

Mars Developing Radiation-proof Innovative Lava-tube Living (DRILL) Mission 2025-2026

Background

Previous Mars missions have established the existence of natural Martian caves and tunnels from ancient lava flows. *Skylights*, or holes, in the ceilings of these caves and “lava tubes” are visible from orbit.

Research shows these underground caves and tunnels offer a potentially advantageous place to establish a large Martian colony. These underground lava tubes provide natural radiation shielding, which is a big plus on Mars. Caves could be pressurized with oxygen and nitrogen to make a breathable environment in which to live and work. Subsurface geothermal activity might provide heat, and possibly underground liquid water!

Using existing “drilling machine” underground tunneling technology, we can expand natural lava-tube cave systems to better meet our working and living space requirements.

This Year’s Mission Objective

This year, Mission to Mars scientists are embarking on the 2025-2026 Mars **Developing Radiation-proof Innovative Lava-tube Living (DRILL) Mission**. Student scientists securing “Strong, Smart Subsurface Survival!”

Starting from a temporary colony base on the Martian surface, near a cave “skylight,” scientists will use an underground tunnel excavating machine, guided by AFRL lasers, to drill through areas connecting natural lava tubes, searching for underground geothermal heat sources and liquid water. Then, a permanent colony can be established in a more hospitable and innovative living environment than the Martian surface.

The team working on the **2025-2026 Mars DRILL Mission** will need a place to live and plenty of food while they work on the surface of Mars. Fifth grade students participating in this year’s Mission to Mars will design and build the necessary living spaces and life support resources, then present them at the final Link-Up Day event in the spring.

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