Celestial Observer

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CCAS Member Ron Setina – Alpetragius: the crater in the center with the large central peak. Diam: 25 miles, Depth: rim to floor just under 2.5 mi, Central peak: about 1 1/4 mi On interesting thing about the central peak is that it appears to have been enlarged by volcanic activity- some indications of a heavily "eroded" vent at the summit. Of course the whole region is very old with a lot of subsequent impacts that make the identification uncertain.

Next Meeting: ONLINE!
Thursday, May 28th at 7pm with guest speaker Jessie Christiansen from NASA's Exoplanet Institute, streaming straight to your computer at home! You can use an iPad, laptop, computer or cell phone.

Connect here:
www.CentralCoastAstronomy.org/meetings

Next Star Gazing: ONLINE!
Saturday, May 16th at 7pm with Kent Wallace and Aurora Lipper! You'll get a front-row seat in a planetarium-style star tour of the night sky right from your computer at home!

Connect here:
www.CentralCoastAstronomy.org/stargaze

ONLINE: Thursday, May 28th at 7pm
Jessie Christiansen, *NASA Exoplanets*
"On the Road to a Billion Planets"

Jessie Christiansen worked on the NASA Kepler mission, cataloguing the exoplanets within the Kepler field. As a member of the Kepler Science Team, she won the NASA Group Achievement Award in 2010. She is involved with the NASA TESS mission, which launched in April 2018 and has identified 1785 candidate exoplanets with 45 confirmed.

Christiansen uses Citizen Science and the Zooniverse to help in her quest for exoplanets using the Kepler Space Telescope K2 dataset. She worked with Professor Ian Crossfield at MIT to ensure the K2 data was made public, and in January 2018 announced the discovery of 5 massive exoplanets orbiting the sun-like star K2-138. The exoplanets make up the longest chain of synchronized exoplanets ever discovered, orbiting in near-perfect resonance to their star.

Alongside being the plenary speaker at academic conferences, Christiansen gives public talks about her research. She continues to discuss her research "Characterizing the Kepler Survey Completeness" at the Australian National University. In July 2018 Christiansen won the NASA Exceptional Engineering Achievement Medal for her work on the Kepler planet sample.

www.CentralCoastAstronomy.org/meetings

Photographing the Sun by Lee Coombs

With an abundance of light, photographing the sun may seem like an extremely easy thing to do. It is this abundance of light, which includes harmful infrared and ultraviolet radiation, that presents the problems associated with solar photography.

As kids, many of us experimented with a magnifying glass using it to focus the image of the sun and thus concentrated the sun's rays to produce a spot image having intense heat (primarily produced by the mostly invisible infrared rays) sufficient to ignite a piece of paper or fry an ant. Imagine what would happen if that focused image fell on a piece of film in your camera or on the retina of your eye!

The invisible high energy ultraviolet radiation could also cause permanent damage to your eye unless proper filtration is used. Using the wrong type of filter to observe the sun could allow this radiation to pass through and cause eye damage even though the intense visible rays from the sun are reduced to a comfortable level. For these reasons, a safe solar filter must be employed to reduce the harmful radiation from the sun and allow for reasonable exposure times and comfortable viewing.

Solar filters from Thousand Oaks Optical, Baader, Orion and others are made of either glass or Mylar designed specifically for solar use. If you own a name brand telescope, custom filters designed to fit over the front end of the main tube are available. Schmidt Cassegrain and Newtonian reflecting scopes may employ a full aperture or an off axis type of filter. These "visual" solar filters allow you to observe and photograph the sun safely and take advantage of the high resolution that your telescope provides. Never use solar filters that are designed to be used at the eyepiece end of the telescope! A decade or so ago, these eyepiece solar filters were commonly included with many department store and imported refractor telescopes and there were many horror stories of these filters cracking from the intense heat of the focused sun while someone was looking through the eyepiece! If you have one of these filters, destroy it!

To obtain photographs of the sun that show any sunspots to good effect, a focal length of at least 1000mm (equivalent to 20X) must be used. Due to atmospheric limitations, you gain very little using telescopes having apertures over 4-inches. For more detail, higher magnifications must be employed and are usually achieved by using barlow or eyepiece projection techniques. A means to attach your cameras to the telescope where the eyepiece is usually located makes this and other types of photography most convenient. Your camera, however, must be one that the lens can be removed and replaced by this adapter. Get an adapter that also accepts eyepieces so projection photography may also be employed. Many astronomical supply companies sell these adapters for very reasonable prices. If your camera does not have a removable lens but is a reflex camera (allows you to view and focus through the lens), an afocal method can be employed where the camera is mounted on a tripod and the image of the sun projected into the camera lens which is set wide open and at infinity. The image is then observed through the camera and focused using the telescope.

