PRELIMINARY ANALYSIS OF COLOUR INFORMATION FROM AMIE ON SMART-1. P. Cerroni[1], M. C. De Sanctis[1], J.-L. Josset[2], S. Beauvivre[3], D. Koschny[4], P. Pinet[5], S. Chevrel[5], Y. Langevin[6], M. A.Barucci[7], P. Plancke[4], M. Almeida[4], B.A. Hofmann[8], K. Muinonen[9], V. Shevchenko[10], Yu. Shkuratov[11], P. Ehrenfreund[12] and B.H. Foing[4], [1]IASF (Area Ricerca Cnr, Via Fosso del Cavaliere, 00133 Roma, Italy), [2]Space Exploration Institute (Case postale, CH-2002 Neuchâtel, Switzerland), [3]Micro-cameras & Space Exploration (Jaquet-Droz 1, CH-2000 Neuchâtel, Switzerland), [4]ESA/ESTEC (Keplerlaan 1, 2201 Noordwijk, The Netherlands), [5]UMR 5562 CNRS/GRGS Observatoire Midi-Pyrénées (14, avenue Edouard Belin 31400 Toulouse, France), [6]IAS (Bat. 121, 91405 Orsay, France), [7]Observatoire Paris Meudon (Meudon , France), [8]Natural History Museum (Bern, Switzerland), [9]Helsinki Observatory (Kopernikuk sentie 1 P.O.Box 14, Finland), [10]Sternberg Astronomical Institute (Moscow, 119899, Russia), [11]Astronomical Institute of Kharkov National University (35 Sumskaya St. Kharkov. 61022. Ukraine), [12] Leiden Observatory & Austrian Academy of Sciences (P.O. Box 9513, 2300 RA Leiden, The Netherlands).

Introduction: The Advanced Moon micro-Imager Experiment (AMIE) [1] is the imaging system on board the ESA mission to the Moon SMART-1. The AMIE camera is providing high resolution CCD images of selected lunar areas and it is performing colour imaging through three filters at 750, 915 and 960 nm with a maximum resolution of 27 m /pixel at the perilune of 300 km. Specific scientific objectives include [2] imaging of the Lunar South Pole, study of permanently shadowed regions, imaging features of the far side and in particular the South Pole - Aitken basin (SPA), study of photometric properties of the lunar surface from observations at different phase angles for the determination of the regolithic structure parameters, analysis of the chemical and mineral composition of the regolith upper layer, detection and characterisation of lunar non-mare volcanic units, study of lithological variations from impact craters and implications for crustal heterogeneity.

AMIE Data: Push-broom data from a different lunar regions including highland and mare regions have been acquired during the first push-broom orbital phase of Smart-1 mission. A preliminary calibration has been applied to the acquired data. The data have been co-registered to produce colour images and band-ratio images. A preliminary assessment and a comparison with Clementine data from the same regions is presented as a test.

Data Analysis: Push broom data from mare region (Mare Ingenii) are presented. The region under study here is the southern portion of Mare Ingenii on the far-side of the Moon. Previous Lunar Orbiter imaging showed in this region the presence of diffuse high albedo structures, or swirls, lying on the mare-like background and possibly the mare adjacent terrains, resembling those of Reiner Gamma. A preliminary calibration has been applied to the data. AMIE data of the different filters have been co-registered to produce colour images and band-ratio images. A preliminary assessment and a comparison with Clementine data from the same regions is presented as a test. In fig. 1 the AMIE colour image of Mare Ingenii region is reported. The data have a ground resolution of 64 m/px and the center longitude and latitude of filter image is 35.5 S, 161 E.

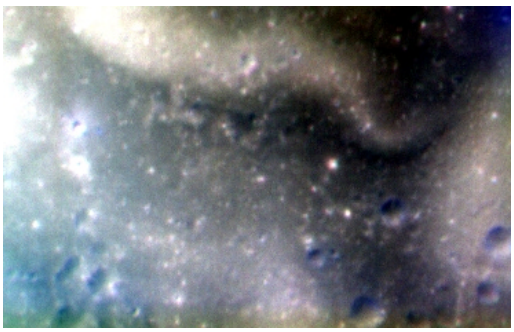

Fig. 1: Amie colour image (Blue: 750 nm, Green: 915 nm, Red: 960 nm) of a region of Mare Ingenii.

The selected spectral bands allow discrimination between mafic minerals which dominate the mare (revealed by the Fe2+ absorption feature at 950 nm) and the anorthosite rich highland materials. The 750/1000 nm ratio is a first order estimate of the relative abundance of mafic minerals and plagioclase.
Fig. 2 shows a colour composite obtained combining 960/750 nm and 915/750 nm band ratios with albedo at 750 nm. Areas coming out as turquoise are characterised by a mafic absorption while red areas are albedo features giving the geologic context (technique proposed by Pieter and Tompkins, 1999 [3]).

