Skywatchers

Newsletter of the China Lake Astronomical Society

Volume 59 No. 3 | ChinaLakeAstro.org | March 2022

CLAS Star Parties – 2022

Check ChinaLakeAstro.org for times and schedule updates.

Sat March 12 – Solar Viewing (Maturango)

Fri March 25 – New Moon (Brown Road)

Sat Mar 26 –New Moon (Red Rock Canyon)

Sat April 9 – Qtr Moon (Maturango)

Fri April 29 – New Moon (Brown Road)

Sat April 30 – New Moon (Red Rock Canyon)

Sat May 7 – Qtr Moon (Maturango)

Fri May 27 – New Moon (Brown Road)

Sat May 28 – New Moon (Red Rock Canyon)

Sat Jun 4 – Qtr Moon (Maturango)

Additional dates to be announced ...

March Meeting

Monday, March 7, 2022

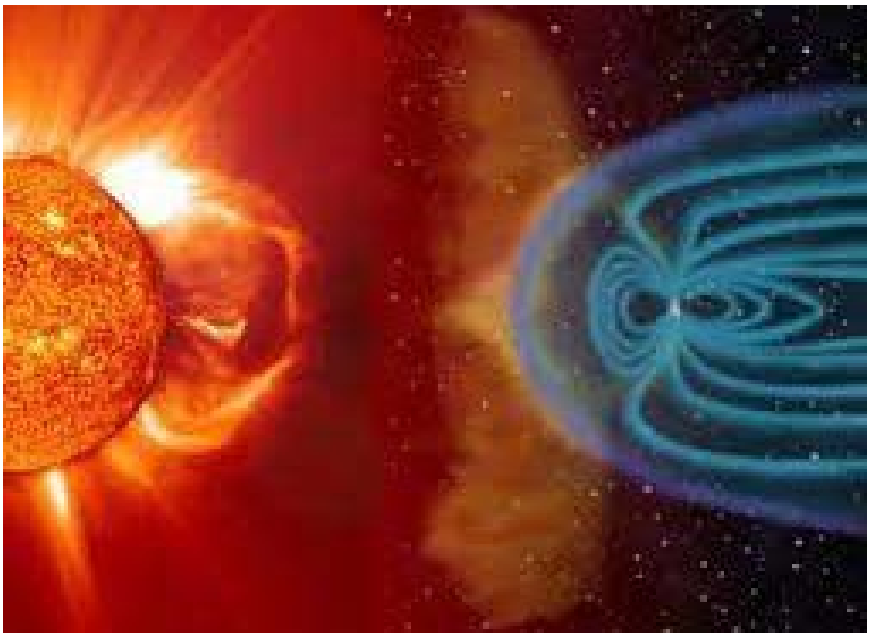
7:00 PM – *Refreshments* 7:30 PM – *Program begins*

Speaker

Prof. Scott Cameron, Dept. of Science & Engineering, Cerro Coso Community College

Program: *"Solar Storms"*

Professional astronomer and CLAS member Dr. Scott Cameron will share his knowledge of the Sun and its solar storms, which are increasing in intensity as we approach a new Solar Maximum.



Location

Maturango Museum – 100 E Las Flores Ave, Ridgecrest, CA

You can also attend via Zoom. (*No refreshments via Zoom.*)

China Lake Astronomical Society (CLAS)

Ridgecrest, California and China Lake Indian Wells Valley, and the surrounding areas.

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Meetings of the China Lake Astronomical Society are held at the Maturango Museum on the first Monday evening of each month, except when the first Monday is a holiday.

Our monthly newsletter is free and sent via email. Sign up at ChinaLakeAstro.org or by contacting the newsletter editor.

Support CLAS by becoming a member! (Membership form on the last page.)

