Lunar Domes in Manilius and Hyginus Region. KC Pau[1] and R. Lena[2]; [1]Flat 20A, Fook Chak House, 17 Po Yan Street, Hong Kong; kcpaulhk@yahoo.com.hk; [2]ALPO and BAA Lunar Section coordinator of the Lunar Domes programme,Via Cartesio 144, sc. D, 00137 Rome, Italy; raffaello.lena@alpo-astronomy.org.

Introduction: The region to the south and southwest of Mare Imbrium is characterised by mare patches and highland remnants that have been scoured by Imbrium impact ejecta [1]. In this contribution we examine some lunar domes, identified using CCD terrestrial image, LROC WAC imagery and LROC WAC-based GLD100 dataset [2].

Some domes have already been measured in previous works [3] and are reported in brackets (Fig. 1), while the examined domes near Manilius and Hyginus region are reported in white label.

The examined domes are characterized and classified according to classification scheme introduced in [3].

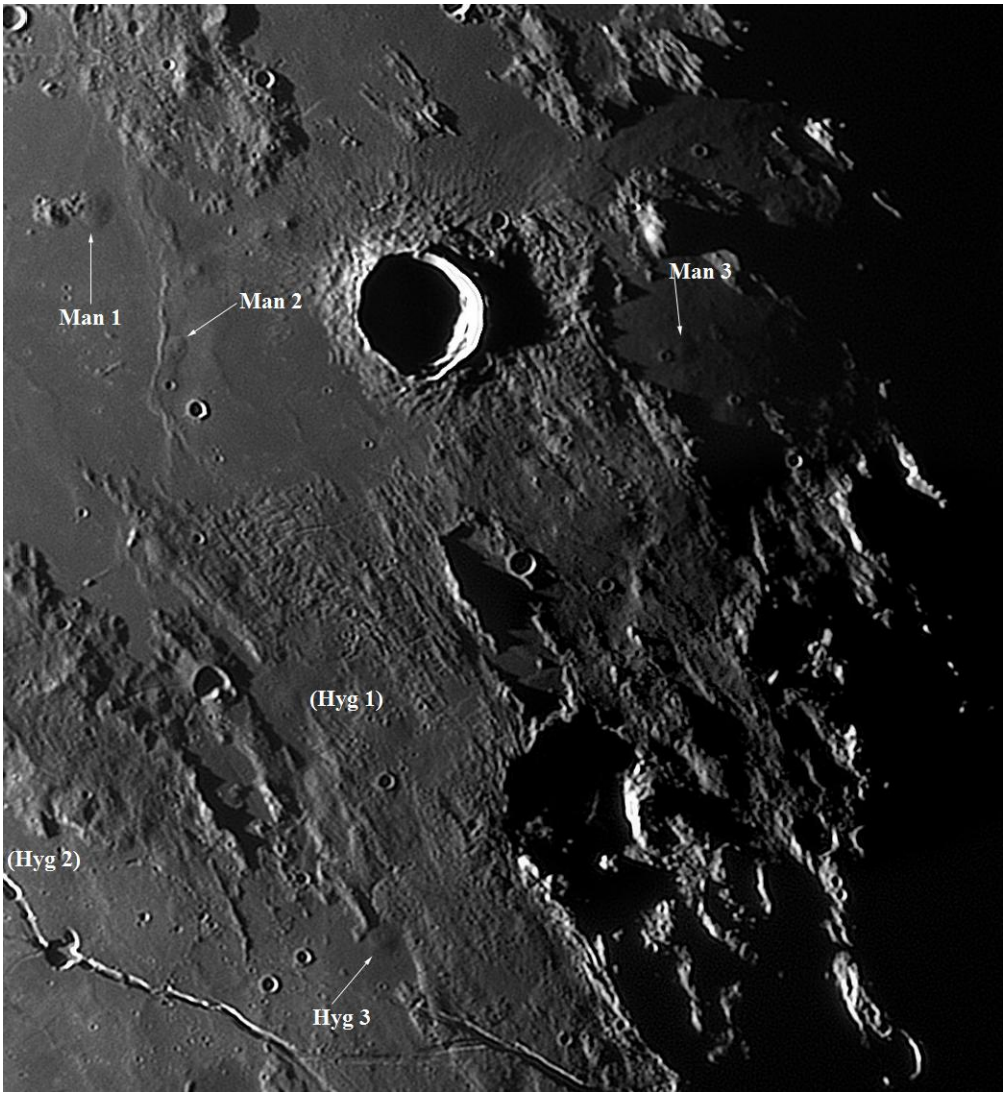

Fig. 1. CCD image of the examined region including domes in Manilius and Hyginus region. The image was taken by Pau on November 2, 2017 at 13:29 UT, using a 250 mm f/6 Newtonian reflector and a QHY CCD camera (Pau).

