WEYMOUTH ASTRONOMY

Sky Watcher

Volume 12, Issue 7
10 November 2017

Trips / Events

Ideas for trips and events always welcome!

events@weymouthastronomy.co.uk

- **15 Nov CADAS—Bob Mixon—8 Great Astronomers**
- **5 Dec WAS—Andrew Coates—Looking for Life on Mars**
- **20 Dec CADAS—Christmas Social and members short talks**

Programmes for many local Societies will be available in the near future.

Check their websites for more details.

If you are interested in giving a talk or workshop, let the organisers know. They like to offer new titles in their programme line-up.

WAC Upcoming Events:

8 Dec—Christmas Quiz Night

More to come in 2018

Plans for informal viewing nights will take place after the monthly meetings, weather permitting.

WAC News—

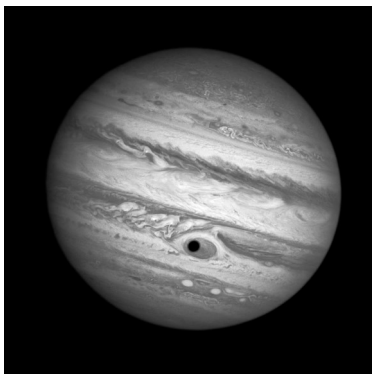
Occultation of Aldebaran 6 Nov 2017

Chris has been busy in the 1c clear crisp wee hours this month to capture the morning star Aldebaran being occulted by the gibbous moon. This is such a tricky subject to photograph successfully, requiring images to be composited together to give a true representation of the observation. It amazes Chris that the human eye can do this naturally however, as the Binocular and Telescope view was automatically adjusted by his own eyes with seemingly no effort at all! A final composite with the pre and post positions of Aldebaran during this occultation event is shown to the right. Well done Chris! Until next month ~ SK

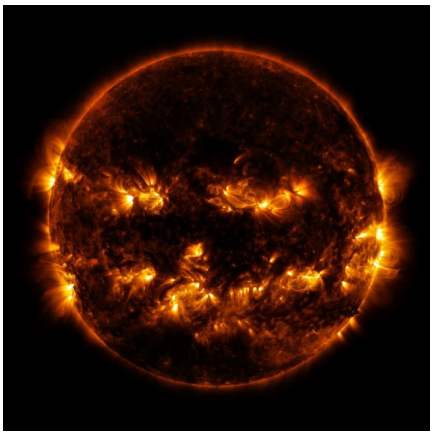
Spooky in Space: NASA Images for Halloween

By Linda Hermans-Killiam

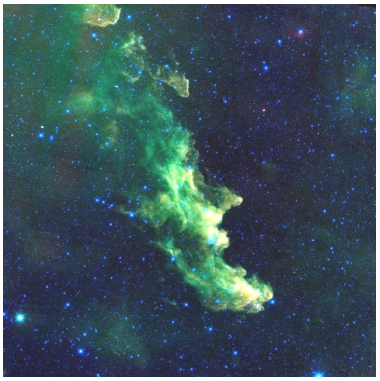
Have you ever seen a cloud that looks sort of like a rabbit? Or maybe a rock formation that looks a bit like an elephant? Although you know that a cloud isn't *really* a giant rabbit in the sky, it's still fun to look for patterns in images from nature. Can you spot some familiar spooky sites in the space images below?



This is a Hubble Space Telescope image of Jupiter. Do you notice something that looks like a big eye peeking back at you? That's actually the shadow of Jupiter's moon Ganymede as it passed in front of the planet's Great Red Spot. Jupiter's Great Red Spot is a gigantic, oval shaped storm that is larger than Earth and is shrinking. It has been on Jupiter for several hundred years, and its winds can swirl up to 400 miles per hour!



This might look like the grinning face of a jack-o'-lantern, but it's actually a picture of our Sun! In this image, taken by NASA's Solar Dynamics Observatory, the glowing eyes, nose and mouth are some of the Sun's active regions. These regions give off lots of light and energy. This causes them to appear brighter against the rest of the Sun. Active regions are constantly changing locations on the Sun. On the day this image was captured, they just happened to look like a face!



Solar Probe (more!)