March Celestial Calendar

Roger Brower

- Jupiter moves to the morning sky this month, but can be seen low in the East the last few days of the month.
- Venus, Saturn, and Mars are also all in the morning sky where they dance around each other in the Southeast before sunrise.
- To complete the morning planet show, Mercury can also be seen low in the East the first few days of the month. ◇

Star Party Announcements

Our 2022 public Star Parties are coming soon, and meet around dusk. See the schedule on page 1, and check ChinaLakeAstro.org/starparty for times and any schedule changes.

CLAS Star parties are free and open to the public, and take place at one of three locations:

- In–town – Maturango Museum
- CLAS dark site – Brown Road (Old Highway 395)
- Red Rock Canyon State Park campground

All ages and abilities welcome. Bring your own telescope, or look through ours!

Solar Viewing Event at Maturango – Sat March 12

We will set up several solar scopes at Maturango Museum for Saturday viewing of the Sun. See *Solar Viewing at Maturango* on page 3 for details.

Red Rock Star Party – Sat March 26

The first star party of 2022 has been set for Red Rock Canyon State Park. *Details on page 4.*

Brown Road Dark Sky Star Parties

Our longstanding dark site, just south of Ridgecrest, is on BLM land south of Brown Road (Old Highway 395). These are held around the time of the New Moon, when the skies are darkest. It's a good oportunity to look for deep–sky objects that cannot be seen from Maturango and the city.

We hope to start these star parties again, and are looking for interested club members and volunteers to help us set up for public viewing. You can bring your own telescope, or operate one of ours—we'll show you how!

If you're interested, please contact an officer (*contact info at left*). ◇

Star Party Announcement

Solar Viewing at Maturango

Saturday, March 12 during the day

Continuing with the Solar theme of Scott Cameron's program this month, we will set up **solar telescopes outside Maturango Museum** for you to observe our nearest star.

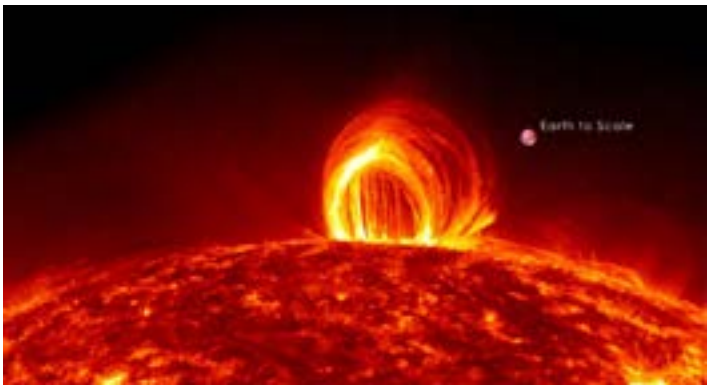
Activity on the Sun, such as sunspots, flares, and solar storms, varies over a roughly eleven–year period called a Solar Cycle. At the transition between cycles, the magnetic polarity of the Sun actually flips.

In case you haven't been keeping track, we entered **Solar Cycle 25** in December 2019, after a period of unusually low activity. One measure of this is the number of contiguous days without any sunspots. You can view a running tally at SpaceWeather.com, but so far, 2022 has had zero spotless days! (Compare that to 281 days in 2019.)

There are two ways to observe the Sun as an amateur

- White light filtered viewing (sunspots)
- Hydrogen–alpha filtered viewing (solar flares and photosphere)

We will be equipped to do both. In white light, a special metalized filter (glass or Mylar) covers the objective and filters intense sunlight to safe levels. This allows us to clearly see Sunspots as small black areas on the Sun. These are areas of reduced surface temperatures caused by concentrations of magnetic flux.



An H–alpha scope is equipped with a sophisticated *etalon* filter that is only allows through a very narrow, tunable wavelength of light around the spectroscopic Hα line at 656.28 nm. By adjusting this wavelength, the observer can see dynamic and explosive events in the Sun's chromosphere such as prominences and filaments, solar flares and mass ejection events, and the bright plages in the chromosphere above sunspots. ◇

President's Corner

New Telescopes for CLAS

Ralph Paonessa

I'm pleased to announce that the China Lake Astronomical Society has received two donations of large Schmidt Cassegrain telescopes in excellent condition. We are prepping them to make them available to the club.