Dome Manilius 1: The dome termed Man 1 is located at 5.77º E and 14.14º N, with a diameter of 10.6 km and a height of 185 m, yielding an average flank slope of 1.9° (Fig. 2). The dome edifice volume is determined to 8.1 km³. The rheologic model yields an effusion rate of 155 $m^3 s^{-1}$ and a moderate lava viscosity of 2.0 x 10^6 Pa s. It formed over a period of time of 1.6 years. The Clementine UVVIS spectral data of the dome reveal a 750 nm reflectance of R_{750} = 0.0983, a moderate value for the UVVIS col-

our ratio of R_{415}/R_{750} = 0.6181, indicating a moderate TiO_2 content, and a weak mafic absorption with R_{950}/R_{750} = 1.0838, indicating a high soil maturity. According to the classification scheme for lunar domes [3] this dome belongs to class C_2. Domes of class C_2 are characterized by gentle flank slopes, moderate volumes which are higher than those of class A.

Dome Manilius 2: The dome Man 2, located near a ridge and to the north of Manilius D, lies at coordinates 6.70 º E and 13.80° N, with a base diameter of 8.0 km. The height amounts to 80 m yielding an average flank slope of 1.14°. The edifice volume is determined to 2.5 km^3. The rheologic model yields an effusion rate of 200 $m^3\ s^{-1}$ and lava viscosity of 7.4x 10^4 Pa s. It formed over a period of time of 0.3 years. The Clementine UVVIS spectral data of the dome reveal a 750 nm reflectance of R_{750} = 0.1003, a moderate value for the UVVIS colour ratio of R_{415}/R_{750} = 0.6191, indicating a moderate TiO_2 content, and a weak mafic absorption with R_{950}/R_{750} = 1.0727.

Man 2 belongs to class C_2 with a tendency towards class A due to its small diameter and lower edifice volume.

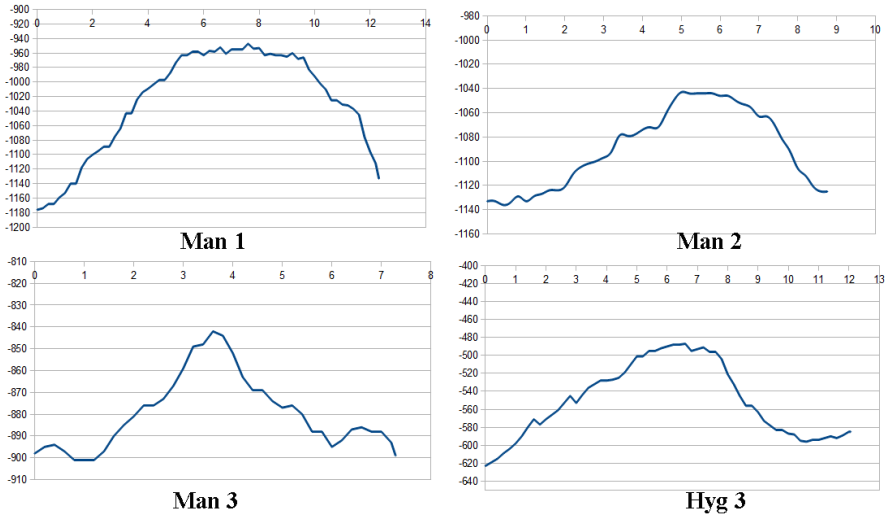

Fig. 2. LRO WAC-derived surface elevation plot of an east to west cross-section of the examined domes.

Dome Manilius 3: It is located in Lacus Lenitatis, at coordinates 11.70º E and 14.36° N, with a diameter of 7.0 and height of 55 m, corresponding to an average flank slope of 0.93°. The dome edifice volume amounts to 1.1 km³. The low slope and edifice volume of the dome Man 3 yields a high effusion rate of 220 $m^3\ s^{-1}$, a low lava viscosity of 1.7 x 10^4 Pa s, and a short duration of the effusion process of only 0.15 years or less than 4 months. It has a rather low 750 nm reflectance of R_{750} = 0.0945, a moderate value for the UVVIS colour ratio of R_{415}/R_{750} = 0.6345, indicating a moderate to high TiO_2 content, and a weak mafic absorption with R_{950}/R_{750} = 1.0857. It belongs to Class A. Domes of this class display small to moderate diameters between 5 and 13 km with very low flank slopes (<1°) and volumes and have been formed by spectrally blue lavas of higher R_{415}/R_{750} spectral ratio.

Dome Hyginus 3: we determine the morphometric and spectral properties of the dome termed Hyg 3, which was previously described in a previous work [4] but no characterized in height, slope and volume. It has a base diameter of 10.0 km. The height is determined to 120 m yielding an average flank slope of 1.37°. The edifice volume is determined to 4.7 km^3. The rheologic model yields an effusion rate of 210 $m^3\ s^{-1}$ and lava viscosity of 3.1 x 10^4 Pa s. It formed over a period of time of 0.7 years. The Clementine UVVIS spectral data of the dome reveal a 750 nm reflectance of R750 = 0.0989, a value for the UVVIS colour ratio of R_{415}/R_{750} = 0.6412 indicating a moderate to high TiO_2 content, and a weak mafic absorption with R_{950}/R_{750} = 1.0709. It belongs to class C_2, as introduced in [3].

References: [1] Wilhelms (1987), *The geologic history of the Moon, USGS Prof. Paper* 1348; [2] Scholten et al. (2012), *J. Geophys. Res.* 117, doi:10.1029/2011JE003926; [3] Lena et al. (2013), *Lunar domes: Properties and Fomation Processes. Springer Praxis Books*; [4] Lena & Douglass (2006), *The Strolling Astronomer* 48(2), pp. 18-23.