

# Two strange formations on the Moon

## “O’Neill’s Bridge” and “Larrieu’s Dam”

Until the USA Lunar Orbiter photography in the late 1960s, the Moon’s surface was not mapped in the fine detail that it is now. Observers often found strange shadows under certain lighting conditions which were hard to explain. Some wild “discoveries” were made!

One object from the 1950s was the so-called “O’Neill’s Bridge” announced in 1953 – *which does not exist*. On the other hand, “Larrieu’s Dam” from 1955, is an interesting, misshapen crater that exhibits what looks like a straight road on top of a dam, crossing dark water.

***Have a look at these for yourself and see what you find!***

### “O’Neill’s Bridge”

#### Basic data and history

- General location: Western (modern system of Lunar EW) shore of Mare Crisium.
- Detailed location: Near 49.4°E/15.2°N. Between the two, facing promontories called “Promontory Olivium” and “Promontory Lavinium”. (See location photo next page).
- Brief description: This formation was claimed in 1953 by the amateur astronomer J J O’Neill to be an immense, 12 mile long, natural arch or bridge between these two promontories.
- Observing: *For after-Full Moon viewing*, a Sun’s Selenographic Colongitude (SSC) of about 127° is the time to observe. (Note: a description of SSC is given at the end)
- Early history: O’Neill saw what looked like the shadow of a huge bridge and an apparent ray of light going under a “bridge” and out on to the Mare. Many observers at the time had a look. Some, including the eminent Hugh Percy Wilkins and Patrick Moore, supported O’Neill’s claim. (Patrick Moore later retracted his belief). Soon afterwards, Wilkins and Moore finished their three hundred inch map of the Moon, which was the largest, hand-drawn Lunar map ever made. This was also reproduced in their book “The Moon”. I am very fortunate to have bought one of the first editions which, I believe is now rare and valuable. The entry in it says ***“This tiny (!) natural arch was discovered by J J O’Neill in 1953 and confirmed by Wilkins. It has given rise to much controversy”***. This entry was removed from later editions because Wilkins, in particular, received so much ridicule that he withdrew from the astronomy world. Later, claims for the bridge said that it was only 2 miles across! It was also not quite where the original claim said.
- More recent history: The NASA LROC (Lunar Reconnaissance Orbiter Camera) craft took a photo of a very much smaller (10 to 20 metre) bridge which would appear to be what’s left of a lava tunnel. This is quite reasonable, and I myself walked across a small one in Iceland a few years ago. So there is a bridge – but not one that you and I can see!