The first is a (huge) 12–inch Meade LX200 Classic SCT donated by CLAS members **Sandy and Jeff Aubin**. It is a computerized GoTo scope with a motorized focuser. It is large enough that it should be mounted on a permanent pier, which we are investigating for one of our observatory domes.

The second is a **10–inch Meade LX200 GPS SCT**, also computerized GoTo, donated by **Rich Crall**, an avid astronomer friend of mine from San Diego who knows about our club and wanted his scope to go to a good cause. He included a host of accessories including a custom 10–inch solar white light filter, a beefy Mitty Wedge to equatorially mount an SCT for long–exposure astrophotography, a Meade reducer–flattener, and a sturdy wheeled case.

I am hoping that this scope will see "first light" soon at the Solar Viewing Event Saturday, March 12, at Maturango, announced in this newsletter.

Meanwhile, we are going through our inventory of equipment with an eye toward moving out many of the small scopes we have, perhaps by donating to families with children who can use them. Contact an officer if you're interested.

If you have astronomy equipment that needs a good home, please consider donating to CLAS. We will either use it for public benefit at our star parties, or refurbish it and find a good home for it. ◇

Star Party Announcement

Red Rock Canyon Star Party

Sat Mar 26

China Lake Astronomical Society, in conjunction with Red Rock Canyon State Park, will conduct a Star Party for viewing planets, constellations, and other celestial objects in the night sky through some amazing telescopes. Meet at the visitor center parking lot area beginning at dusk.

CLAS Secretary Ted Hodgkinson organizes these events at Red Rock. For more information or to volunteer, contact ghodkinson@sbcglobal.net. ◇

Helped wanted:

Refreshments Chairperson

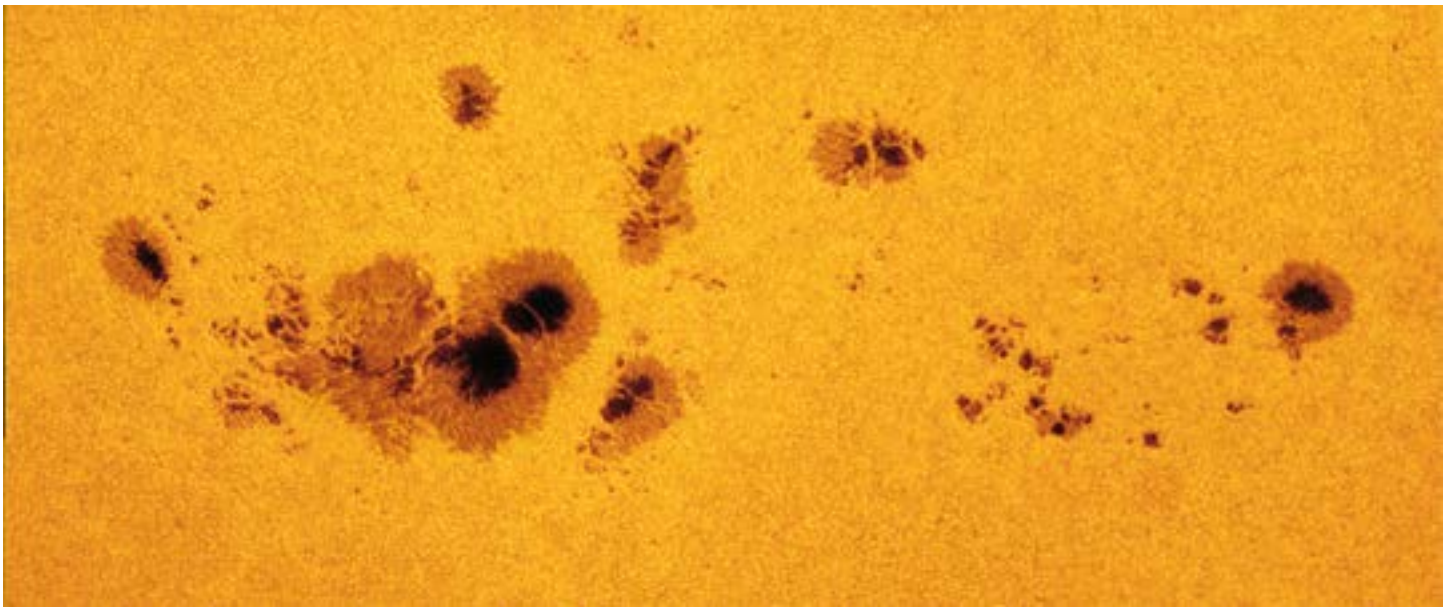
The club needs a person or persons to be responsible for refreshments at the monthly meetings.

