SELENOLOGY TODAY: A NEW LUNAR SCIENCE JOURNAL. M. T. Bregante[1] and J. Phillips[2] – Geologic Lunar Research (GLR) Group. [1]Via Antica Romana Occ. 13, 16039 Sestri Levante (Genova), Italy; breterrimar@yahoo.it; [2]101 Bull Street, Charleston, SC 29401, USA; thefamily90@hotmail.com

Introduction: *Selenology Today* is a new online journal devoted to studies of the Moon, mainly of an observational, geological, and historical nature (http://digilander.libero.it/glrgroup). It is a free, international journal welcoming contributions from serious amateur and also professional scientists. Selenology refers to Selene, the ancient Greek goddess of the Moon, and Today refers to modern studies that derive understanding from detailed imaging and measurements of surface characteristics. Modern technologies have allowed skilled amateur astronomers to contribute lunar images, measurements and analyses comparable to those of professional scientists. *Selenology Today* publishes articles based on such modern approaches.

Aims of *Selenology Today*: Despite the fact that the Moon has been visited by six manned missions and a multitude of unmanned spacecraft, its surface is far from being completely explored. Our neighbor in space is one of the few solar system bodies for which images and spectra taken with state-of-the-art ground-based instrumentation and even amateur equipment may be of high scientific value and provide novel insights into topography and geology. For the last few years the use of CCD cameras or webcams has allowed the degrading effects of seeing to be minimized in telescopic imaging so that amateurs routinely produce images resolving detail of 1 km, sometimes reaching a resolution of a few hundreds of meters, clearly superior in resolution e. g. to those in the Consolidated Lunar Atlas [1]. In these images it is possible to measure the heights and slopes of topography and investigate the color of lunar soils. These issues refer to several aspects such as: processing techniques for high resolution images, shadow length measurements along selenographic coordinates using software packages such as LTVT [2], dome studies concerning the source regions of the various dome types and the corresponding implications for local and regional lunar volcanism, multispectral imaging for advanced observers and those who want to be able to follow professional papers about surface composition, and surveillance and imaging of meteorite impacts on the moon.The primary goal of *Selenology Today* is to promote serious lunar research among dedicated amateur astronomers who are interested in observing and imaging the surface of the Moon as well as in its geologic history and the processes that formed its surface. In order to bridge the gap between amateur and professional researchers, we would like to attract professional planetary scientists with a special interest in lunar research.

The Publisher: *Selenology Today* is published by the Geologic Lunar Research (GLR) group. Founded in 1997, the GLR group is an association of dedicated lunar observers sharing a common interest in all domains of lunar science, especially in the field of lunar volcanism (http://www.glrgroup.org). While many GLR members specialize in high resolution CCD imaging of the lunar surface, including e.g. lunar domes, some concentrate on the evaluation of the obtained imagery with respect to the morphologic or topographic features of the imaged surface regions. Others are interested in transient lunar phenomena (TLP) and the critical assessment of the corresponding observations. Another field of investigation is the imaging of meteorite impacts on the moon including methods intended to detect spurious flashes, e.g. cosmic rays or noise, and prevent them from being interpreted as genuine impacts. Relevant results of GLR projects have been published in various places (cf. e. g. [3,4]).

Topics of *Selenology Today*: The most important topics covered by *Selenology Today* include:

