AMIE/SMART-1 Mapping of Lunar Poles and Other Regions of Interest

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The Advanced Moon micro-Imager Experiment (AMIE) on board the ESA lunar mission Smart-1 has performed colour imaging of the lunar surface using various filters in the visible and NIR. The low pericenter, polar orbit, allowed to obtain high resolution images in various locations at the surface. From the 300 km pericenter altitude, the field of view (5,3˚x5,3˚) corresponds to a spatial resolution about 30 m. The 1024x1024 images are shared by the various filters, allowing to derive mosaics of the surface in up to 3 colors depending on pointing mode. Spot-pointing observations and multiple observations from different orbits have provided photometric sequences that allow to study the surface properties in restricted areas.

Geometrical analysis of the AMIE images relies on the SPICE system: image coordinates are computed to get precise projection at the surface, and illumination angles are computed to analyze the photometric sequences. Images from various orbits are first identified for each selected region of interest. These images are then selected according to signal to noise ratio, spatial coverage, and spatial resolution. The best images obtained with the neutral filter are calibrated, and mosaicked using the coordinates of the image frames corners.

Regions presented in this work include both the northern and southern polar areas, as well as several regions of interest: Marius Hills, the Gruitheisen Domes, Rumker Hills, Aristarchus Plateau. In the polar areas, images are selected so as to provide the best possible viewing of surface topography, depending on solar illumination angle, while preserving images continuity in shadowed areas.

Eventually, this method will be applied in all regions where AMIE has provided high resolution observations of the surface, typically a factor of 3 higher than the Clementine UV-vis camera. These regions are essentially located at latitude ranging from 80 to 40˚S, specially in the eastern hemisphere.