WEYMOUTH ASTRONOMY

Sky Watcher

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This month I came across a fascinating article on what is now understood to be the extent of Andromeda's enormous halo. In an article which can be read in its entirety at https://hubblesite.org/contents/news-releases/2020/news-2020-46 it explains that in the most comprehensive study to date, Hubble astronomers have mapped this tenuous plasma, finding that it has a layered structure, with two distinct, nested shells of gas. They also found that it extends 1.3 million light-years from Andromeda—about halfway to our Milky Way—and as far as 2 million light-years in some directions.

At a distance of 2.5 million light-years, the majestic spiral Andromeda galaxy it is so close to us that it appears as a cigar-shaped smudge of light high in the autumn sky. If its gaseous halo could be seen with the naked eye, it would be about three times the width of the Big Dipper—easily the biggest feature on the night time sky.

With the early dark evenings now, I hope you are finding time to enjoy this month's meteor showers and a comet!

Until next time...SLK

The International Space Station: 20 Continuously Crewed Years of Operation

by David Prosper

Did you know that humans have been living in the International Space Station, uninterrupted, for twenty years? Ever since the first crew members docked with the International Space Station (ISS) in November 2000, more than 240 people have visited this outpost, representing 19 countries working together. They have been busy building, upgrading, and maintaining the space station - while simultaneously engaging in cutting-edge scientific research.

The first modules that would later make up the ISS were launched into orbit in 1998: the Russian Zarya launched via a Proton-K rocket, and the US-built Unity module launched about a week and a half later by the Space Shuttle Endeavour. Subsequent missions added vital elements and modules to the Space Station before it was ready to be inhabited. And at last, on November 2, 2000, Expedition-1 brought the first three permanent crew members to the station in a Russian Soyuz capsule: NASA astronaut William M. Shepherd and Russian cosmonauts Sergei Krikalev and Yuri Gidzenk. Since then, an entire generation has been born into a world where humans continually live and work in space! The pressurized space inside this modern engineering marvel is roughly equal to the volume of a Boeing 747, and is sometimes briefly shared by up to 13 individuals, though the average number of crew members is 6.

A complete view of the ISS as of October 4, 2018, taken from the Soyuz capsule of the departing crew of Expedition 56 from their Soyuz capsule. This structure was built by materials launched into orbit by 37 United States Space Shuttle missions and 5 Russian Proton and Soyuz rockets, and assembled and maintained by 230 spacewalks, with more to come! Credit: NASA/Roscosmos More info: bit.ly/issbasics

Trips / Events

Ideas for trips and events always welcome!

events@weymouthastronomy.co.uk

Society Meetings cancelled until further notice—Please check their websites for the latest schedule

In the meantime, the British Astronomical Association has moved their meetings to an online format. Live streamed on release and 'catch-up' on Youtube available. These webinars are Open to All.

https://britastro.org/

BAA live webinars, 7pm every Wednesday

https://www.youtube.com/user/britishastronomical

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:

	Watch website for online options.
11 Dec	A 'socially distanced' Social
8 Jan 21	10 Min Talks
12 Feb	Prof Carl Murray - Cassini at Saturn

ISS (more!)

The ISS photobombs the Sun in this amazing image taken during the eclipse of August 21, 2017 from Banner, Wyoming. Photo credit: NASA/Joel Kowsky More info: bit.ly/eclipseiss

The unique microgravity environment of the ISS means that long-term studies can be performed on the space station that can't be performed anywhere on Earth in many fields including space medicine, fluid dynamics, biology, meteorology and environmental monitoring, particle physics, and astrophysics. Of course, one of the biggest and longest experiments on board is research into the effects of microgravity on the human body itself, absolutely vital knowledge for future crewed exploration into deep space.

Stargazers have also enjoyed the presence of the ISS as it graces our skies with bright passes overhead. This space station is the largest object humans have yet put into orbit at 357 feet long, almost the length of an American football field (if end zones are included). The large solar arrays – 240 feet wide - reflect quite a bit of sunlight, at times making the ISS brighter than Venus to observers on the ground! Its morning and evening passes can be a treat for stargazers and can even be observed from brightly-lit cities. People all over the world can spot the ISS, and with an orbit only 90 minutes long, sometimes you can spot the station multiple times a night. You can find the next ISS pass near you and receive alerts at sites like NASA's Spot the Station website (spotthestation.nasa.gov) and stargazing and satellite tracking apps.

Hundreds of astronauts from all over the world have crewed the International Space Station over the last two decades, and their work has inspired countless people to look up and ponder humanity's presence and future in space. You can find out more about the International Space Station and how living and working on board this amazing outpost has helped prepare us to return to the Moon - and beyond! - at nasa.gov.

