Paper ID: 71124
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25th IAA SYMPOSIUM ON HUMAN EXPLORATION OF THE SOLAR SYSTEM (A5)
Interactive Presentations - 25th IAA SYMPOSIUM ON HUMAN EXPLORATION OF THE SOLAR SYSTEM (IP)

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DEVELOPMENT FRAMEWORK FOR MARTIAN INFRASTRUCTURE WITHIN PLANETARY RESOURCES

Abstract

Mars has always been a subject of exploration for humanity, and numerous space organizations have long wished to build human bases on the Martian surface and emerge as a multi-planetary species. This scholarly article lays forth a thorough plan for establishing a human base on Mars utilizing existing resources and energy systems. The Odyssey orbiter, which was launched in 2001 with the purpose of identifying signs of possible water, discovered that martian surface is dominant by more than 35% of basalt, a type of igneous rock generated by the cooling of lava, is rich in magnesium and iron and has qualities such as high flexural strength and non-corrosive nature. However, comparable to Martian soil, research is being conducted to characterize diverse basalt compositions from Mars must be completed in order to gain a better understanding of its utility in the Martian environment We discovered that the concrete mixture used to make the basalt rocks are made of Martian regolith and molten sulfur, and that it has higher strengths and is more practicable for construction on Mars under atmospheric pressure and temperature. Metals and alloys provide a backbone structure for the assembly of base components. Magnesium, iron, and aluminum are potential metals that could be employed to offer additional strength due to their abundance and mechanical properties. Because Mars' thin atmosphere makes it difficult to convey heat from solar radiation by atmospheric movement, calibrated methods were developed to carry out these tasks with minimal resources, including in-situ energy solutions while the surface temperature is significantly higher, resulting in temperature disparities and the requirement for in-situ energy measures. Another technique of creating a sustainable energy source for infrastructure improvement is the isotopic thermoelectric generation, which converts radioisotope decay heat into electricity with a possible energy quality ratio and a long life that is not affected by external forces on Mars' surface. This research would help current Mars missions by offering a boost and assisting in the development of bases with limited resources and raw materials on the planet.