

WHAT'S UP IN AUGUST

By Bernie Reim

The month of August is named for Augustus Caesar, just as July was named for Julius Caesar. This is the last full month of summer already and also the hottest time of the year since it takes about half a season for the land and water to really warm up after the sun reached its highest point back on June 21, the summer solstice. The opposite is true in winter since the coldest days occur about 6 weeks after the sun reached its lowest point in the sky on the winter solstice.

These are known as the “dog days” of summer since the Greeks and Romans falsely thought that the combined heat of Sirius, the Dog Star, along with our sun when they are close together in the sky at this time of year would create a lot of extra heat on Earth at this time of year. We now know that Sirius is 8.8 light years away and could not possibly create any extra heat on Earth at that huge distance of about 50 trillion miles. Sirius is one of the closest stars to us after Alpha and Proxima Centauri at 4.2 light years, but that is still much too far away to create any extra heat on Earth. This was only one of many misconceptions that ancient people had, even though they were potentially as smart as we are, they just did not have the technology to learn what is really happening.

The great planetary alignment broke up early last month, but 4 of our 5 brightest planets are still visible in order in our morning sky along with Uranus and Neptune sprinkled in with the other four. The next time all 7 planets will be visible with the 5 bright ones in sequence from the sun will be 100 years from now, 2122.

The gas giants, Jupiter and Saturn, will once again rule the night sky by the end of this month when Jupiter rises by 9 pm and Saturn will already be up by sunset, since it reaches opposition, when it rises exactly at sunset, on Sunday, August 14. Jupiter will reach its own opposition next month on September 26, soon after fall will start.

The next Mars season is now upon us leading up to its opposition around the winter solstice this year. Mars only reaches opposition every 26 months compared to about every 13 months for Jupiter and Saturn. Mars will double in brightness over that time. The red planet is already brighter than Saturn and Mercury, but it will not get as bright as Jupiter or Venus.

Mercury will be visible low in the western evening sky all month. The Perseid meteor shower peaks on the 12th this month, but the moon is full on the 11th, so most of these meteors will be washed out by moonlight. It will still be worth looking for the brighter fireballs and remember that this entire shower lasts from July 17 to August 24, so you can catch some of them when the moon is not yet full or after the full moon.

Then Comet C/2017 K2 (PanSTARRS) may brighten to 7th magnitude in Scorpius this month, so look for it with a good pair of binoculars or a small telescope when the moon is not full.

The real highlights for this month are not anything that will happen over our local skies. That is the release of the first few stunning and dramatic images from the Webb Space Telescope unveiled last month. They are the result of over 20 years of hard work by about 20,000 scientists and engineers from all over the world, a true testament of what can be accomplished when we work well together and persevere in the face of extreme odds, inventing amazing new technology on the fly as we went along over that time period that has already borne rich fruit.

The JWST is performing beyond expectations and may continue to produce such incredible images for about 20 more years since its launch went so perfectly that it has plenty of fuel left

to continue to make great discoveries for us and answer many questions that we had not even thought to ask yet.

Here is a brief summary what those first 5 images have taught us already. They represent the whole range of what the telescope can see from our own planets nearby all the way out to the edge of the known universe with the deep field image, taken in just 12 hours with about 10 times more detail than the best Hubble Deep Field, which took 10 days to create. It showed many dramatic red arcs, caused by the gravity of a galaxy cluster located about 7 billion light years away. This is called gravitational lensing, created by all the dark matter in this cluster that is bending the light of many galaxies directly behind this cluster, acting like a giant natural lens in space. We can learn a lot more about the galaxy cluster and its mass along with the distorted galaxies behind it by analyzing it carefully. Notice that all of the arcs are red because those galaxies are so much farther away that they are extremely red shifted as we are seeing much further into the past.

The JWST will be able to see a little further into the universe than the Hubble Space Telescope could because it sees the universe in infrared light and the universe gets more and more red shifted as we get closer and closer to its “edge”. So we will gain about 300 million years closer to the Big Bang of 13.8 billion years ago, but we will still not be able to see back to the very beginning. That will take the next generation of space telescopes after JWST, and even then we will only get closer and closer, never actually “seeing” the very beginning and exactly how the very first star or galaxy or black hole really formed. That could forever remain a mystery, but at least we will learn much more about the true nature of our universe with every effort we make.