## Drawings and photos (All are South-up and not mirror-imaged).

### My own drawings and photos.

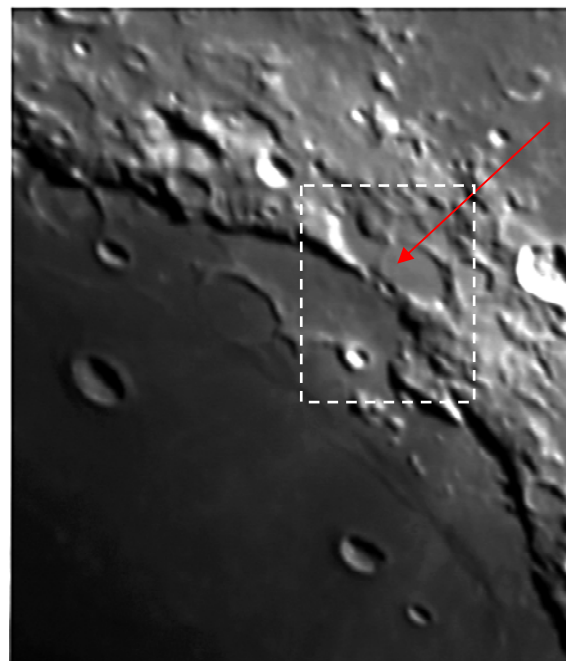
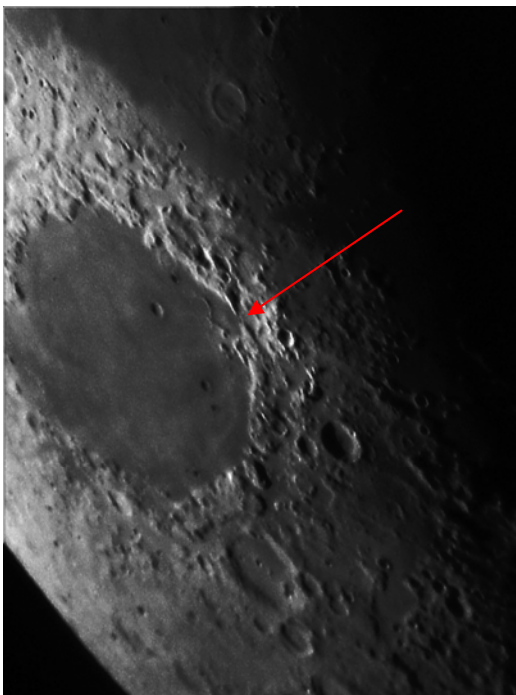
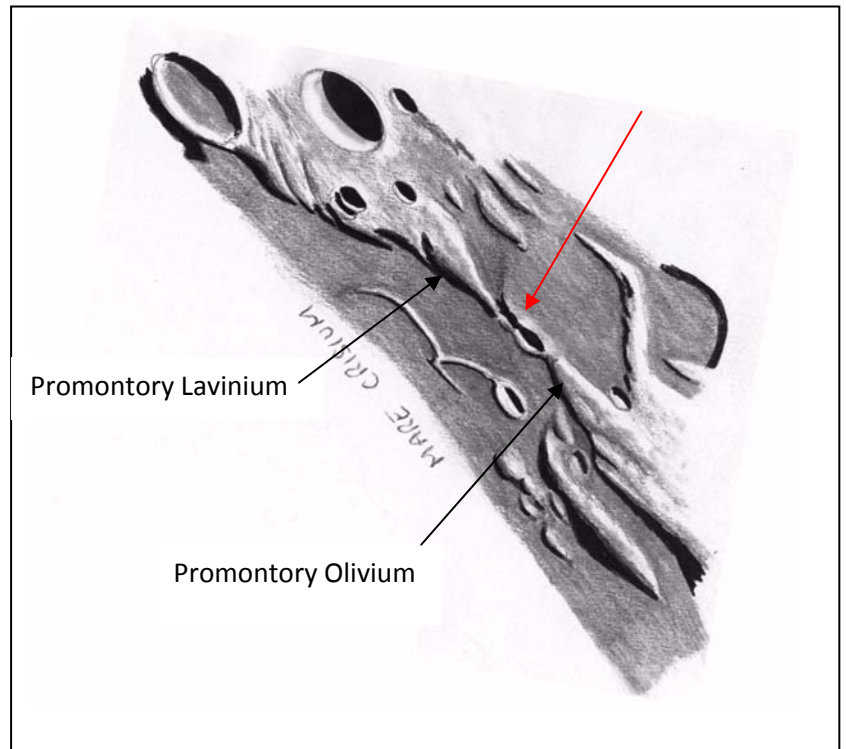
My one and only drawing was made on 2<sup>nd</sup> November 2001, at 2220 to 2320 GMT, SSC was about 115°. I used a magnification of x335 on the Cody Astronomical Society's Zeiss 150mm refractor. Seeing fairly poor!

This shows the two promontories almost meeting.

The red arrow points at roughly where the original claim for O'Neill's Bridge was supposed to be. I saw what seems like a larger crater and perhaps a smaller one in line with it.

My first photo, below, left, shows the area of the Moon concerned. SSC unknown.

The second, right, at SSC of 114° shows about the same resolution and lighting as the drawing.



Nothing seemed to me to indicate a bridge! The box (right) refers to the next page's photo.

