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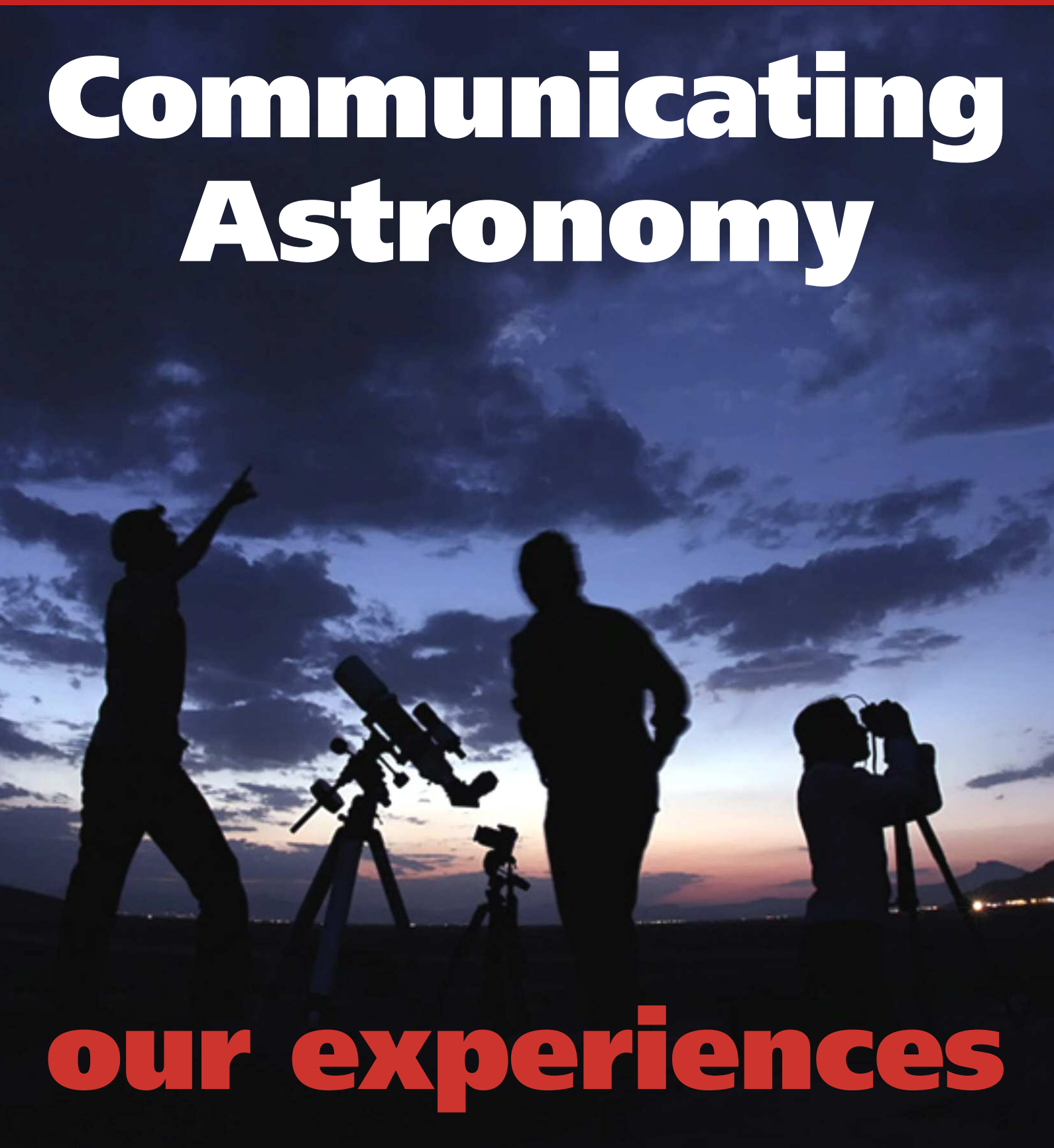

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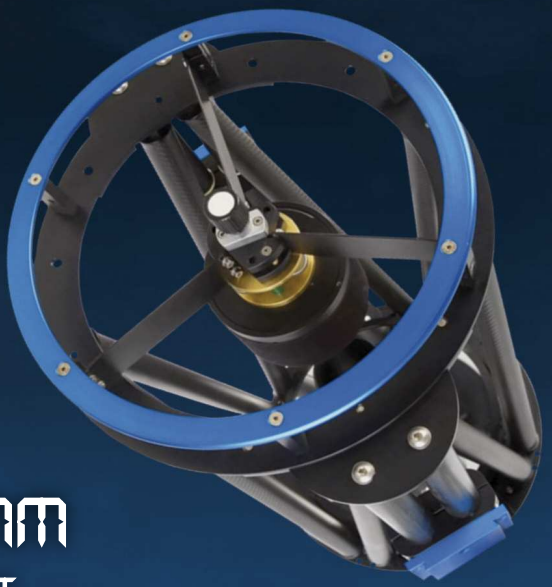

