Introduction:
With the current direction of missions and focus of research, the need for development of new approaches to characterization of sediments and creating a more interdisciplinary research environment for the samples gained is clear. Currently there is little in the way of a detailed strategy for identification, characterization and processing of lunar resources. Given the aggressive timelines of the planned campaign, a wider range of academic expertise in earth-sciences from a range of disciplines could heavily influence the realistic research scope for missions. A critical part of the plan of expansion to space includes the increased research scope of lunar resources, as an enabler long term habitation and as the first steps towards the goal of establishing a thriving, sustainable cislunar economy.

The expansion of research expertise applied to the borehole cores gathered will enhance understanding and promote space research as a wider field of research. Data gathered by the Clementine, Lunar Prospector, SELENE, Chandrayaan-1, LRO, LCROSS, and other missions have shown there are potential mineral and volatile resources on the Moon that could be used to sustain human life on the lunar surface and to develop a transportation architecture for human spaceflight beyond the Earth-Moon system. Utilization of these resources requires detailed assessment techniques. Given recent findings of up to 30 wt.% water ice in some permanently shadowed regions at the poles of the Moon (Li et al., 2018), the time is now right to develop a phased approach to start to develop these and other resources, as proposed in the LEAG Lunar Exploration Roadmap Implementation Plan, NASA’s ISRU Roadmap, and the latest version of the Global Exploration Roadmap ISRU Strategy.

The research proposed is to create an interdisciplinary Sample Testing Framework for Space Utilization, combining earth sciences with current astrobiology testing. This would be done using the newly developed Sample Testing Framework for Undisturbed and Disturbed borehole samples developed by PhD student Frida Klabo Vonstad at University College London (UCL) in Civil, Environmental & Geomatic Engineering.

The conceptual Sample Testing Framework which shows how an interdisciplinary collaborative approach can help disciplines work in a synergistic manner, and enables the research of similar interdisciplinary collaborations in the future in various earth-research fields. The research is currently being tested for applications in industry and academia, to reduce risk on construction sites, save cost and time, and to create more efficient work practices. The research will attempt to adjust the Framework to suit the need of lunar and martian core samples for synergistic interdisciplinary testing.

References: