Future Explorer’s Guide to the Moon

Danger: High Radiation Levels

Caution: Electrostatic Charging Possible

Enough Fuel to launch the shuttle every day for 21,000 years

Heads Up!

Landing pads built with regolith

Live-in lava tubes

Skylight access

200 new impact craters found in 7 years
Where should we go?
A series of studies conducted between 2008 and 2012 identified the Schrödinger Impact Basin, on the lunar farside, as an ideal place to send robotic and human explorers. Missions to Schrödinger basin could address an incredibly large number of scientific and exploration objectives, including the highest-priority objectives laid out by the 2007 National Research Council report, “The Scientific Context for Exploration of the Moon.”

Danger: High Radiation Levels Data collected by the Lunar Reconnaissance Orbiter reveals that the current flux of galactic cosmic radiation is relatively high. If this flux continues to increase, by the year 2020, human missions may be limited to durations of less than one year.

Regolith Lunar regolith is a fine-grained material that covers the surface of the Moon and is a result of billions of years of impact events breaking up rock into smaller and smaller pieces. Regolith is an abundant building material that can be used to create structures by welding it into bricks for construction or sintering the surface into paved roads and landing pads.

Heads Up! In its first seven years of operation (2009-2016), the Lunar Reconnaissance Orbiter has imaged 200 new impact craters that have formed in the four to five decades following the Apollo missions. Some of these impact events were seen by telescopes on Earth as they happened!

Caution: Electrostatic Charging Possible Unlike the Earth, the Moon’s surface is a terrible electrical “ground.” Future explorers standing in sunlight on the surface will be electrically grounded (their suits won’t build up a charge) by the solar wind. However, working in shadow will create an electric charge on suits that could be passed onto, and damage, sensitive equipment. Apollo astronauts moved between light and shadow while on the Moon’s surface and were fortunate enough to not damage equipment.

Fuel One study using data from the Lunar Reconnaissance Orbiter estimates that 5.8 billion metric tonnes (~13 trillion pounds!) of water-ice exist in permanently shadowed areas in the northern polar regions. This water can be used for drinking and radiation shielding, and can be separated to produce liquid hydrogen (H₂) and liquid oxygen (O₂) for rocket fuel.

Lava Tubes Lava tubes create caves beneath the lunar surface that could serve as protective living areas for future explorers. Lava tubes offer a stable temperature environment as well as shielding from solar radiation, meteoroid impacts, and ejecta from impact cratering events.

Skylight Access “Skylights” are holes in the lunar surface that may provide access to subsurface lava caves.

Future Explorer’s Guide to the Moon Since 2007, spacecraft data and laboratory studies of lunar samples have been changing our view of the Moon, including its formation and evolution as well as the near-space environment around it. A snapshot of some of this knowledge is presented in this infographic.