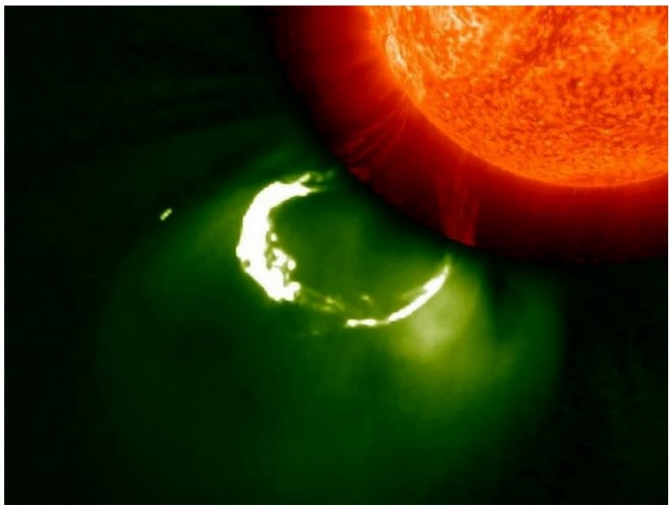
The "Complicated" Complexity of Solar Storms

By Elizabeth Thompson 29 October 2020

The damaging effects of storms, from flooding caused by heavy rain or storm surges to strong winds knocking trees to the ground, are familiar to most people. Fewer, however, are aware of the hazards of solar storms, though these events can disrupt radio communications, knock out electrical power, and damage satellites. With our increasing reliance on technology, solar storm damage is now a greater threat than ever before.

In a new study, *Jones et al.* turned to crowdsourced science to help protect against this hazard by identifying potential patterns in coronal mass ejections (CMEs), vast eruptions of plasma and magnetic field flung from the Sun. The researchers showed participants side-by-side images of numerous CMEs taken by the Solar Terrestrial Relations Observatory (STEREO) spacecraft and asked them to select which one looked more "complicated."

A standard CME is bulb shaped in appearance, with a bright outline, dark interior, and another bright prominence within, but CME structure varies greatly in these images. In choosing the purposefully vague term "complicated," the scientists hoped the participants could draw out patterns that could form the basis of future study. The researchers used participant input to rank 1,111 images from most to least complicated, then analyzed the images.



A coronal mass ejection (CME) is seen in this image captured by the Solar Terrestrial Relations Observatory spacecraft on 7 October 2012. The Sun and the base of this CME are shown in extreme ultraviolet light, and the outer part of the bulb is in visible light. Credit: NASA

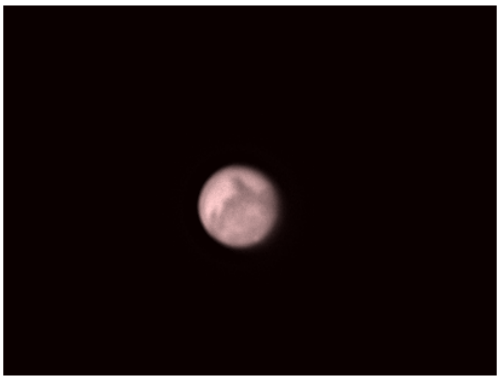
Participants tended to look at a mix of factors to decide whether a CME was complicated. They labeled as more complicated images in which CMEs had a larger angular width, were brighter, and had more detailed interior structures. These patterns stood out to participants, but what do they tell us about CMEs? A large angular width might result from an inconvenient camera angle and does not necessarily correlate with CME size, the researchers note. Patterns of brightness and shadow in the STEREO images, meanwhile, relate to CME mass and movement.

Prior research has found that the angular width and mass of CMEs tend to follow the 11-year solar cycle. But what about the solar cycle causes these changes in complexity? The researchers suggested that perhaps a more active Sun emits more complex

View through my scope...

Recent observations of Jupiter, Saturn, Mars, the Moon and the Sun taken with an ETX125EC and PST scopes over the period 4th to 6th November by Chris Bowden.

Images were taken with a QHY5 and Sony A77 cameras using a Barlow lens with the QHY on the ETX and projection through a 26mm eyepiece on the PST (with the A77).