You will be in charge of bringing and setting up and taking down refreshments at all our monthly meetings (or designating someone in your absence). CLAS will reimburse you for any costs over the donations at each meeting.

Please contact ralph@chinalakeastro.org. ◇

Warning: Safe Solar Viewing

Never look at the Sun, especially through a telescope, without an approved filter that is *used correctly*. You ***will*** suffer **permanent eye damage** and **permanent blindness** without proper filtration. And you probably won't feel any pain until *after the damage is done!* Also, the dark "solar filters" that come with many cheaper telescopes are not good enough! See ***"Solar Filter Safety"*** at Sky & Telescope. ◇



An "Archipelago" of Sun Spots. —Credit: NASA Goddard

Space Storm Knocks Out Latest Batch of Starlink Satellites

A minor space storm took down much of the latest Starlink batch shortly after launch.

David Dickinson Feb 11, 2022

On February 3rd, a SpaceX Falcon 9 rocket launched out of the Kennedy Space Center in Florida with Starlink Group 4–7. The launch, part of a routine addition to SpaceX's Starlink satellite network, went off without a hitch. But it soon became clear that something was amiss.

What the worldwide satellite–tracking community picked up on was the initial Two–Line Elements (TLEs) published for the launch by U.S. Combined Space Operations Center Space–Track. Instead of the full complement of 49 satellites plus the usual associated hardware debris, the site listed only four (COSPAR IDs 2022–010A–D). What's more, the perigees for this initial quintet were all extremely low, around 190 kilometers (120 miles). Reentry predictions soon started popping up on the site shortly after publication.

SpaceX confirmed those suspicions on February 8th, when it released a statement on the loss of up to 40 satellites from the batch. The statement outlined a nominal deployment into an initial 210–kilometer orbit before calamity struck.

Space Weather Wipeout

The culprit was space weather: The Sun released a magnetized bubble of solar plasma known as a coronal mass ejection that struck the Earth environment right around the time of launch. That sparked a minor G1–class geomagnetic storm during the deployment phase for the Starlink satellites.

SpaceX normally releases the Starlinks into a lower initial orbit before boosting them to a higher operational altitude. This technique enables satellites to de–orbit more quickly if they should fail post–deployment checks. But when the geomagnetic storm hit, it caused Earth's upper atmosphere to puff out, and that dramatically increased the drag on the satellites to more than 50% over the normal expected load.

"Space weather affect satellites differently, depending upon where they orbit Earth," says space weather physicist Tamitha Skov (The Aerospace Corporation). "For satellites like Starlink in low–Earth Orbit, solar storms are the phenomena that affect them the most dramatically. This is because during a solar storm, the storm's energy sometimes can get past the Earth's magnetic shield. When that happens all of the energy gets pumped into the near–Earth system and gets dumped into the Earth's upper atmosphere."

Reentries

SpaceX controllers reacted immediately to the unfolding events, placing the satellites in safe mode and angling them edge–on with respect to the atmosphere to minimize drag. Meanwhile, LeoLabs and U.S. Space Force's 18th Space Control Squadron monitored the space weather situation.