Most solar filters produce an orange or bluish image (Mylar-type). The Baader filter material produces a more normal white image but you will have to make your own filter cell as the Mylar-type material is all that is available. Most prefer the light orange color as produced by the Thousand Oaks and others.

Since exposure times are usually quite short, you do not need a tracking mount, however, having to reposition, focus and shoot in a short period of time can be a nuisance. If your camera has through the lens metering, then start with that exposure and bracket one or two stops on either side of it. Use a cable release or the timer on your camera to make the exposures and minimize vibrations. Keep good notes so that bracketing will not be necessary once you know the best exposure for the different lens systems and films you employ. Many of the techniques you use for solar photography will apply directly to Lunar and planetary photography to be covered in a later article. The best advice is to just get out and do it. Learn from your mistakes and before long, you will be producing high quality images of the sun to be proud of.

Next Stargazing: ONLINE! Invite friends!!

Saturday, May 16th at 7pm

CCAS Member Kent Wallace and president Aurora Lipper are hosting an online star gazing event that you don't want to miss!

It'll be like going to a planetarium except it's from your computer screen at home. We will focus on how to find naked-eye and binocular objects in the night sky, and you'll be able to interact and ask questions as we go along.

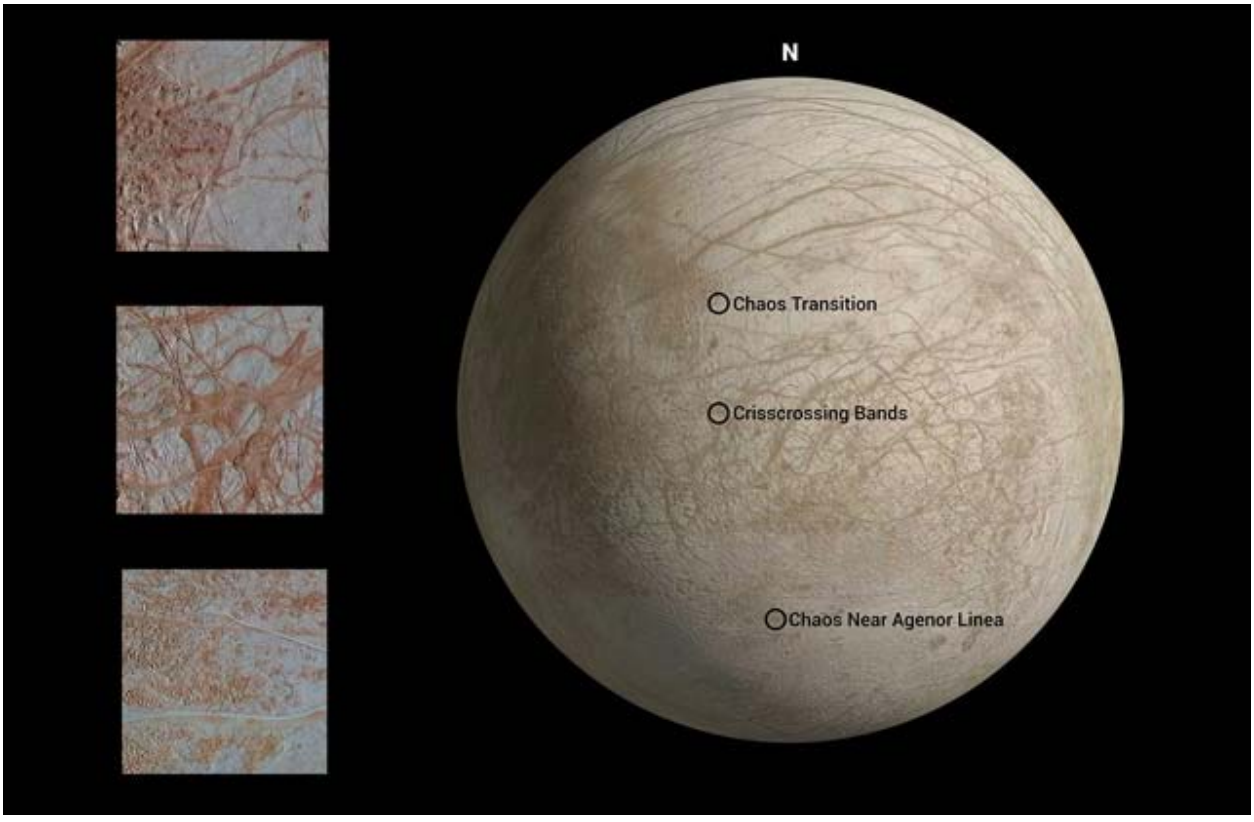
When we're done, go outside and look up, and you'll be able to not only find objects but also understand what you're looking at. Check our website for all the details:

