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LUNAR LAVA TUBE EXPLORATION: FINDING THE SETTLEMENTS FOR FUTURE SMALL-SIZE  
CREW MISSION

**Abstract**

With the deepening study of the moon in the past decade, lunar lava tube have been debated to be an ideal location for lunar base due to its thermostatic environment and the nature advantage in radiation protection. For short-term human missions, some small lava tube caves can be selected as temporary settlements for the crew. This article analyzed such lunar lava tubes in terms of site selection, accessibility, security, mission support, and resource allocation. In addition, early unmanned exploration mission methods were proposed to find such lunar lava tube settlements. Three methods were discussed: orbital detection, in-situ detection and entry exploration. From recent studies, different entrance characteristics of lunar lava tubes were found. Three entry methods were planned for future lunar cave entry missions: vertical entry, mobile entry, and flying entry. A case study of a lava tube with special inclined entrance in the Central Mare Fecunditatis region was presented.