However, the maneuvers weren't enough, and the company now expects to lose 40 of the 49 satellites from the batch. The impact of the loss is pretty minimal on the Starlink constellation overall: SpaceX has been keeping a breakneck launch pace as of late, with 1,888 working Starlink satellites in orbit and counting.

Starlinks are about the size of a small coffee table, weighs in at 260 kilograms (570 pounds), small enough that debris from reentries aren't expected to survive to the ground.

Ultimately, the low–altitude release strategy worked as advertised in that it quickly eliminated the failed batch. But such events may become an increasing issue as more satellite constellations head to orbit, and as the Sun, in Solar Cycle 25, heads towards peak activity through 2023–2026. It's worth noting that the coronal mass ejection and ensuing storm were mild events.

Community Reaction

"Many of us in the space weather field have been warning that this would happen at some point, especially as the new solar cycle ramps up," says Skov. "Activity will continue to ramp up to solar maximum over the next five years so the potential for something like this to happen again in the near future should not be underestimated. As all good sailors know, if we are to bravely sail the seas of space, we should never underestimate the weather."

Ironically, the plethora of satellites in low–Earth orbit might give space physicists the chance to study the upper ionosphere as it interacts with space weather events. However, for many fields of astronomy, the satellites pose a threat as their streaks across images hinder the search for near–Earth objects, cosmological studies, and other fields.

To address the growing threat, the International Astronomical Union has recently announced it's creating a new center to deal with the satellites' impact on astronomy — not just Starlink but others, too. The center will have multiple "hubs," to deal with multiple issues. One hub will create software to avoid and remove satellite trails in images taken by professional and extremely sensitive telescopes, for example, while another will advocate for policy changes to protect radio frequencies from interference, reduce space junk, and reduce overall impact on astronomy.

SpaceX isn't the only one creating such a network; OneWeb is busy launching its own set of satellites, with its 13th batch launching from the Guiana Space Center this afternoon. OneWeb expects its network to be providing broadband Internet to users by the end of 2022.

It's a brave new world and mitigating the impact of space weather on satellites will become an increasing issue to address in the years to come.

Source: *Space Storm Knocks Out Latest Batch of Starlink Satellites* – **Sky & Telescope** ◊

A Note from Your Editor

Ted Hodgkinson

This newsletter is sent directly to 183 folks and available to many more that visit our website, ChinaLakeAstro.org. There are so many interesting things that are of interest going on in the field and so many things "you may be doing" that we would love to hear about.

Please consider writing an article and sending it my way so it can be added in. Photographs, field trips, book reviews, etc. Just about anything related to Astronomy, Space Science, or related fields. Use your imagination.

Hope to hear from you soon. Remember this is your Newsletter.

Keep looking up. ◊

Pleiades star cluster, 9 hour exposure through LRGB filters.


The summer Milky Way from southern horizon (bottom) to northern, over the White Mountains. — Ralph Paonessa

‘Tatooine–like’ exoplanet spotted by ground–based telescope

University of Birmingham – February 23, 2022

A rare exoplanet which orbits around two stars at once has been detected using a ground–based telescope. The planet, called Kepler–16b, has so far only been seen using the Kepler space telescope. It orbits around two stars, with the two orbits also orbiting one another, forming a binary star system.

Kepler–16b is located some 245 light years from Earth and, like Luke Skywalker’s home planet of Tatooine, in the Star Wars universe, it would have two sunsets if you could stand on its surface.

Twin suns set on Tatooine, a long time ago and far, far away.

The 193cm telescope used in the new observation is based at the Observatoire de Haute–Provence, in France. The team were able to detect the planet using the radial velocity method, in which astronomers observe a change in the velocity of a star as a planet orbits about it.

The detection of Kepler–16b using the radial velocity method is an important demonstration that it is possible to detect circumbinary planets using more traditional methods, at greater efficiency and lower cost than by using spacecrafts.

Importantly the radial velocity method is also more sensitive to additional planets in a system, and it can also measure the mass of a planet — its most fundamental property.

