IAF SPACE EXPLORATION SYMPOSIUM (A3)
Moon Exploration – Part 3 (2C)

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# ASTRONOMY FROM THE MOON AND EARTH OBSERVATION WITH INTERNATIONAL LUNAR OBSERVATORY 1/2

**Abstract**

ILO-1 / ILO-2 (backup), the flagship mission of International Lunar Observatory Association of Hawaii, is planned to operate on the Moon around 2026. With lessons learned from precursor ILO-X, set to launch to a Moon South Pole site on Intuitive Machines Nova-C lander / SpaceX Falcon 9 rocket in 2023 with the goal of imaging the Milky Way Galaxy Center and other astronomical objects selected by a global team of invited observers, ILOA is determined to demonstrate the viability and importance of astronomy and Earth observation conducted from the lunar surface with the 2.8-kg ILO-1/2 dual imager instrument suite. Developed by Canadensys Aerospace Corporation, ILO-1/2 are an advanced version of the fixed ILO-X imagers, featuring a 2-axis gimballed Pan / Tilt instrument mount which provides remote pointing capability for free astronomical target acquisition across the sky. ILOA is currently engaged in the payload proposal process with both NASA (Artemis 3) and CNSA (Chang'E-7), and will consider flying with ISRO / JAXA (LUPEX), SpaceX (HLS demo mission) and other commercial providers (Intuitive Machines, Astrobotic, ispace / Draper, Blue Origin) as appropriate. ILOA has been working to conduct Astronomy from the Moon since its founding in 2007. Imagined since at least 1634 (Somnium, J. Kepler) and seriously advanced in the 1990s (D. Schrunk, B. Cooper 1999), the era of astronomy from the Moon is now being realized. First performed by John Young during Apollo 16, utilizing Far Ultraviolet Camera/Spectrograph (built by G. Carruthers, GSFC), the resumption of astrophysical observation from the Moon began in 2013 with Chang'E-3 Lunar-based Ultraviolet Telescope (LUT) and continues on the lunar farside with Low Frequency Radio Spectrometer (LFRS) onboard the Chang'E-4 Mission (2019). As the international space community concentrates efforts towards establishment of permanent lunar operations formalized under ILRS and Artemis agreements, continuation and expansion of Astronomy from the Moon will provide a host of scientific, technological commercial and social benefits. A thin exosphere, farside radio quiet, planetary-like stability, low gravity, extractable volatiles for ISRU and near-term human settlement allowing for service make the Moon an attractive environment for global placement of telescopes for astrophysical observation including long duration, high resolution observation of Earth (climate, atmosphere / magnetosphere, rotation, axial precession tracking) and Sun, parallax astrometric measurement, interferometry / VLBI radio arrays for extragalactic astronomy, and classical refractor and reflector telescopes freed from terrestrial constraints.