Other drawings and photos (inverted, as required, to be South-up)

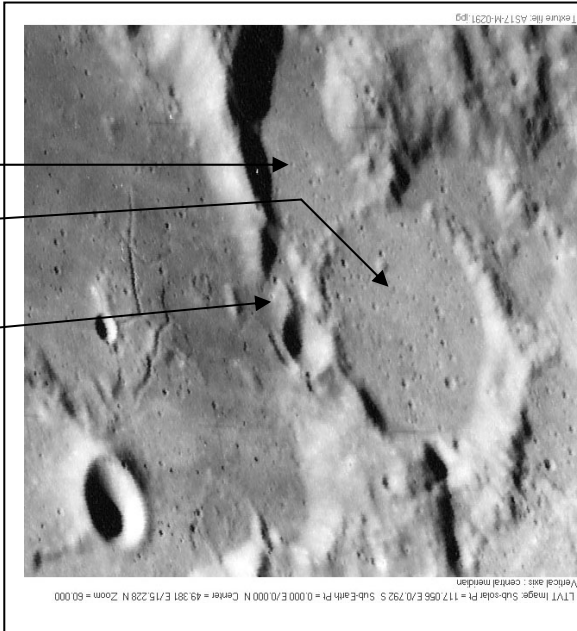
Interested observers should consult the Internet which abounds with articles, drawings and photos. Apart from that, Sky and telescope had an article in the January 1998 edition which covers the ground very well. Here is a selection from the Internet.

This photo was taken by Apollo 17. The Mare is to the left. It shows just the area (square on the previous page right-hand photo), of the two squashed craters Proclus P

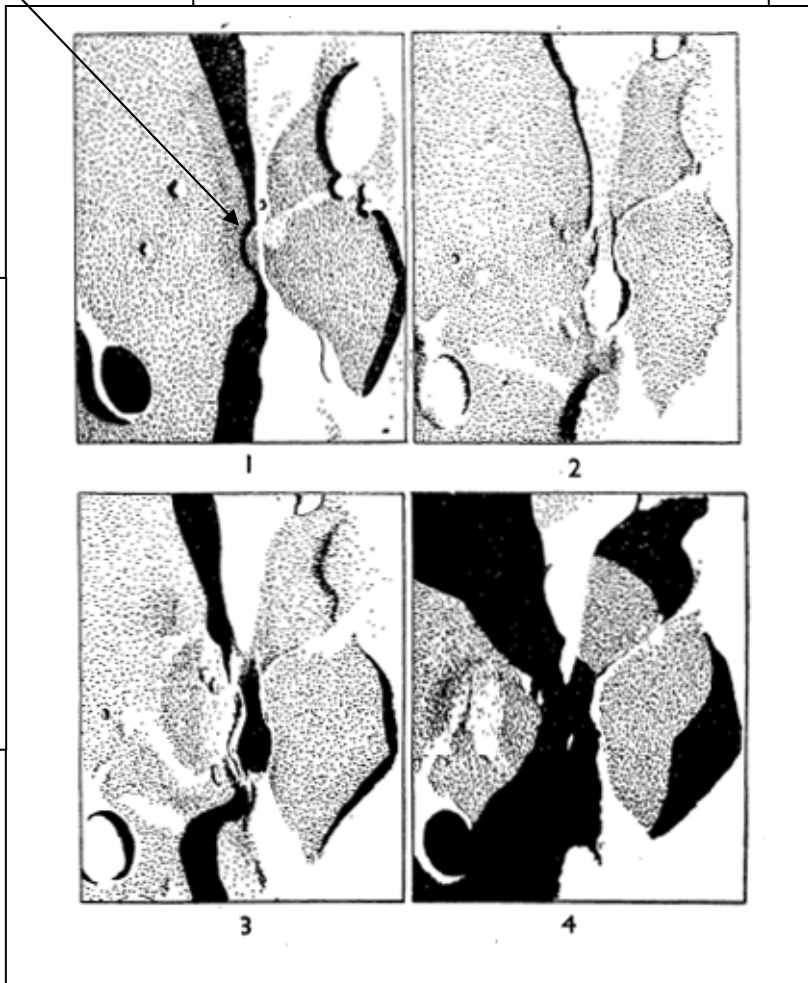
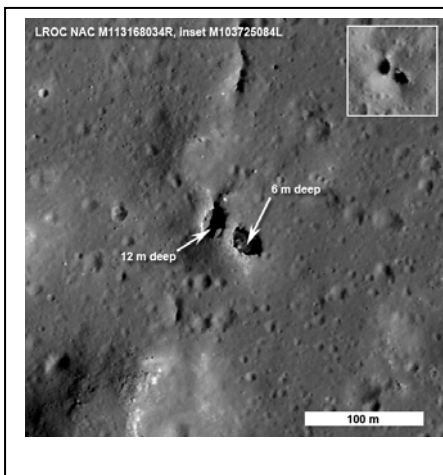
and Glaisher X.

