Scientific Targets for UAE's New Missions to the Moon. H. Almatroushi[1], K. Badri[1], H. Alahmed[2], S. Els[1], H. Almarzooqi[1], and M. Alzaabi[1], [1]Mohammed Bin Rashid Space Centre, Dubai, UAE, [2]Mohammed Bin Rashid Space Centre Lab, University of Dubai, Dubai, UAE.

The Emirates Lunar Mission program, initiated by the United Arab Emirates, marks a significant step in the nation's pursuit of lunar exploration. This program involves the design, construction, and operations of lunar rovers, aligning with the Mohammed Bin Rashid Space Centre (MBRSC) Mars 2117 Program. The Mars 2117 Program aims to establish the first human settlement on Mars by the year 2117. The Emirates Lunar Mission serves as a critical stepping stone, enabling the development, demonstration, and scientific investigation necessary to support human habitation on Mars.

In December 2022, MBRSC successfully built and launched the "Rashid-1" rover aboard the Japanese lander HAKUTO-R. Despite the unsuccessful landing, MBRSC's aspirations and commitment remain undeterred. MBRSC announced the development of its new lunar rovers, Rashid-2 and Rashid-3, which are building on the established heritage. Thereby showcasing a series of rovers designed for a sustainable, long-term program. The Rashid rover series fosters collaboration with local and international partners, emphasizing the importance of cooperation in space exploration.

Rashid-2 will be a replica of the Rashid-1 rover. As its predecessor, Rashid-2 is targeted to operate at the mid-latitude region of the Moon, while Rashid-3 is aimed at the lunar polar region. Therefore, the primary objectives of Rashid-2 and Rashid-3 differ, reflecting the diverse scientific opportunities available on the Moon.

This paper will delve into the scientific objectives of the Rashid-2 and Rashid-3 missions, along with the investigations and instrument selection processes to achieve their respective goals.

Rashid-2's scientific objectives include the study of the lunar geology and plasma environment, as well as material in-situ testing and terra-mechanical investigations. For Rashid-3, the primary objectives are to study the geological features and to investigate the presence of water in the lunar polar region.

To achieve these mission objectives, specific investigations have been defined. Each of these investigations, along with evaluation criteria such as scientific merit and technical, and as well as operational implications for the rover system, has guided the selection of instruments to be onboard the rover. Five scientific instruments have been selected for Rashid-2, while seven potential scientific instruments, provided in part by international partners, have been chosen for Rashid-3. On both rovers their wheels will act as platforms to bring materials into direct contact with lunar regolith.

With all of the necessary technology developments, the Rashid-2 and Rashid-3 rovers will not only advance our understanding of the lunar regions but also strengthen international collaborations and technological advancements in space exploration. The insights which will be gained from the Emirates Lunar Mission program will be pivotal in shaping future lunar missions and contributing to the broader goals of human space exploration. This program underscores the UAE's commitment to contributing to global space science and fostering international partnerships that drive innovation and discovery in the field of lunar exploration.