

The Martian Moon Phobos holds many unanswered questions that may provide clues to the origin of Mars. The moon exhibits unique surface features, particularly striations due to being within the Mars Roche limit. Phobos has been proposed as potential, low delta V stop-over site for future human missions to Mars. Using Phobos, it has been suggested that future human missions could tele-operate Mars assets or develop infrastructure for eventual human landing on Mars. Considering the strategic importance of Phobos to future Mars exploration, there has been little known about Phobos or its surface. Soviet Union's Phobos lander launched in the late 1980's was lost within 30 minutes of landing on the Moon's surface.

The objective of Devil's LOGIC, the Low Orbit Geology Imaging Cubesat, is to capture into the Mars System and return visible and thermal images of the Martian moon Phobos. LOGIC, a 6U CubeSat comprised primarily of COTS components (Commercial Off The Shelf), will accomplish its mission in four phases: Deployment, Transit, Mars Capture and Science Operations. The satellite will be deployed on an Earth escape orbit to Mars. LOGIC will communicate with the Deep Space Network (DSN) utilizing IRIS X-band radio and reflect array. Mars capture is to be achieved utilizing a green monopropellant thruster to perform a series of impulsive maneuvers. LOGIC will capture into a highly elliptical orbit utilizing this method, and perform 6 months of aero braking maneuvers to reduce its apoapsis to match that of Phobos. The final phase of the mission will begin as science operations commence when LOGIC is within 94 km of Phobos. Observation opportunities will be available during the elliptical orbit and X-band communication will be used to relay science data. Multiple interactions within the range of the science payload will be achievable from the elliptical orbit and the frequency of interactions can be improved utilizing the thruster. The CubeSat will be able to get within reach of Phobos to obtain thermal images at resolution higher than what's currently available of at least half the Moon's surface. An extended mission offers full coverage of Phobos.