Lunar domes. The GLR group has an ongoing project to study lunar domes. In 1980 Head and Gifford published a catalogue of 81 well-confirmed lunar domes [5]. An amateur lunar dome catalogue was compiled in the 1960s as part of a joint effort between the Association of Lunar and Planetary Observers (ALPO) and the British Astronomical Association (BAA) [6]. In 1992, a revised lunar dome catalogue was published [7]. It contains 713 domes but also includes erroneous and incomplete data. When ALPO and the BAA first began their dome catalogue, observers were using different maps. Some of the domes in the catalogue were reported and recorded multiple times resulting in multiple observations of the same dome. But why is there only limited topographic data about lunar domes? Most lunar mare domes can only be observed under oblique illumination. Consequently, the Lunar Orbiter images, mostly acquired at solar altitudes between 20° and 30°, display steeper effusive mare domes like e. g. the Hortensius dome field, some (but not all) of the domes near Milichius, the Marius Hills, and the Rümker complex. The lower domes in Mare Tranquillitatis, however, are invisible in the Lunar Orbiter images. An important drawback of these images is that they are not suitable for photogrammetric analysis aiming at generating topographic data due to the lack of geometric and photometric calibration. Images from the Clementine spacecraft, despite being well-calibrated, could only be used to derive topographic maps of the lunar polar regions by stereophotogrammetry [8]. In the equatorial regions of the Moon, where the lunar mare domes are situated, Clementine images were acquired at local lunar noon and therefore at high illumination angles, making these images neither suitable for stereophotogrammetry nor photoclinometry or shape from shading analysis. Brungart [9] compiled a catalog of 261 domes reporting their coordinates, diameters, heights, slopes, and morphologic characteristics, utilizing the Orthographic Lunar Atlas [10] consisting of telescopic photographs. Brungart determined values for dome heights and flank slopes based on shadow length measurements but at the same time the obtained results merely represented an estimated order of magnitude. As an example, for the well-known domes Arago α and β in western Mare Tranquillitatis a height of 700 m and 800 m with an average slope of 5.5° and 6.0° is reported, respectively. Results obtained by photoclinometric and shape from shading analysis based on high-resolution telescopic CCD images [4] indicate lower heights of 330 m and 270 m along with slopes of 1.5° and 1.3°, respectively. It is shown by Wöhler et al. [4] that the height estimates by Brungart [9] are systematically too high by a significant amount. In this context it is often favourable to combine telescopic and spacecraft data; e.g. the corresponding Clementine UVVIS data set can be readily obtained [10]. As a result of a GLR project, a novel classification scheme for lunar domes is presented in [4] which is based on their spectral and morphometric properties. Given the diameter, height, and volume of a lunar dome, rheologic quantities such as effusion rate and duration of the effusion process can be inferred based on geophysical modelling [12]. In *Selenology Today*, known and especially previously unreported lunar domes are routinely described in terms of these novel approaches [13,14]. A simple approach to apply photoclinometry-based image evaluation methods in a standard PC software environment is discussed by Evans [15]. Topographic measurements have also been used to determine data regarding lunar tectonic faults [16], for many of which, surprisingly enough, no accurate height and slope data are available to date.

Lunar photometry and spectrophotometry. The second issue of *Selenology Today* contains a handbook on lunar photoelectric photometry [17]. Another work reviews the methods used to create and interpret false color and ratio images of lunar features derived from multispectral Clementine UVVIS and NIR data. It also and explains how these data are used to determine lunar geologic and mineral composition of the soil [18]. Further works were carried out in highland regions, e.g. craters were imaged through a small telescope using 50 narrowband filters covering the spectral range from 500 to 1000 nm in 10 nm increments. Additional imaging was performed using a near-infrared camera and 23 filters covering the range from 990 nm to 1500 nm. Multispectral images from both data sets were co-registered and calibrated against the Apollo 16 landing site. The purpose of the analysis was to compare absorption trough characteristics to Clementine color albedo images and to compare results with Clementine five-band spectral data [19].

TLP and critical assessment. The nature and reality of transient lunar phenomena (TLP) is still an open problem for the professional lunar science community. Lena [20] shows that TLP #1027 in the Cameron catalog is not a TLP but the normal appearance of this crater. Many other TLP reports involving events during local lunar sunrise may actually represent unusual, but similarly normal, appearances [21].

Historical Notes. A section in *Selenology Today* is devoted to articles of historical interest. One contribution focuses on drawings of lunar rilles in the middle of the 19th century by the German selenologist Julius Schmidt [22]. Another work looks back at some little known drawings of the Moon by the great early 20th century selenographer Walter Goodacre [23].

Conclusion: Advanced amateurs may be interested in studying the Moon with modern observational methods, using images taken in multiple colors or under oblique illumination very close to the terminator, showing subtle topography not apparent in spacecraft imagery. Especially, modern high-resolution telescopic CCD imagery in combination with spacecraft data reveals novel insights into the topography and geology of the Moon and the processes that formed its surface. *Selenology Today*, published by the Geologic Lunar Research (GLR) group, provides a forum to share these findings with the lunar science community.

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