WHAT'S NEXT? BUILDING ON RECENT RESULTS C. M. Pieters[1] [1]Department of Geological Sciences, Brown University, Providence, RI 02912 (Carle_Pieters@brown.edu).

Introduction: After the long awaited pulse of new data from the international armada of missions to the Moon (Kaguya, Changé, Chandrayaan-1, LRO), new discoveries and scientific insights are being revealed in abundance. What is left to do?

LOTS!

As in all good exploration endeavors, this influx of new data and information about the Moon, its surface, and its environment has opened abundant new areas of research and broad fundamental questions that need to be addressed.

This discussion will outline several small to modest missions that address questions that were unknown a decade ago, but now beg to be explored with modern instruments on orbiters, landers/rovers, and with targeted sample return. These are unprioritized examples, but certainly not a complete list!

Rover:

Traverse a swirl. What is the surface texture across bright and dark swirl markings? What is the magnitude of surficial magnetic field and how does it vary across swirl markings? How does the intensity of the solar wind vary across a swirl? How does OH/H2O vary across the swirls? Key experiments include: High resolution stereo camera, in-situ magnetometer, solar wind monitor, dust detector, mass spectrometer, etc.

Landed:

Target nearside sample return. With new lithologies identified in remotly sensed data, several readily accessible nearside areas are excellent targets for automated sample return. Each of the examples below will provide samples that do currently not exist in our sample collections.

Copernicus. The central peaks exhibit diverse deep-seated lithologies: troctolite (olivine + plagioclase), plagioclase, and now also Mg-spinel. In addition, impact melt is widespread and may improve traficability across the floor.

Theophilius. The central peaks exhibit one of the best exposures of Mg-spinel lithology to date.

Sinus Aestuum. This area of regional dark mantling material (volatile driven pyroclastic deposits) contains abundant Cr-spinel either as a crystallized product or as mantle xenoliths.

Young picritic basalt. Several of the western young Ti-rich basalt regions contain extensive olivine and are an important unsampled basalt type.

Orbital:

Track the Water. What is the nature and abundance of the widespread surficial water? How does it vary with time? How is it linked to different surface environments (composition, regolith, temperature, illumination, etc.)? Key experiments include: Next generation Moon Mineralogy Mapper, Thermal infrared imaging spectrometer, Solar wind monitor and particle reflectance, etc.

Read the geologic record at high resolution. What are the primary compositional constituents of the lunar crust? What is their distribution laterally and vertically? What do local, regional, and global geologic relations between lithologies imply about planetary processes active on the Moon? How has the compositional diversity evolved? Key experiments include: Next generation Moon Mineralogy Mapper, Thermal infrared imaging spectrometer, Next generation X-ray spectrometer, etc.