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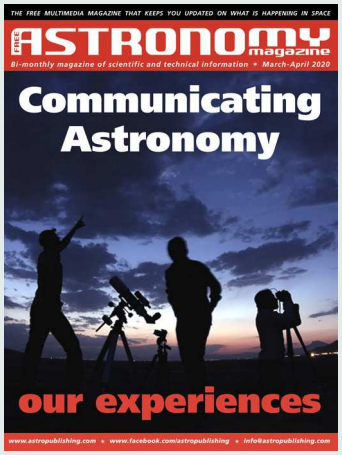

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Editor in chief
Michele Ferrara

Scientific advisor
Prof. Enrico Maria Corsini

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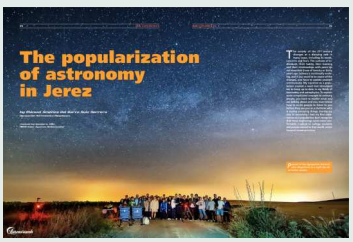

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Amateur astronomers have always existed, and the former, perhaps, were not even human. Contemplation of the night sky in the pre-industrial era was usual. This is demonstrated by the countless myths and legends that the most disparate peoples created by admiring the night sky. Over the past two centuries, this link between human beings and Nature's wider spectacle has...

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Amateur astronomy outreach – a local perspective

by Damian G. Allis
NASA Solar System Ambassador

Amateur astronomy began for me on *Yahoo!* in 2003. After finding the Syracuse Astronomical Society in Central New York (CNY), a first visit included a slide projector presentation, an expensive sign that the presenter, Dr. Stu Forster, had given this same talk many times before. The public viewing included my first Messiers, found by members who had positions memorized from years of moving an old 16" Cave Newtonian, and more obscure objects found using a mas-

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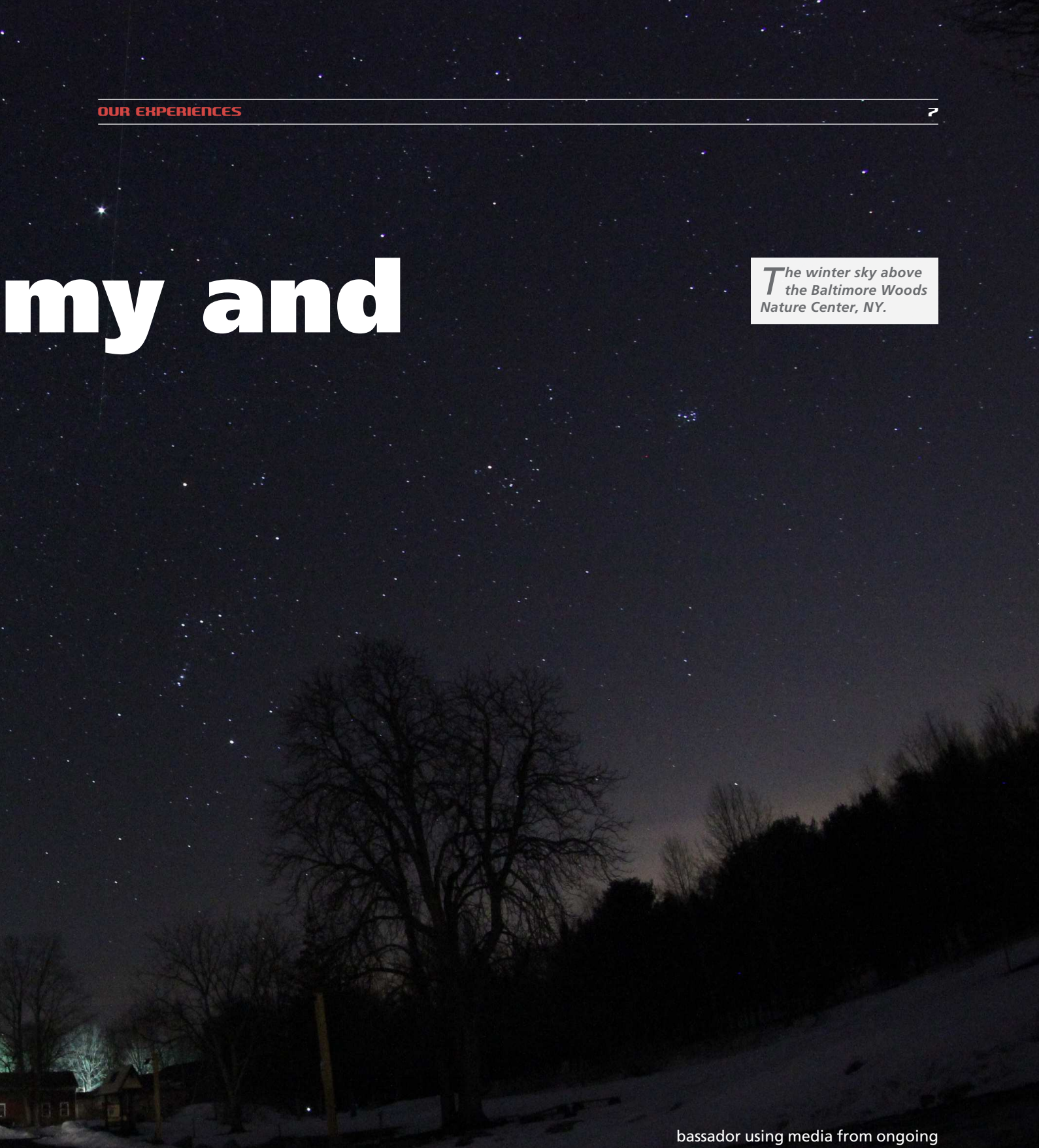


