confirm a site and collect the resources. With the informations acquired, a colony design proposal is elaborated through the reinterpretation of Earth vernacular architecture with innovative technologies. Benefits of Mars exploration and of the terrestrial application of space technologies and paradigms are also discussed.