The supposed shadow of the "bridge" is somewhere here.

The 4 drawings below are at various sun-angles. They are oriented the same way as my photos and drawing, with the squashed craters to the right of the promontories. Bridge shadow?



The bottom-left photo is of the real very small lava-tube bridge photographed by the LROC and mentioned earlier.



## The Internet

I typed into Google “astronomy, moon, O’Neill’s Bridge” and got lots of articles, as listed below, in the order they appeared on the first page. *The words in blue italics are my comments.*

1. [\*\*Astro-Challenge: Spotting O'Neill's Bridge.\*\*](#) : Astro Guyz. *A good description and area photo.*
2. [Stephen James O'Meara's Secret Sky: O'Neill's illusion - \*\*Astronomy.\*\*](#) *Ref: astronomy magazine article 2010, drawing and Apollo 17 photo.*
3. [the-moon - O'Neill's Bridge.](#) *Two good photos and discussion.*
4. [\[PDF\] Cosmic Messenger.](#) *Short article.*
5. [Telescope Reviews: The O'Neill Bridge Illusion on 6-18/6-19.](#) *This is the Cloudy Nights site with inputs from observers.*
6. [UFOs - scientific research: O'Neill's bridge](#) *Little value.*
7. [Anybody remember an older "moon hoax"? \[Archive\] - Bad Astronomy ...](#)*Lots of chat.*
8. [Bridge on the Moon discussed in rare audio tape](#) *Very interesting, but poor quality audio tape. NASA LROC very close-up photo of a very small arch or bridge.*
9. [1956 radio interview regarding "bridge" on the moon., page 1](#) *Same as No 8 above.*
10. [Lunar Land Bridge](#) *Same as No 8 above, but 4 good drawings too.*

## “Larrieu’s Dam” or “Polybius K”

### Basic data and history

- General location: North-east foothills of the Rupes Altai (modern system) scarp.
- Detailed location: Near 25°E/25°S. About 75Km SSW of Polybius.
- Brief description: Observations under the right Sun-elevation shows quite a striking very straight, thin, bright line about 15Km long, which crosses an area of shadow, rather like a brightly-lit roadway across a dam filled with dark water.
- Observing: SSC of about 335° (First Quarter) or about 146° to 153° (Third Quarter) are the approximate times to observe the effect.
- Early history: The BAA Journal dated April 2008 and the BAA Lunar Section Circular dated August 2008 carry good features about this. M.Larrieu of Marseilles brought this lunar feature to the attention of the editors of a short-lived newsletter called Vega, whose January 31, 1956 issue carried an article. Larrieu’s original May 27, 1955 drawing is reproduced as Fig 2 of the BAA Journal, together with Fig 3, which is his follow-up drawing. Other drawings and photos follow. The BAA Lunar Section followed up with an article in its August 2008 Circular. This adds three more drawings.
- More recent history: Various spacecraft have taken excellent photographs which clearly show that the effect described comes from sunrise illumination of the straight, northern wall of the “D-shaped” crater called “Polybius K”. The Internet has very few references.