www.CentralCoastAstronomy.org/stargaze

Newly Reprocessed Images of Europa Show 'Chaos Terrain' in Crisp Detail Credit: NASA JPL

The surface of Jupiter's moon Europa features a widely varied landscape, including ridges, bands, small rounded domes and disrupted spaces that geologists call "chaos terrain." Three newly reprocessed images, taken by NASA's Galileo spacecraft in the late 1990s, reveal details in diverse surface features on Europa.

Although the data captured by Galileo is more than two decades old, scientists are using modern image processing techniques to create new views of the moon's surface in preparation for the arrival of the Europa Clipper spacecraft. The orbiter of Jupiter will conduct dozens of flybys of Europa to learn more about the ocean beneath the moon's thick icy crust and how it interacts with the surface. The mission, set to launch in the next several years, will be the first return to Europa since Galileo.



"We've only seen a very small part of Europa's surface at this resolution. Europa Clipper will increase that immensely," said planetary geologist

Cynthia Phillips of NASA's Jet Propulsion Laboratory, a division of Caltech in Pasadena. As a Europa project staff scientist, she oversees a long-term research project to reanalyze images of the moon.

All three images were captured along the same longitude of Europa as Galileo flew by on Sept. 26, 1998, in the eighth of the spacecraft's 11 targeted flybys of Europa. High-resolution images revealing features as small as 500 yards (460 meters) across were taken through a clear filter in grayscale (black and white). Using lower-resolution color images of the same region from a different flyby, technicians mapped color onto the higher-resolution images - a painstaking process.

Enhanced-color images like these allow scientists to highlight geologic features with different colors. Such images don't show Europa as it would appear to the human eye, but instead exaggerate color variations to highlight different chemical compositions of the surface. Areas that appear light blue or white are made of relatively pure water ice, and reddish areas have more non-ice materials, such as salts.

Planetary scientists study high-resolution images of Europa for clues about how the surface formed. At an average of 40 million to 90 million years old, the surface we see today is much younger than Europa itself, which formed along with the solar system 4.6 billion years ago. In fact, Europa has among the youngest surfaces in the solar system, one of its many intriguing oddities.

The long, linear ridges and bands that crisscross Europa's surface are thought to be related to the response of Europa's icy surface crust as it is stretched and pulled by Jupiter's strong gravity. Ridges may form when a crack in the surface opens and closes repeatedly, building up a feature that's typically a few hundred yards tall, a few miles wide and can span horizontally for thousands of miles.

In contrast, bands are locations where cracks appear to have continued pulling apart horizontally, producing wide, relatively flat features.

Areas of so-called chaos terrain contain blocks that have moved sideways, rotated or tilted before being refrozen into their new locations. To understand how they might have formed, scientists study these blocks as if they are jumbled puzzle pieces.

The Galileo mission was managed by JPL for NASA's Science Mission Directorate in Washington. Additional information about Galileo and its discoveries is available on the Galileo mission home page at:

http://solarsystem.nasa.gov/galileo/

More information about Europa and Europa Clipper is available at: europa.nasa.gov

Favorite Astronomy Movies of All Time

Occasionally, CCAS will host a “Movie Night” and show an astronomy-related movie or film for our members instead of having a guest speaker. Over the years, we’ve collected quite a collection of good titles. Here’s some from our list that you might enjoy watching yourself at home:

2001 Space Odyssey
Apollo 13
October Sky
The Right Stuff
SolarMax
Hidden Universe
Apollo 11
The Dish
Hubble
The Martian
Hidden Figures
In the Shadow of the Moon
Space Cowboys
The Astronaut Farmer
Moon (2009)
Infinite Cosmos: Life and Death of a Star
Wonders of the Solar System (BBC: Prof Brian Cox)
Cosmos: Ultimate Edition (5 disc set; Carl Sagan)
Forbidden Planet

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CCAS Information

Founded in 1979, the Central Coast Astronomical Society (CCAS) is an association of people who share a common interest in astronomy and related sciences.

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