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KOREA PATHFINDER LUUNAR ORBITER (KPLO): UPDATE ON THE COLLABORATIVE KARI/NASA MISSION

Abstract

The United States signed a government-to-government framework agreement for civil space cooperation with South Korea in December 2016. Under that agreement, NASA and the Korea Aerospace Research Institute (KARI) have partnered to develop and launch the Korea Pathfinder Lunar Orbiter (KPLO), which will be Korea's very first lunar mission. The no-exchange-of-funds agreement provides for KARI to develop, launch and operate KPLO in exchange of 15kg payload accommodation for a NASA instrument on the KPLO mission. In return, NASA will provide technical support and expertise in the areas of mission flight trajectory design, lunar orbit operations, Deep Space Network communication and navigation services. This paper will discuss KPLO's overall mission and concept of operations and provide a mission status update.

KARI plans to launch KPLO in December 2020 and the unmanned lunar orbiter will initially enter into a 300 km Earth orbit, followed by a translunar injection burn and a one-month lunar transfer phase. After capture into an elliptical lunar orbit, it will circularize in a 100 km nominal polar orbit where it will conduct science operations and technology demonstrations for one year. The objectives for this first mission are to develop indigenous lunar exploration technologies, demonstrate a "space internet," and conduct scientific investigations of the lunar environment, topography and resources as well as identify potential landing sites for future KARI and NASA missions.

KPLO will carry a payload comprised of five science instruments and a Disruption Tolerant Network experiment. The five instruments include 1) a Lunar Terrain Imager (LUTI), 2) a Wide-Angle Polarimetric Camera (PolCam), 3) a magnetometer (KMAG), 4) a Gamma-Ray Spectrometer (KGRS) and 5) a high-sensitivity optical camera developed by NASA (ShadowCam). The NASA payload included on KPLO will help address strategic knowledge gaps regarding the lunar environment and polar volatiles located in the permanently shadowed regions (PSRs) related to architecture planning as well as advance overall science goals of understanding the lunar system and inform exploration In-Situ Resource Utilization (ISRU) planning.