NASA pictures support biblical origin for moon

Tas Walker

New images from one of NASA's spacecraft have revealed small scarps[1] all over the moon, indicating that it's not cold and dead as has been conventionally believed.[2] The research team led by planetary geologist Dr Thomas Watters of the Centre for Earth and Planetary Studies at the Smithsonian National Air and Space Museum, Washington, DC, published its findings in *Science* journal.[3]

The scarps are relatively small, which explains why they have escaped detection until the high-resolution images now available from the Lunar Reconnaissance Orbiter (LRO) revealed their existence. They are curved like a lobe, with the largest being about 100 metres high and several kilometres long. Most however are only about 10 metres high and much shorter.

The first lobe-shaped scarps on the moon were discovered in the early 1970s from photographs from the Apollo 15, 16, and 17 missions, but those photos only covered the area near the lunar equator. Watters' team has discovered 14 more. Seven of these are toward the lunar poles, which is good evidence that the scarps are a global feature (figure 1).

Crustal contraction

The team suggests that the entire crust of the moon has contracted, creating thrust faults that pushed up localized parts of the surface (figure 2). They proposed that the most likely driving force for the crustal contraction is cooling of the moon's interior. On a global scale the contraction is relatively small: only about 100 m along a moon radius of around 3,500 km.

This discovery has significant implications for ideas about the moon's origin and history. It is consistent with the biblical account but contradicts long-held evolutionary beliefs, which is why it is so surprising in conventional circles.

Current naturalistic thinking has the moon forming some 4.5 Ga ago and consisting of an ocean of lava initially, molten likely over its entire radius. With time the lava solidified and the moon continued to cool until all the heat sources dissipated long ago. For the past 3 Ga the moon is believed to have been cold and dead.

However, these tiny scarps mean that the moon has been cooling only *recently* and is much more dynamic than believed. Their presence directly challenges conventional thinking on the naturalistic origin for the moon, especially its supposed multi-billion-year age.

How did the team determine that the scarps are young? According to NASA:

> "The team believes they [the scarps] are among the freshest features on the moon, in part because they cut across small craters. Since the moon is constantly bombarded by meteors, features like small craters (those less than about 1,200 feet [350 m] across) are likely to be young because they are quickly destroyed by other impacts and don't last long. So, if a small crater has been disrupted by a scarp, the scarp formed after the crater and is even younger. Even more compelling evidence is that large craters, which are likely to be old, don't appear on top any of the scarps, and the scarps look crisp and relatively undegraded."[4] (See figure 3.)

Scarps point to youth

Based on this evidence, the team, wearing their long-age evolutionary glasses, estimated that these scarps cannot be older than a billion years but could be as young as 100 Ma—or even younger. That is quite an age range.

In fact, there is well documented evidence that geological activity is taking place on the moon's surface at the *present* time.[5] This evidence is in the form of transient lunar phenomena, which include "localized colour changes, spots or streaks of light, clouds, hazes, veils and other observations that speak of geological activity on the moon."[6] The earliest reported observations go back 1,000 years and in the early days of the telescope such events were freely reported. Transient lunar phenomena are by their nature ephemeral with most

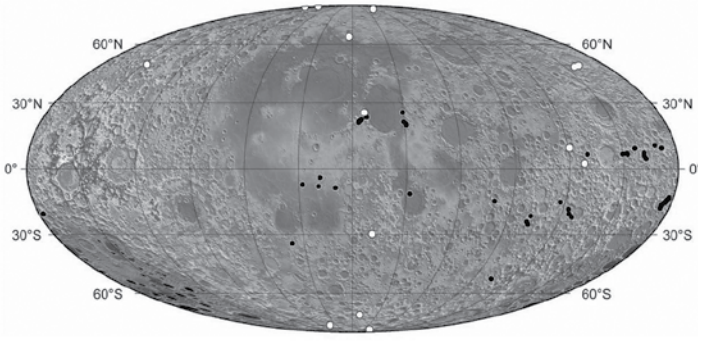

Figure 1. Location of lobate scarps on Moon. Black dots = previously known scarps. White dots = scarps newly detected in LRO images. (From ref. 3, p. 938)

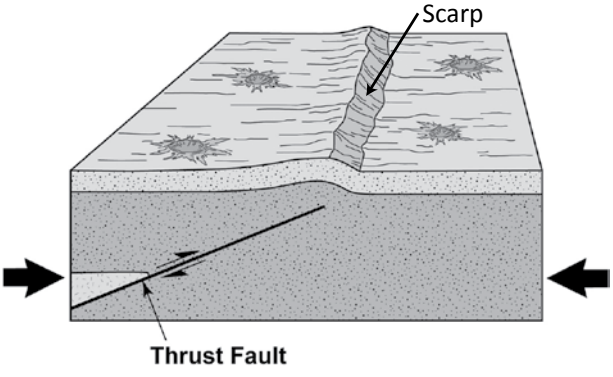

Figure 2. A thrust fault develops when the crust of the moon is compressed. The fault pushes one part of the surface above the rest, creating a steep slope, or scarp. (From ref. 4)

