CHARACTERISATION OF A POTENTIAL LANDING SITE OF INTEREST IN THE LUNAR SOUTH POLAR REGION. H. Irfan[1,2], I. A. Crawford[1,2], P. M. Grindrod[1,2], D. De Rosa[3], J. D. Carpenter[3] [1]Department of Earth and Planetary Sciences, Birkbeck, University of London, Malet Street, London, WC1E 7HX, UK, [2]Centre for Planetary Sciences, UCL/Birkbeck, London, WC1E 6BT, UK, [3]European Space Agency, Estec, Keplerlaan 1, 2200 AG, Noordwijk ZH, The Netherlands (huma.irfan.09@ucl.ac.uk).

Introduction: The objective of this study is the detailed investigation and characterisation of a potential landing site of interest in the lunar South Pole, which is being conducted in collaboration with the European Space Agency (ESA). A prospective region of ~30 x 40 km, centred at 82.7°S, 33.5°W (Fig. 2) is being examined for these studies, which is located on the western limb of the Scott crater in the lunar South Pole, this location has been highlighted previously as an example of a possible site of interest in light of the Russian Luna-Resurs mission. The aim is to investigate and characterise smaller sub-sites of ~3 x 3 km within this locality that satisfy the criteria for the landing site selection, which take into account a risk assessment perspective and proximity to the scientifically interesting features that include: favourable illumination conditions, safe topography, technical constraints for spacecraft landing precision, and a proximity to the scientifically significant features which hint of a possible presence of water ice and/or volatiles and any latent scientifically interesting mineralogy.

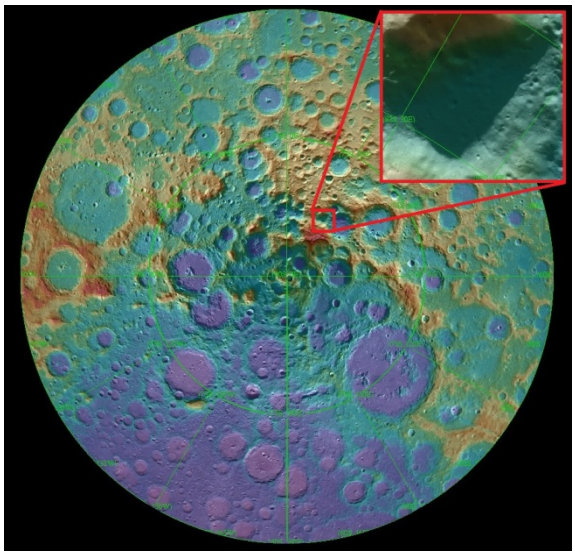

Figure 1: Lunar South Polar region, potential landing site of interest.

The lunar South Pole is a scientifically interesting region for future landing missions, within which, cold regions containing crater cold-traps have been suggested by the Diviner Lunar Radiometer Experiment data surface-temperature observations, where the temperatures can reach as low as 38 K in the permanently shadowed regions [1]. It is thought that within these crater cold-traps, cryogenically trapped water ice and/or volatiles of a primitive origin may have been derived from impacts and believed to have been preserved for billions of years. Suitable temperatures for volatile stability may also be found in the subsurface in some illuminated areas. In the light of these observations and assumptions, the site considered for this study presents interesting possibilities which are being investigated in detail in this study.

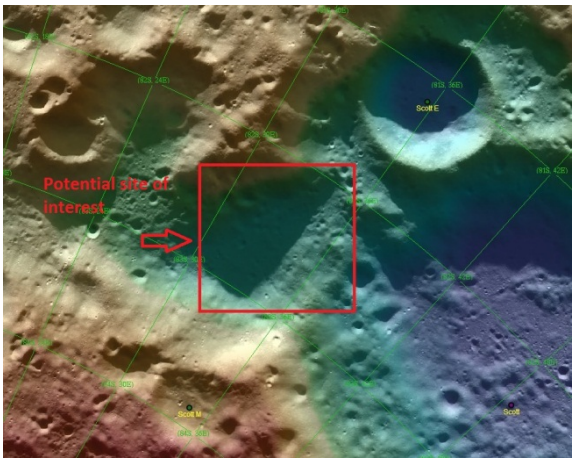

Figure 2: Potential landing site of interest, shown on LROC WAC Colour Shaded Relief map.

Datasets and Methodology: For a comprehensive analysis of this region and the sub-sites within it, various lunar remote sensing datasets have been utilised to ascertain the merit of the potential landing site based on the aforementioned criteria. The Lunar Reconnaissance Orbiter Camera (LROC) Narrow Angle Camera (NAC) images, Lunar Orbiter Laser Altimeter (LOLA) datasets, and NASA's Moon Mineralogy Mapper (M3) data aboard the Chandrayan I mission are being utilised. USGS Integrated Software for Imagers and Spectrometers (ISIS) and SOCET SET software are used to process images and generate DTMs. Topography and surface features, hazard maps including crater and boulder size-frequency distributions, slope and roughness maps, permanently shadowed regions and illumination conditions are simulated using the DTMs in ArcGIS software.

Digital Terrain Models (DTMs). The Lunar Reconnaissance Orbiter Camera (LROC) Narrow Angle Camera (NAC) stereo images of 0.5 to 2 m per pixel resolution are used to generate DTMs. ISIS software routines process the images and perform radiometric correction, which are then imported into SOCET SET for further operations. SOCET SET's

Multi-sensor triangulation (MST) algorithm or bundle adjustment is performed for improved registration of the images [2], and a pair-wise rectification of images is implemented. SOCET SET's Next Generation Automatic Terrain Extraction (NGATE) algorithm is used to generate the DTMs. Lunar Orbiter Laser Altimeter (LOLA) datasets are used to address the accuracy assessment of the DTMs.

Ongoing and Future Work: The Landing Site Risk Analysis software framework (LandSAfe) is a software tool developed by ESA for the analysis and selection of landing sites on the lunar surface [3], which is also being used to generate and compare results for products obtained from other software as described. Furthermore, NASA's Moon Mineralogy Mapper (M3) hyperspectral data of scale 140 m per pixel resolution are also used to investigate the latent scientifically important mineralogy of these sub-localities using the Envi software suite.

References: [1] Paige, D. A. et al. (2010) *Science, 330,* 479-482. [2] Tran, T. et al. (2010) *41st LPSC,* Abstract#2515. [3] Schmidt, R. et al. (2012) *XXII ISPRS Congress,* Vol XXXIX-B4, 506-510.