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WISDOMOON: AN INNOVATIVE GPR FOR LUNAR MISSIONS

Abstract

Directly inherited from the WISDOM instrument onboard the ESA ExoMars Rosalind Franklin Mars rover, the WISDOMOON instrument is being developed by LATMOS and CNES to answer the need for in depth cartography of the lunar surface.

The geological history of the Moon is made of impacts, space weathering and volcanism. The lunar subsurface holds a record of these processes and of their chronology in the form of the superposition of layers of ejecta debris, regolith and solidified lava flows. Such a record can be investigated in a nondestructive way by Ground Penetrating Radars.

WISDOMoon is a dual-frequency band step-frequency radar operating on a rover. With one or two sets of antennas WISDOMoon is designed to image the lunar subsurface down to a few hundreds of meters with a centimetric resolution in the first tens of meters below the surface and a decimetric resolution below. It allows lunar rovers to characterize the subsurface of the exploration zone, in particular searching for pockets of water ice. Those measurements will be key to understand the geological history of an exploration zone as well as for the inventory of the lunar resources, especially in the lunar South Pole.

This paper will describe how CNES, the French Space Agency, and LATMOS laboratory adapted the Mars WISDOM instrument design to lunar surface operations. The consortium, its development and heritage strategy and the different subsystems will be presented, as well as the concept of operations for future in situ resource utilization or science missions.