Having demonstrated the method using Kepler–16b, the team plans to continue the search for previously unknown circumbinary planets and help answer questions about how planets are formed. Usually, planets formation is thought to take place within a protoplanetary disc –– a mass of dust and gas which surrounds a young star. However, this process may not be possible within a circumbinary system.

Professor Amaury Triaud, from the University of Birmingham, who led the team, explains: “Using this standard explanation it is difficult to understand how circumbinary planets can exist. That’s because the presence of two stars interferes with the protoplanetary disc, and this prevents dust from agglomerating into planets, a process called accretion.

“The planet may have formed far from the two stars, where their influence is weaker, and then moved inwards in a process called disc–driven migration –– or, alternatively, we may find we need to revise our understanding of the process of planetary accretion.”

Dr David Martin, from the Ohio State University (USA), who contributed to the discovery, explains “Circumbinary planets provide one of the clearest clues that disc–driven migration is a viable process, and that it happens regularly.”

Dr Alexandre Santerne, from the University of Marseille, a collaborator on the research explains: “Kepler–16b was first discovered 10 years ago by NASA’s Kepler satellite using the transit method. This system was the most unexpected discovery made by Kepler. We chose to turn our telescope and recover Kepler–16 to demonstrate the validity of our radial–velocity methods.”

Dr Isabelle Boisse, also from the University of Marseille, is the scientist in charge of the SOPHIE instrument that was used to collect the data. She said: “Our discovery shows how ground–based telescopes remain entirely relevant to modern exoplanet research and can be used for exciting new projects. Having shown we can detect Kepler–16b, we will now analyze data taken on many other binary star systems, and search for new circumbinary planets.”

Source: *‘Tatooine–like’ exoplanet spotted by ground–based telescope”* – ScienceDaily ◇

Keith’s Equipment Blog

Building Cases for my Sky–Watcher EQ6–R Pro

Keith Weisz has written an online article about building a case for his Sky–Watcher EQ6–R Pro equatorial mount. Read about Keith’s experience. ◇

The rise and fall of the riskiest asteroid in a decade

European Space Agency

Initial observations of an asteroid dubbed "2022 AE1" showed a potential Earth impact on 4 July 2023 — not enough time to attempt deflection and large enough to do real damage to a local area should it strike.

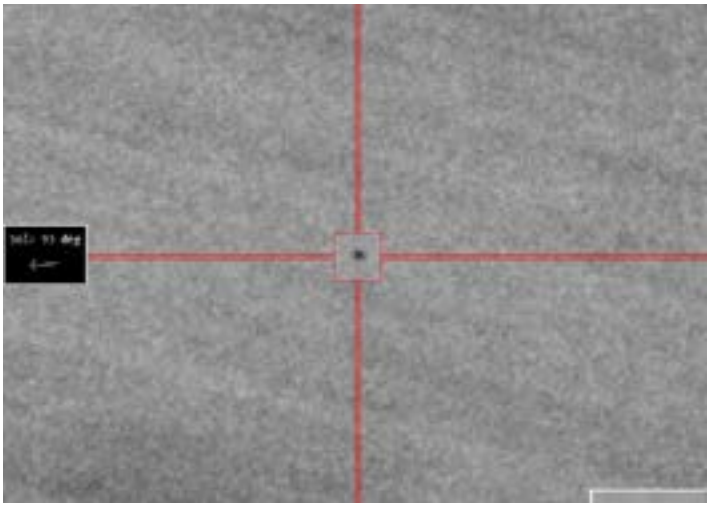
Worryingly, the chance of impact appeared to increase based on the first seven days of observations, followed by a dramatic week "in the dark" as the full moon outshone the potential impactor, ruling out further observations. As the moon moved aside, the skies dimmed and ESA's Near–Earth Object Coordination Centre (NEOCC) took another look, only to find the chance of impact was dramatically falling.

It has since been confirmed that 2022 AE1 will not impact Earth and has been removed from ESA's risk list. So, what's the story behind the excitement, and how can we trust this seemingly "meandering" impact risk?