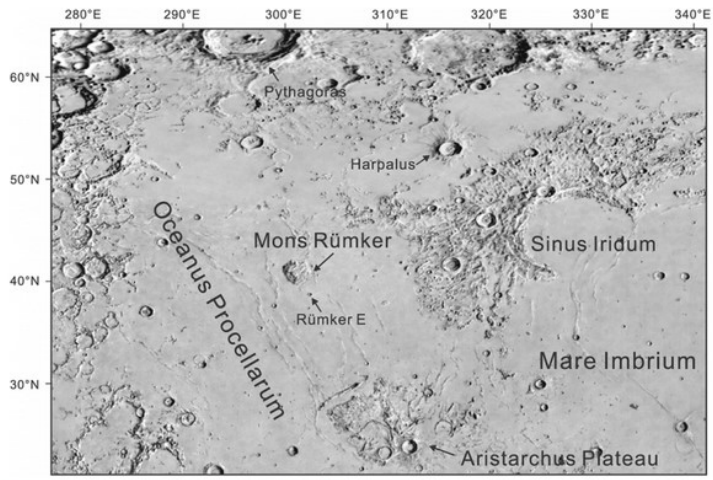
Can you see the profile of a witch in this image? This image, from NASA's Wide-Field Infrared Survey Explorer, shows the Witch Head nebula. The nebula is made up of clouds of dust heated by starlight. These dust clouds are where new stars are born. Here, the dust clouds happen to be in the shape of an open mouth, long nose and pointy chin.

The Black Widow Nebula looks like a giant spider in space. It is a huge cloud of gas and dust containing massive young stars. Radiation and winds from these stars push the dust and gas around, creating a spider-like shape. This image is from NASA's Spitzer Space Telescope.

Did a skeleton lose one of its leg bones on Mars? Nope! It's just an image of a Martian rock. NASA's Curiosity rover captured this image. The rock was probably shaped to look this way over time by wind or water. If life ever existed on Mars, scientists expect that it would be small organisms called microbes. So, it isn't likely that we'll ever find a large fossil on Mars!

Choosing a Lunar Landing Site by Caleb I. Fassett

Although engineering capability and safety are important considerations, the primary goal when choosing an optimal landing site on the Moon for a science mission is to maximize the scientific return. A research article recently published in *Journal of Geophysical Research: Planets* by Zhao et al. [2017] describes two candidate landing sites in consideration for the Chang'e 5 mission, a lunar mission planned by the China National Space Administration, originally slated to launch in 2017 but which has now been delayed. One of the most exciting aspects of Chang'e 5 is that it aims to return up to 2 kilograms of samples to Earth. But from which site should these samples be taken? In the frame is Mons Rümker, a distinctive rise in northern Oceanus Procellarum that is the location of a number of enigmatic domes. Zhao et al. use an impressive array of data from spacecraft launched by Japan, India and the US to describe the geology of potential landing locations in this area. Their observations support the interpretation that the rise and domes are the consequence of extrusive volcanism, some of which might be relatively young (about 3 billion years ago, from the Eratosthenian period). One of the two l anding sites (Site A) is on one of these potentially young volcanic domes; the second (Site B) is on an area of lineated terrain on the northern part of the rise that is interpreted as ejecta from Iridum crater. Both sites are of great scientific interest, but a choice between the two must be made. Experience of previous lunar landings suggest that a few factors typically come into play when seeking the best site.First, it is desirable to explore somewhere with a diverse suite of processes have acted, resulting in a range of landforms and materials. Diversity maximizes what can be explored at one location, but can come with some cost in added complexity; the amount of landing site complexity that a mission should accept is not a straightforward call. Second, having a reasonable hypothesis for the sequence of geologic events and processes that affected a landing site is important for being able to understand in situ measurement once the data have been gathered. In situ observations can then anchor our knowledge of lunar geology from remote sensing. There are obvious tensions here. If a landing site is too complex, it may prove very hard to untangle, limiting both the direct science return of the mission and the ability to broadly extrapolate its findings. If it is too simple, some amount of science return is left on the table. Third, on a planetary surface with previous landing sites, such as the Moon, it is typically worth going somewhere new and different. The argument for this is that planetary surfaces are big, and landing sites are small, so exploring the same place or same kind of place twice may lead to missed opportunities for serendipitous discoveries. On the other hand, going back to the same place a second time might be smart if the value of what was learned during previous exploration outweighs the lost opportunities for unexpected discoveries, though the vigorous debate about sending Mars 2020 rover back to the same location as Mars Exploration Rover Spirit illustrates how this can be controversial. Based on Zhao et al.'s analyses, both of the candidate Chang'e 5 landing sites in their paper score highly on the criteria discussed above: the sites are likely to be diverse, have a reasonably tractable geologic context, and are novel. Site A would be particularly exciting because no prior lunar landing sites have been on a steep-sided dome, and exploring whether these landforms are indeed young is of substantial interest. As acknowledged in the paper, Site B is a bit more confusing, and the origin of its materials is more uncertain: for example, past work has suggested there may be pyroclastic materials at this location but Zhao et al.'s study did not support this conclusion. Regardless of where the next landed missions go, however, Zhao et al.'s paper is an excellent reminder of how much we still stand to learn by going back to the Moon's surface and how exciting the prospect is for lunar sample return for the first time since the 1970s. NASA has recently announced a workshop to be held in January 2018 to examine other candidate landing sites on the Moon that we might explore in the coming decade.



Location of Mons Rümker. Credit: Zhao et al., 2017, Figure 1