

Observations for August have been received from: Clive Brook (UK), Marie Cook (Mundesley, UK), Robin Gray (Winnemucca, USA), and Brendan Shaw (UK). So far few observations have been received for the September's spurious color study, but some images were submitted by Martin Mobberley and a visual report by Marie Cook. On 2004 Aug 31 Clive Brook was observing Gassendi and reported "*a slight chestnut brown coloration in the dark area on the crater floor to the north of the central mountain leading to Gassendi A – the effect lasted for about two minutes between 22:30 and 22:35UT*" – was anybody else observing around this time? Clive phoned me later but the effect had gone – I put out a limited alert to a couple of observers in the USA but results so far have been negative.

Last month we talked about spurious color - this month I will discuss true permanent color on the lunar surface. Now this is not easy because the Moon for most people is a very grey object. However there are some regions that can be seen visually to have a faint hint of color when viewed through wide field, low magnification eyepieces. 1) Aristarchus has a blue tinge, 2) "Wood's Spot" is a plateau area on the NW of Aristarchus that has a slight reddish hue, 3) in the past permanent subtle hints of red have been seen on the floors of Fracastorius and Bullialdus craters, 4) the vast mare areas have faint shades of greens, browns, purples and other colors, 5) most geologically recent craters or landslips on steep walls are slightly bluish due to the fact that space weathering has had less time to shallow out mineral absorption bands. For those of you interested in seeing colored areas on the Moon, the following web site shows a medium resolution global mosaic of the colors at 415nm (blue), 750nm (green), and 950nm (red). Note this is not quite natural light, but as close as we can obtain from the Clementine spacecraft... http://cps.earth.northwestern.edu/MOON/clem_color.html.

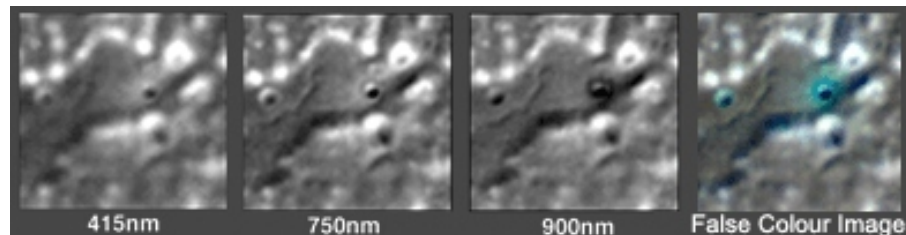


Figure 1: Clementine UVVIS images of the far NE end of the Alpine Valley – north is at the top. Far left image at 415 nm (blue light), left image at 750nm (red light), right image at 900nm (in the near IR), far right image is a false color composite: blue=415nm, green=750nm, red=near IR. The individual color channels have been calibrated by least-squares fit stretching in brightness and contrast to give an overall background grey color.

For those of you equipped with high resolution CCD cameras with filters, figure 1 presents a challenge in terms of high resolution imaging and color. Figure 1 shows an apparent a 1 km diameter craterlet with a strongly colored 2 km diameter halo. The latter, at 1" diameter, should just about be detectable under the best seeing conditions close to Full Moon when there is minimal shadow from the walls - but probably only if your CCD camera can selectively image in the visible and in the near IR. There is a very slight chance that it may have a hint of color for visual observers too, but probably this is pushing at the limits of detectability. To the west (left) of this crater is a slightly smaller craterlet with color confined to its interior. Possibly what has happened here is that underneath the present floor, at this end of the Alpine valley, lies some material that is reflective in the visible but dark in the near IR. The impact from the larger of the two craters was deep enough to penetrate into this layer and distribute the material over its ejecta blanket. The second craterlet is slightly smaller/shallower and either did not excavate enough of this layer, or perhaps the layer is deeper or less extensive to the west? Just to ensure that this was not a LTP I checked the same area again on Clementine images from orbits on three different months and it was present on all three. There are other similar colored halo craterlets elsewhere on the Moon that can probably be detected using high-resolution color CCD imaging from Earth using narrowband filters in the visible and near-infrared.

At least two observers have been attempting color imaging: Both Brendan Shaw and Martin Mobberley have sent me some excellent examples in recent months and these are illustrated on the "observations received" web site. Also Rik Hill (ALPO, Tucson) has emailed me some high resolution images taken through a 665nm filter. As for tips and advice in taking color images: 1) Infrared blocking filters are essential when using filters down the visual end of the spectrum as traditional gelatin filters such as Kodak Wratten 15 etc leak near IR. 2) refocus in each filter if you have glass transmission optics anywhere in the camera or telescope system, 3) monochrome images through three separate narrow band filters are better than a single color CCD camera as the latter has a lower effective resolution, 4) when taking images through each of the filters try to keep the image window on the same part of the Moon with minimal displacement, 5) register the images together manually – the Moon may have moved slightly in between the exposures – for precise alignment you can enlarge the images by 2-3x, register the color components together precisely and then resample (shrink) the image back to its original size, 6) there can sometimes be internal reflections and scattered light from the filters – so try taking a second 3-filter set of images with the image displaced should help determine what colors may be from glare and which are real – also it is a good way to confirm local color changes that maybe LTP! 7) Once you have registered your 3 filter images together use the histogram of each channel to adjust the brightness and contrast so that the image mostly appears grey when viewed in color e.g. do a contrast stretch in each channel between +/-3 standard deviations on the mean brightness.

For predictions of repeat illumination/libration for past LTP, see the following web site: <http://www.lpl.arizona.edu/~rhill/alpo/lunarstuff/ltp.html>.

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