Never seen anything like it

"In January this year, we became aware of an asteroid with the highest ranking on the Palermo scale that we've seen in more than a decade, reaching –1.5," explains Marco Micheli, astronomer at ESA's NEOCC.

"In my almost ten years at ESA I've never seen such a risky object. It was a thrill to track 2022 AE1 and



refine its trajectory until we had enough data to say for certain, this asteroid will not strike."

The Palermo scale is used by planetary defenders to categorize and prioritize the impact risk from near–Earth objects (NEOs) by combining the potential date of impact, the energy they would strike with and the impact probability.

There are asteroids out there that will certainly hit Earth but are so small they are almost imperceptible as they burn up in our atmosphere. Others might be giant, extinction–level event asteroids which could do immense damage but are traveling in orbits around the sun that are entirely safe.

Values less than –2 on the Palermo Scale reflect events with no likely consequences; those between –2 and 0 indicate situations that merit careful monitoring, and positive values generally indicate situations that merit some level of concern.

Planetary defenders: Always alert

On 7 January, one day after its discovery, asteroid 2022 AE1 was flagged for a potential future impact by the Asteroid Orbit Determination (AstOD) automated system that makes up part of the NEOCC's suite of tools to assess the asteroid risk.

Every day, the system automatically calculates the orbits from asteroid observation data provided by telescopes and observatories around the world. It then computes the Palermo Scale values, immediately publishing the results on the NEOCC web portal.

More risky cases—when asteroids are categorized as –2 or above on the Palermo Scale—are first cross–referenced with analysis from NASA JPL, to be extra certain of calculations before they're published on the public page.

"I was surprised at first when I heard about the –1.50 rated asteroid, as it is very rare to have such high Palermo scale. Yet, I wasn't too concerned as we get notifications like this—though at a lower level—few times per year," explains Luca Conversi, Manager of the NEOCC.

"As it is custom in these cases, we activated our global network of telescopes to immediately get more observations and it soon seemed this asteroid was unlike any other we'd seen."

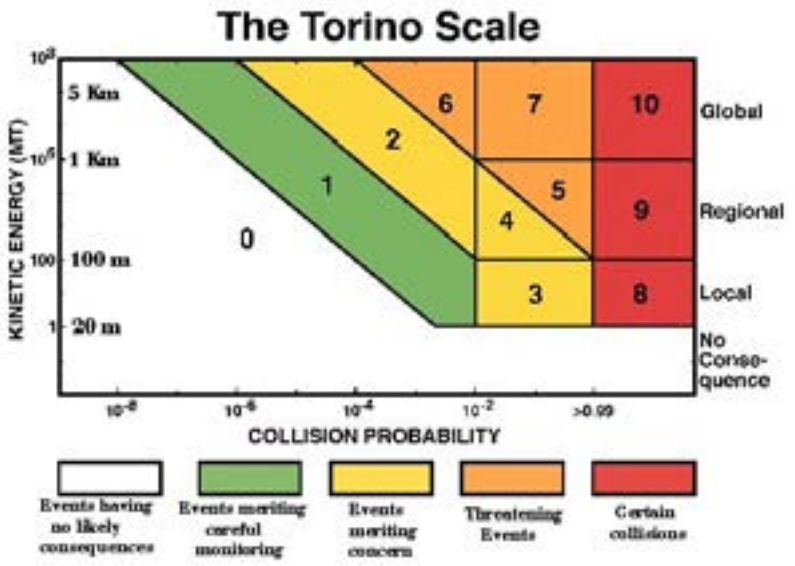
The sun never rises on ESA's eyes on the sky ...

On the evening of Saturday 8 January, Marco "the impactor killer" Micheli got hold of the 80 cm Schmidt telescope in Calar Alto, which the Coordination Centre has nearly continuous access to (weather permitting), to get more data.

"There's no waiting till Monday when you're back in the Office with this job," explains Marco, whose role is to gather enough data on asteroids in ESA's "risk list" such that they can be deemed safe, at which point they are removed.