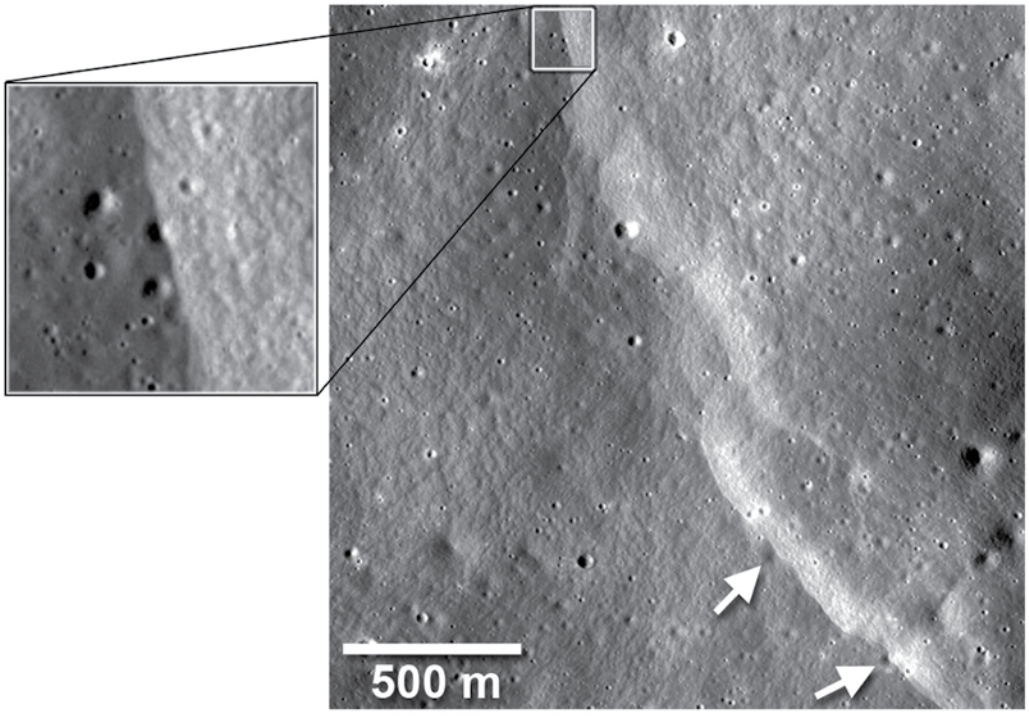

Image from: NASA/Goddard/Arizona State University/Smithsonian

Figure 3. A fault scarp has cut across and deformed several small impact craters (arrows). The fault has carried material up and over the craters, burying parts of their floors and rims. About half of the rim and floor of a 20-m crater (box) has been covered. Small craters are quickly destroyed by newer impacts, so the fault (which is later) is relatively young. (From ref. 4)

reports by a single observer and unable to be independently confirmed. Belief in the evolutionary long-age paradigm has tended to discount the significance of these claims, even to discourage their reporting.

Scarps, however, are a permanent feature on the landscape and their presence can be confirmed by repeated observation.

In order to produce the amount of strain needed to create these thrust faults, the team estimated that the moon's core would need to be surrounded by an ocean of magma. They suggest that such a magma ocean could have been created by large space objects crashing onto the lunar surface during the so-called (and controversial) Late Heavy Bombardment. In the evolutionary time scale this was around 4 Ga ago, which means that it does not really explain the recent contraction. The heat should have dissipated billions of years ago.

To their credit, the team has not ruled out the possibility that the moon may still be tectonically active and forming scarps today. They plan to re-examine the records of moonquakes from seismometers installed by the Apollo missions in the 1970s. These quakes have been attributed to gravitational tides on the moon, meteorite impacts and temperature changes between day and night. However, Watters' team plans to check whether some of the recorded moonquakes can be attributed to thrust faults.

Also, they also plan to compare the new LRO images with the photographs from the Apollo cameras. The aim is to see if there have been any changes in the shapes of the scarps in the last 30 years.[3]

Mega-scarps missing

Lobate scarps have also been found on Mercury. The same process of planetary contraction is believed to have produced the fault scarps which are huge by comparison—scarps hundreds of kilometres long and 1,000 m high. The largest extends more than 1,000 km. These scarps suggest that Mercury was once molten and its crust contracted by a few kilometres as its molten interior continued to cool and shrink.

So why don't we see giant thrust faults on the moon since it is also believed to have been molten once? Although it is slightly smaller than Mercury (over a third of its volume) the contraction of its molten interior should have produced enormous faults. Some researchers suggest the faults did exist once but meteorite bombardment erased them with time. However, their absence is more simply explained by a cooler initial starting temperature, which is the conclusion that team-leader Watters has reached.

Conclusion

The newly discovered fault scarps contradict evolutionary long-age beliefs about the origin and history of the moon but are consistent with the biblical model. They contradict the evolutionary formation hypotheses, which have a molten moon at the beginning. Instead they suggest that the initial temperature of the moon was not much different from its present temperature, consistent with the biblical account. They contradict the billion-year time scale, suggesting instead that Earth's companion satellite is young.