## Drawings and photos

### My own photos

I took several photographs as follows:

10/11/06 SSC = 143° Good

22/11/06 SSC = 335° Very poor

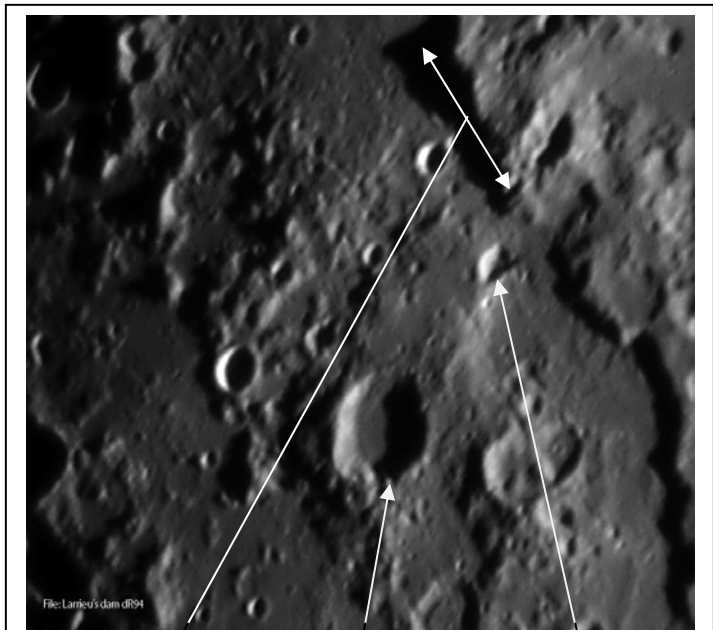
22/04/07 SSC = 335.2° Poor

20/09/08 SSC = 153.2° Good

19/10/08 Sun's SSC = 146.9° V. Good

The right hand photo was taken on 19/10/08. It shows its location.

Left hand below was taken on 20/09/08 and the right-hand one on 22/11/06, showing the "dam".