"But I love it, it's part of the challenge. What makes this 'detective work' so much easier is that we have a network of telescopes on every continent that we can access in near real–time. It's actually a unique capability of ESA which means it's always night–time somewhere in our network, necessary to make asteroid observations."

ESA continued to monitor the asteroid, verifying results with NASA JPL which confirmed a worrying increase in the large rock's chance of impact. Unfortunately, as the probability of impact peaked, observations became impossible.



The Torino Scale used to quantify the impact hazard of a certain NEO. Credit: European Space Agency

During a tense week over 12–19 January, 2022 AE1 couldn't be seen as the moon outshone the dim potential impactor. On top of this, the asteroid was moving further away in its current orbit and getting fainter at the same time.

"We just had to wait," says Marco.

Another one bites the dust

As soon as the moon was dim enough, the NEOCC team pointed the Schmidt telescope at where 2022 AE1 was expected to be. With one single observation, the risk level crashed—getting close to zero—and with that, the team moved on.

"The data was clear, confirmed the next morning by our counterparts at NASA—asteroid 2022 AE1 poses no impact risk," explains Laura Faggioli, near–Earth object dynamicist in the NEOCC who computed the orbit of 2022 AE1 throughout the observation period.

Although some keen observers have continued to monitor the asteroid, confirming results from ESA, we now know that in early July 2023, asteroid 2022 AE1 will fly by Earth at a distance of about ten million kilometers (+/– one million km)—more than 20 times the distance of the moon.

Asteroids often look risky before they're proven safe

It's a funny thing about homing in on an asteroid and calculating its path, future position, and probability of impacting Earth—it will often appear risky during initial observations, get riskier, and then suddenly become entirely safe.

In the case of an asteroid on a definite collision course, the risk would keep growing until it reaches 100%. Fortunately, in most cases, the risk of impact ultimately flattens before rapidly getting down to zero—but why? Does this suggest our results are uncertain? Can we really be sure asteroid 2022 AE1 is safe?

The very first observation of an asteroid is "just" a single dot of light in the sky. At this point, it's not clear what it is or where it's going. A second observation is needed to reveal an object in motion, at least three are needed to determine an orbit—how quickly our asteroid is going and where it is headed. Further observations refine the orbit a little more, reducing uncertainties until we can be sure of where it won't go: primarily to Earth.

As is often the case, the overlap with Earth remains even while the risk corridor gets smaller due to further observations—and so the risk appears to increase.

More often than not, as the hazard zone narrows, the small potential corridor moves off Earth and the risk suddenly drops. Even if some uncertainty remains about the path of an asteroid, we can know for sure it doesn't pose a risk.

ESA's Planetary Defense Office and Near–Earth Object Coordination Centre are now focusing on the next space rocks that could pose a threat, working with the international community to ensure that when an asteroid's risk doesn't drop, and an Earth impact looks likely, we are ready. Source: The rise and fall of the riskiest asteroid in a decade. Source: **Phys.org** ◇

Subscribe to *Skywatchers*

The monthly ***Skywatchers*** newsletter is free to the public via email. More info at

CHINALAKEASTRO.ORG

Astronomy gear for sale

If you have used astronomy gear to sale, send an email with pictures to the editor at ghodkinson@sbcglobal.net. No charge for CLAS members.

Support the China Lake Astronomical Society by

Becoming a Member

CLAS is dedicated to serving its members and the community at large.

We provide education, public outreach, and opportunities for curious individuals of all ages, and especially young people, to learn about and develop an interest in the wonders of astronomy, science, the world around us, and the Universe.

Become an annual member and help us in our mission. ***Send in the membership form below.***

Membership/Annual Renewal Form

China Lake Astronomical Society – CLAS

Name: _____

Address: _____

City State Zip: _____

Email: _____

Phone: (optional): _____

Membership (check one): _____ Individual ($25/year) _____ Family ($40/year)

Mail this form (or hand it in at a meeting) with with your personal check or money order to:

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