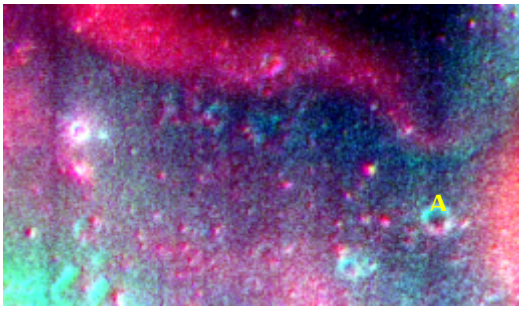

Fig. 2: Amie composite image of 960/750 nm and 915/750 nm band ratios with albedo at 750 nm. 'A' marks a crater whose spectrum is shown in Fig. 4.

Comparison with Clementine data: **An**AMIE colour image has been compared with the same region imaged by Clementine. Representative spectra for two locations have been extracted (normalized to 1 at 750 nm). In the spectra, the Clementine filter 2 is 750 nm while our filter at 915 nm should be compared with Clementine filter at 900 nm. The spectra obtained are remarkably in agreement with those of Clementine as can be seen in fig.3 and 4, where the spectral profile of the crater A of fig. 2 and of the soil above this crater, are reported for comparison.

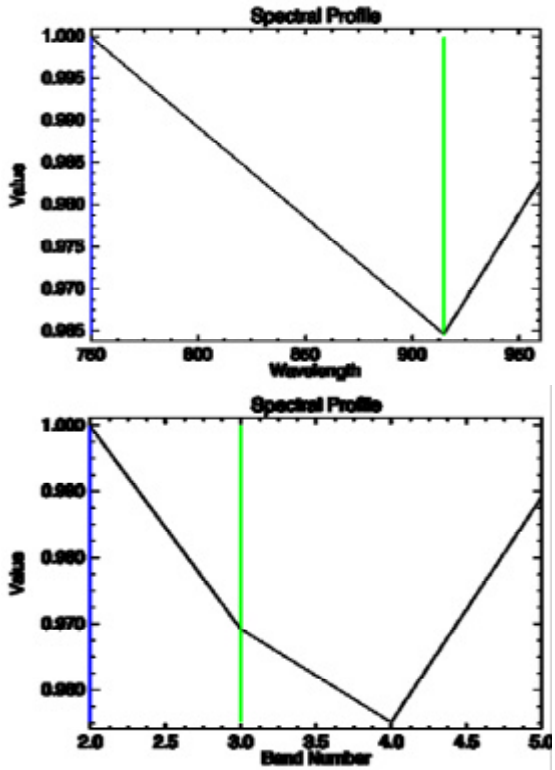

Fig. 3: Spectral profile of crater A of fig.2 (top: AMIE data, bottom: Clementine data)

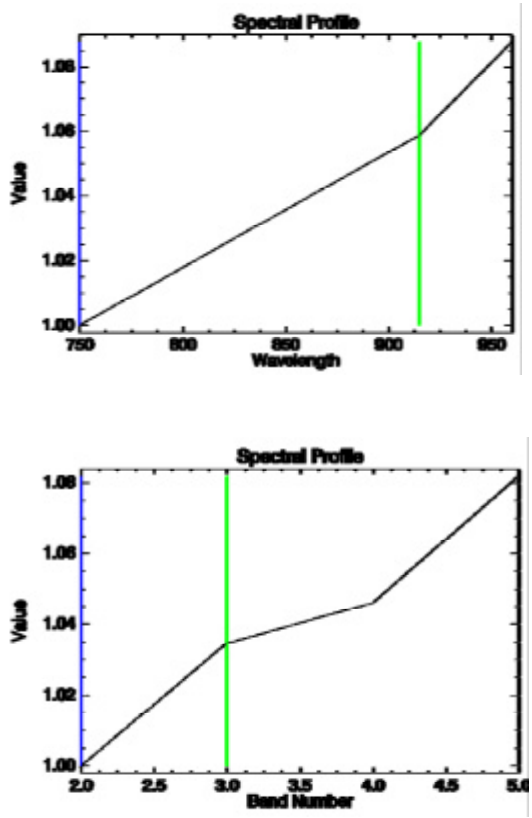

Fig. 4: Spectral profile of soil above crater A of fig.2 (top: AMIE data, bottom: Clementine data)

Conclusion: The AMIE push-broom data acquired at high spatial resolution on selected targets seem to be very promising for answering to the main scientific questions about them.

References: [1] Foing B. et al., (2005) *LPS XXXVI*, Abstract # 2404. [2] Pinet, P. et al. (2005) *PSS*, 53, 1309-1318. [3] Tompkins, S. and Pieters, C. M. (1999) *M&PS, 34*, 25-41.