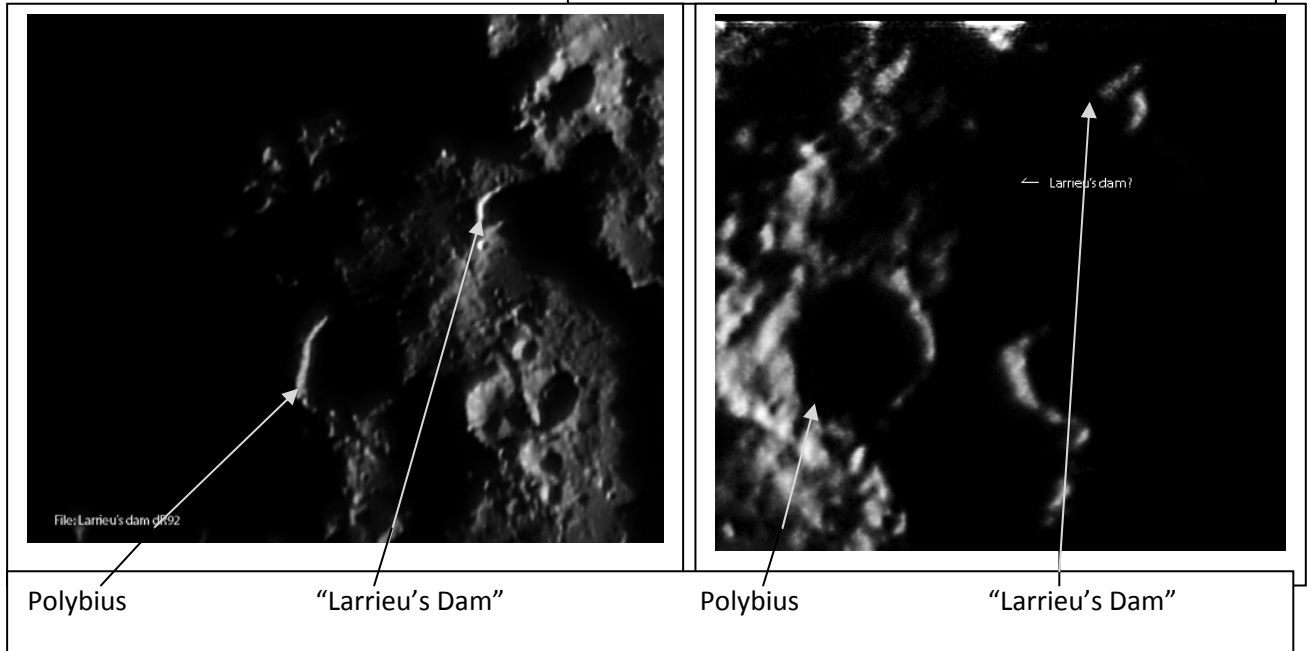


Altai Scarp

Polybius

"Larrieu's Dam"

(Or Polybius K)



Polybius

"Larrieu's Dam"

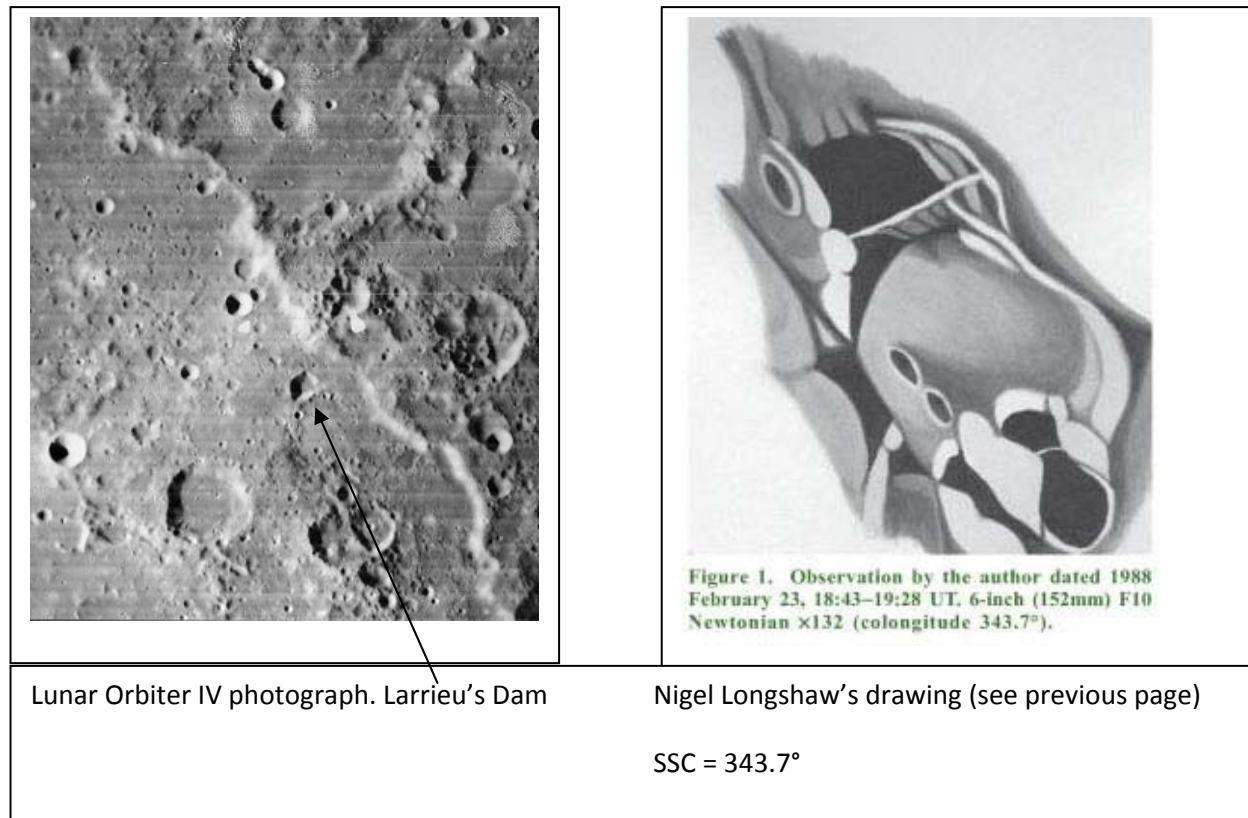
Polybius

"Larrieu's Dam"

### Other drawings and photos

Nigel Longshaw's drawing from the BAA Journal dated April 2008 is shown on the right of the next page. On the left is a Lunar Orbiter IV photo.