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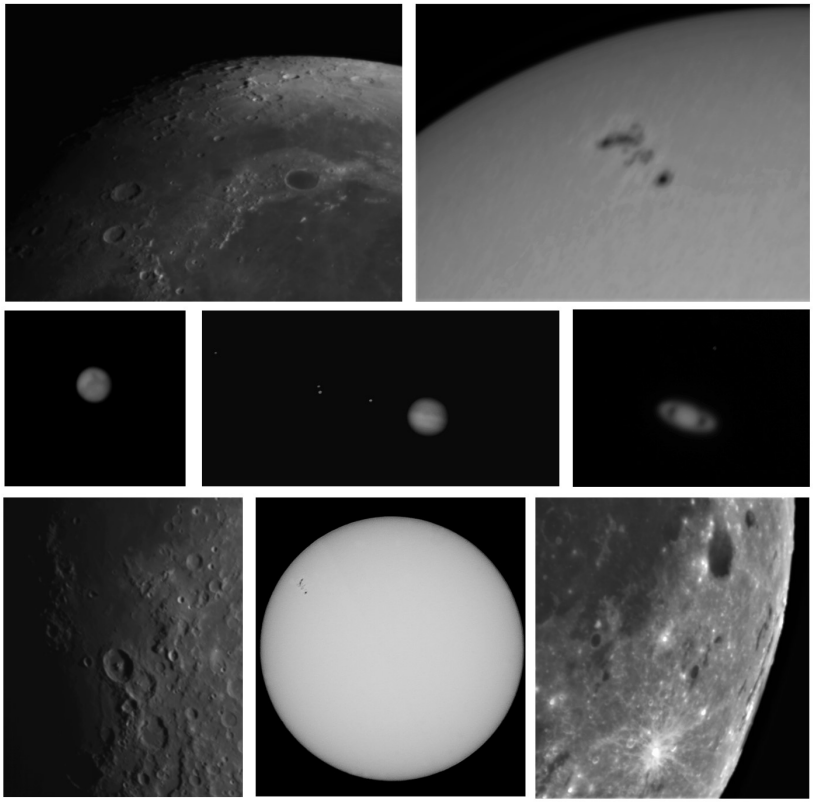

Image taken through a LG V50 phone camera in night mode by Sheri Lynn Karl on 30 Oct 2020. Mars is just above and off to the right in the foreground.

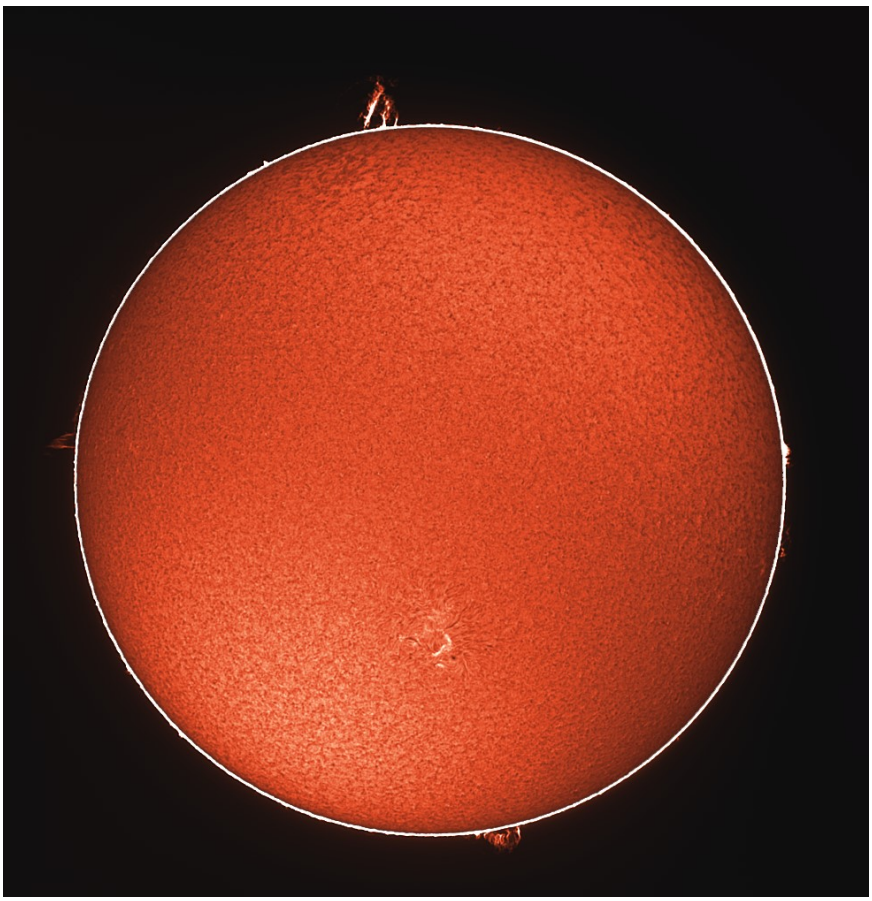

Image taken through a Lunt60THa DS with a ZWO ASI174MM camera by Sheri Lynn Karl on 21 Oct 2020. Two different exposure final stacked and sharpened images overlaid to bring out the details in the 656.3nm wavelength of the solar chromosphere.