3. Recommended L-ISCT targets

3.1. L-ISCT #1 Apollo 16 Central Nearside Highlands

Target center: 9.0°S; 15.5°E

Principal rationale: This site is a large region of relatively uniform feldspathic highlands on the lunar nearside. Ground truth from Apollo samples provides excellent compositional calibration. Mature soil as well as several fresh craters of various sizes are found in the region.

An overview of the Apollo 16 region from a Clementine 750 nm albedo mosaic is shown in Fig. 2. The landing site is indicated with an arrow. An area of undisturbed (mature) soil that has been used for spectral calibrations is indicated by an "X". Clementine color composites of this area reveal the bright fresh craters to be relatively blue relative to surroundings (high 415/750 nm ratio).

The Apollo 16 mission was targeted to explore the central highlands of the Moon near Descartes Crater in order to assess the nature of the lunar highlands at considerable distance (~200 km) from any mare basalt deposits. The mission was originally intended to examine evidence for a possible volcanic origin of the Cayley plains as well as to examine unusual landforms in the vicinity of the landing site (hills, dome-like features) also proposed to be of possible volcanic origin (e.g., Ulrich et al., 1981). Apollo 16 Astronauts John Young and Charles Duke explored the landing region and found little to no evidence of volcanic activity at the site (Young et al., 1972). Instead, they quickly recognized that the rocks were composed of impact breccias, and that the intense crater and basin-scale bombardment history of the lunar highlands dominated the site. With the return and analysis of lunar samples, this region is now known to represent a large area of relatively uniform, but brecciated, feldspathic highlands on the nearside of the Moon.

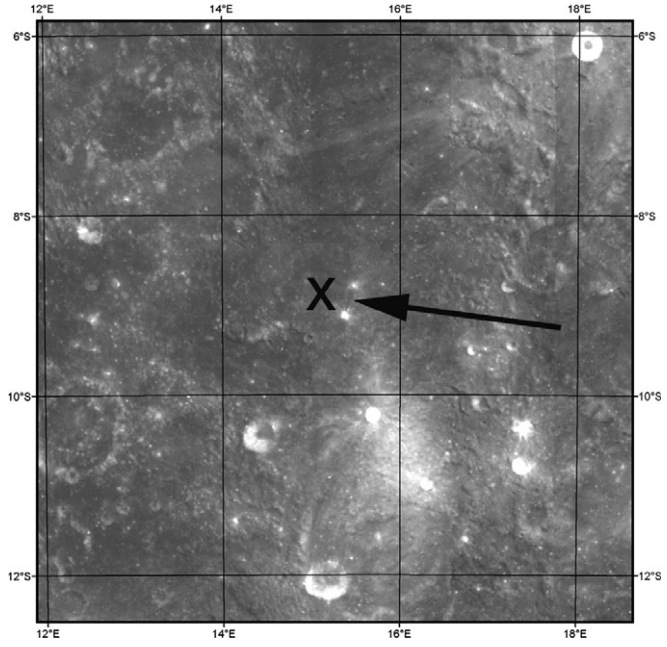

Fig. 2. Clementine 750 nm albedo data for the Apollo 16 region. The landing site area is indicated with an arrow. A large area of undisturbed (mature) soil that is often used for a calibration reference area is indicated with an X.

Apollo 16 has become an important site for the calibration of lunar spectroscopic data. Spectra of representative samples of well-developed soils collected at Apollo 16 and measured in Earth-based laboratories are used as "ground truth" for regions of undisturbed soil observed remotely (McCord et al., 1981; Pieters et al., 1994). The spectrum of a representative mature soil from this region, 62231, has been used extensively for spectral calibration of such areas of undisturbed highland soil such as that indicated with an "X" in Fig. 2. The spectrum of this Apollo 16 mature soil is shown in Fig. 3, and a more detailed discussion can be found in Pieters (1999). Digital spectroscopic data for 62231 can also be found at http://www.planetary.brown.edu/relabdocs/Apollo16_62231.html.

The Apollo 16 site is located in a central region that has been influenced by the ejecta deposits of many major impact basins (e.g., Nectaris, Imbrium, etc.; see Petro and Pieters, 2006) and a fundamental question is whether diverse datasets can be used to distinguish units formed by these basins and to separate these from local impact-generated units. The Apollo 16 area is an excellent test site for further calibration and for the deconvolution of complex highland stratigraphy (Stoffler et al., 1985). The presence of fresh craters of various sizes in this feldspathic region also provides contrasting material for studies of space-weathering and the influence of maturity on remote compositional analysis.

3.2. L-ISCT #2 Lichtenberg crater

Target center east rim: 31.5°N; 293°E

Principal rationale: Two very different types of basalt exist in the region, relatively old low-Ti and much younger high-Ti basalts. The young high-Ti basalts appear to over-

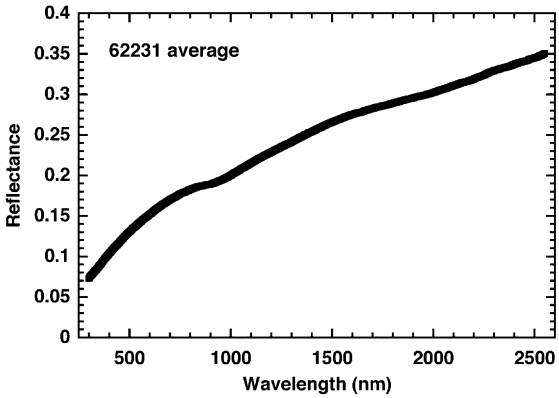

Fig. 3. Reflectance spectrum (reflectance factor) of Apollo 16 soil 62231. This spectrum of representative mature soil has often been used for "ground truth" calibration of remote spectral measurements. This laboratory spectrum was acquired with angle of incidence = 30° and emission angle = 0°. The spectrum is the average of several independent measurements.