The left-hand photo was taken by Lunar Orbiter IV and shows the real shape of Polybius K as a “D” with one wall becoming “Larrieu’s Dam” under the right lighting conditions.



Other drawings can be seen on the Internet reproduction of the BAA Lunar Section Circular.

The Internet – this is about all I could find.

1. [Polybius \(crater\) - Ask.com Search](#)
  2. [polybius \(crater\) - Ask.com Search](#)
  3. ['Larrieu's Dam'; the 'rediscovery' of a seldom explored ... This has the BAA article](#)
  4. ['Larrieu's Dam'; the 'rediscovery' of a seldom explored ...](#)
  5. [Note on an early attempt to correlate visual and UV studies of Venus](#)
  6. [the-moon - Unofficial Names \(G to L\)](#)
  7. [the-moon - Unofficial Names \(M to R\)](#)
  8. [J. Brit. Astron. Assoc. : Index to Volume 118 \(2008\)](#)
  9. [\[PDF\]](#)
- [Index to Volume 118 \(2008\)](#)
10. [\[PDF\]](#)

[LUNAR SECTION CIRCULAR](#) [This is very good.](#)

## When should I look to see these features, as shown above?

All photos or drawings of the Moon should include the date and time of observation. The Moon's Age (days) or Phase (value 0 to 1, or %) is often added to show the line of the terminator. While helpful, these are unsatisfactory descriptions to predict exactly when you should look to see the same view with the same lighting. Here are the reasons.

If the Moon presented exactly the same aspect to us on the Earth at all times, then its zero Latitude (equator) line and its zero Longitude ("Greenwich Meridian" equivalent) would always be straight lines crossing at the exact centre of its disc.

If this were the case, then at exactly First Quarter for example, the Terminator would lie exactly down the centre of the Moon and the sun-angles of all features would always look the same at First Quarter.

In fact, the Moon only rarely and momentarily presents this ideal view to us on the Earth. Its elliptical orbit about the Earth makes it change its orbital speed during each month. Since it spins at a constant rate, this orbital speed change makes it appear to us to swing slightly towards its east or west limb at different times. So features on the Moon's zero longitude usually appear as far as 8° to one side or the other of the average centreline. This effect is caused "Libration in Longitude".

In addition, the Moon's equator is inclined by about 6.4° to its orbital plane. This makes it appear to us to tilt upwards or downwards towards its north or south pole at different times. This effect is called "Libration in Latitude" and can be almost 7°.

Since both kinds of Libration are happening at the same time, all features are usually displaced from their average positions at some combined Latitude/Longitude angle. Therefore the sun-angles and shadows will not usually be the same as when there is zero Libration.

A much better, but not perfect measure relating to sun-angle is "The Sun's Selenographic Colongitude" (SSC).

The BAA Handbook says: "The Sun's Selenographic Colongitude is numerically equal to the selenographic longitude of the morning terminator, measured eastwards from the mean centre of the disc. Its value is approximately 270° at New Moon, 0° at First Quarter, 90° at Full Moon, and 180° at Last Quarter. Observers should always quote the west or east longitude, or the morning or evening terminator as appropriate."

I found an example from 2011 data. First Quarter occurred on Feb 11<sup>th</sup> at 0718 GMT. But the Libration in Longitude then was about 6.5°. As a result, the SSC was also about +6.5°, instead of zero (see above). The terminator (and thus the SSC angle) moves at about ½° per hour. Therefore, if you had used the Moon's age instead of SSC, the terminator would have moved some distance and you would have been about 13 hours too late to see the sun-angle that you wanted to.