Within the biblical framework the meteor bombardment of the moon likely took place about 4,500 years ago during the Flood.[7,8] The fault scarps discovered are consistent with this sequence of events and the shorter biblical timescale.

References

1. A scarp, or escarpment, is a long steep embankment, or cliff, between two areas of land that are of a different elevation.

2. Chow, D., Incredible, shrinking Moon revealed in photos, *SPACE.com*, 19 August 2010; space.com/scienceastronomy/shrinking-moon-new-lunar-photos-100819.html.

3. Watters, T.R. and 10 others, Evidence of recent thrust faulting on the Moon revealed by the Lunar Reconnaissance Orbiter camera, *Science* **329**(5994):936–940, 20 August 2010; DOI: 10.1126/science.1189590.

4. Neal-Jones, N. and Steigerwald, B., NASA's LRO Reveals 'Incredible Shrinking Moon', 19 August 2010; nasa.gov/mission_pages/LRO/news/shrinking-moon.html.

5. DeYoung, D.B., Transient lunar phenomena: a permanent problem for evolutionary models of Moon formation, *Journal of Creation* **17**(1):5–6, 2003; creation.com/images/pdfs/tj/j17_1/j17_1_5-6.pdf.

6. Whitcomb, J.C. and DeYoung, D.B., *The Moon: It's Creation, Form and Significance*, BHM Books, Winona Lake, IN, pp. 105–127, 1978.

7. Faulkner, D., A biblically-based cratering theory, *Journal of Creation* **13**(1):100–104, 1999; creation.com/a-biblically-based-cratering-theory.

8. Hurlbut, T., Shrinking moon likely cooling from Flood-era impacts, *Creationism Examiner*, 20 August 2010; examiner.com/creationism-in-national/shrinking-moon-likely-cooling-from-flood-era-impacts.

Photosynthetic sea slugs: an evolutionary enigma

Shaun Doyle

Kleptoplasty (also known as *kleptoplastidy* or *chloroplast symbiosis*) occurs across a diverse range of eukaryotic organisms—dinoflagellates, ciliates, foraminifera, and even some sea slugs! It happens when a predator ingests a chloroplast-containing prey (often algae) and retains only the plastids, while it digests the rest. The predator can thenceforth photosynthesise to produce its own fuel. It really is an ingenious principle: why waste energy constantly looking for prey when one can just devour some algae, retain their chloroplasts, and use them for fuel production? It's a great mechanism to have, especially in a resource-limited environment.

Certain types of sea slugs called sacoglossans possess the capacity for kleptoplasty. One in particular, *Elysia chlorotica*, can survive its entire adult life on the photosynthetic products of the chloroplasts it sequesters in the first few days of its adult life from its food source, the intertidal alga *Vaucheria litorea*. Even though the larvae of *E. chlorotica* eat *V. litorea*, they don't retain chloroplasts until after reaching the adult stage of the life cycle and then ingesting *V. litorea*.[1] Researchers have proposed a number of methods.

Most plastid-thieving molluscs do not supply their stolen plastids with required accessory molecules, so the plastids must be replaced periodically, leaving these sea slugs dependent on a continual supply of algae.[2] However, *E. chlorotica* and other sacoglossans maintain their chloroplasts, and recent research suggests that *E. chlorotica* possesses nuclear DNA for photosynthesis.[3–5] Therefore, these sacoglossans possess an *inherent* ability to use and maintain chloroplasts.

Kleptoplasty and endosymbiosis

Evolutionists think that kleptoplasty presents a modern analogue for endosymbiosis, which is the favoured theory for the origin of all eukaryotic organisms.[6] Endosymbiosis posits that a large, anaerobic prokaryote ingested a smaller aerobic prokaryote and retained it permanently, modifying it to interact beneficially, and even reproducing it during cell division. This is supposed to have happened a couple of times with different prokaryotes to explain the origin of membrane-bound organelles, such as chloroplasts and mitochondria, in eukaryote cells. There are numerous problems with this idea,[7–9] and kleptoplasty provides no support for it either.

The first thing to note is that kleptoplasty involves the sequestration of *chloroplasts*, not whole cyanobacteria. Most of the information to enable photosynthesis is not present in chloroplasts of algae because it is encoded in the nucleus. So the information needed for photosynthesis couldn't be passed from the chloroplasts to the kleptoplast. Chloroplasts, unlike cyanobacteria, are also completely dependent on an appropriate cellular environment to function. That is what makes kleptoplasty such an amazing phenomenon: the chloroplasts of one organism are sequestered and used by another organism with a *completely different cellular environment*.

Secondly, chloroplasts are not passed to the next generation in kleptoplastic organisms—especially not in sacoglossans—but the nuclear information for chloroplast acquisition, usage, and maintenance is. It's like having everything you need to drive a car—except the engine. This is quite different from what is supposed to have occurred in endosymbiosis, where both the endosymbiont and all its genetic information are supposed to be passed onto the next generation when the host reproduces.

While kleptoplasty may look like the evolutionary notion of endosymbiosis on the surface, it turns