Then we saw Stephan’s Quintet, a group of 4 interacting galaxies located about 300 million light years away, about 50 times closer than the deep field image. They could even see a black hole of 24 million solar masses actively feeding in one of those 4 galaxies, called an AGN or active galactic nuclei. All large galaxies have super massive black holes, but only about 10 percent of them are active right now. The JWST even got spectra of that black hole, which was completely unprecedented with any previous technology.

Then we saw the Carina nebula at about 7500 light years away, one of the largest star-forming regions in our galaxy, in tremendous new detail. Then there was the Southern Ring nebula in Vela about 2500 light years away. They saw two stars in the center; one was the white dwarf which exploded to create all of these intricate shells of material as the star exploded over time and now covers half a light year of space. The other one is still alive and interacting with the white dwarf.

Then they released a picture of a “hot Jupiter”, a large planet orbiting a star about 1000 light years away every 3 days. They took a spectrum of it which showed water vapor at several different wavelengths, which means that this strange planet which is a little larger than Jupiter and has a temperature of 1200 degrees F, actually has clouds! They also released some images of our own Jupiter already which showed its rings and some other amazing detail with its moons in infrared light. They proved they could track nearby objects accurately and they plan to spend about 10% of its time studying closer objects like our own planets.

All of this is only the very tip of the iceberg of what the JWST will reveal to us over the next 20 years. Now it is up to us to interpret those images correctly using good science to piece

together a little more of the amazing and astounding universe that we all really live in on the much grander scale and to not just get overwhelmed with their artistic beauty.

On a different note, but no less spectacular, there is one more highlight which may occur on the 29th of this month or early next month. That is the launch of the largest and most powerful rocket in the world ever created in our 200,000 history of modern humans or at any other time, the Artemis 1 mission to the moon carrying the new Orion capsule, which can carry up to 6 astronauts, compared to just 3 for Apollo. Artemis is the mythological sister of Apollo, so that is a perfect name for our next lunar missions. I was lucky enough to sit in a mock-up of the Orion capsule and to learn much more about the Artemis mission while I was visiting the Johnson Space Center in Houston a few years ago, which I highly recommend to everyone even remotely interested in space and our place in it and what we have learned so far and how much we can continue to learn as we apply ourselves in this new golden age of space and making it more assessable and understandable for every one of us.

This is an uncrewed mission, but they will have 3 mannequins aboard with the interesting names of Helga, Zohar, and Commander Moonikin Campos, in honor of Arturo Campos, a key player in bringing Apollo 13 and its 3 astronauts back to Earth safely. They will have many sensors on them to check the radiation levels and several other factors. Artemis 2 is already scheduled to launch in May of 2024, just after the April 8, 2024 total solar eclipse visible right here over Maine. That one will have a crew, but they will not land on the moon. Then Artemis 3 will carry the astronauts that will actually land back on the moon sometime in 2025, 53 years after the last humans landed there in December of 1972.

August 1. Mars passes close to Uranus in the morning sky. Maria Mitchell was born on this day in 1818. She was the first woman professional astronomer and discovered a comet.

August 4. The Phoenix mission to Mars was launched on the day in 2007.

August 5. First quarter moon is at 7:07 a.m. EDT.

August 6. The Curiosity Rover was launched to Mars on this day in 2012.

August 7. Venus passes close to Pollux in Gemini this morning. John Mather was born on this day in 1946. He won the Nobel prize in physics in 2006 for his work with COBE on the cosmic microwave background radiation, proving the Big Bang. He just retired as the chief scientist on the JWST, so we have him to thank (along with thousands of others) for the great images so far.

August 10. The moon is at perigee, or closest to Earth at 223,587 miles today.

August 11. Full moon is at 9:36 p.m. This is also known as the Grain, Green Corn, Sturgeon, or Blueberry Moon.

August 12. The Perseid Meteor shower peaks this morning. Margaret Burbidge, a British-American astronomer, was born on this day in 1919. She developed a theory for stellar nucleosynthesis.

August 14. The moon passes near Neptune this morning. Saturn is at opposition.

August 15. The moon passes near Jupiter this morning.

August 16. The moon passes near Uranus this morning.

August 19. Last quarter moon is at 12:36 a.m. The moon passes just north of Mars this morning.

August 22. The asteroid Vesta is at opposition. The moon is at apogee at 251,915 today.

August 25. The moon passes near the dwarf planet Ceres tonight and near Venus this morning.

August 27. New moon is at 4:17 a.m. Mercury reaches greatest eastern elongation.