The winter sky above the Baltimore Woods Nature Center, NY.

sive laminated Sky Atlas. Email was the primary mode of contact, but the monthly newsletter was still mailed to all members until 2010, when three copies were mailed to members without internet access. Seventeen years later, I prepare lectures as a NASA Solar System Ambassador using media from ongoing missions, with astronomy.fm or ISS feeds in the background, maintain a website for an outreach organization I live too far away to attend events for, and read through open

The gathering crowd along the Syracuse, NY Creekwalk for the June 5, 2012 Transit of Venus.

NASA/ESA/ESO/ALMA browser tabs as I edit the English language version of this magazine produced an entire ocean away from me – all of which is "doing" amateur astronomy, but none of which involve looking through a telescope.

Those benefiting from greater connectivity appreciate having so much more on their screens, while others may reminisce about a time when enjoying the celestial sights meant being outside. For young astronomers, this new technology is a fact of life, and becoming an amateur astronomer now need not ever involve a telescope, much less a club affiliation. While this magazine has international coverage, the changes to astronomy and outreach are familiar to those engaged in either, even if some specifics differ by location. What follows is a perspective on our changing hobby as experienced by one person within the CNY amateur astronomy community.

Old and new amateur astronomy

Books could be dedicated to the ways that amateur astronomy has changed because of advances in manufacturing and internet access. A small sampling is considered below.

An early Association of Lunar & Planetary Observers (ALPO) podcast featured an interview with Dr. Thomas Williams, author of Getting Organized: A history of amateur astronomy in the United States. Dr. Williams went into detail about how early amateur astronomy in the U.S. had, like the Royal Astronomical Society, AAVSO, IOTA, and ALPO still today, worked to produce original, publication-quality scientific research. Before the mass production of inexpensive scopes lead to the popularization of amateur astronomy as purely a hobby, the difference between amateur and professional astronomy was, for some, just the paycheck.

Today, anyone online can contribute to astronomy research in the form of

Barlow Bob (in yellow NEAF Solar Star Party attire), Calcium K-line and H-alpha Solar Scopes at Darling Hill Observatory in Tully, NY.

projects like Planet Hunters, Galaxy Zoo, and others from Zooniverse, or the long-running SETI@Home.

For observing hobbyists, there's no longer a need to buy an expensive telescope at all thanks to commercial rent-a-scope projects like Slooh and iTelescope.

We no longer wait for a Hubble photobook to be available at a local bookstore – just visit hubblesite.org. A daily tweet reminds us of just how far away both Voyager probes are. Discussions and debates are no longer scheduled, as virtual organizations and email lists like Cloudy Nights, Astronomical Spectroscopy, and HASTRO-L host exchanges in near-real time, with collective memberships in excess of any local astronomy club on the planet.

Gone are the days of needing papers of incorporation and board meetings. Create a Facebook group, make a few local connections, and soon you've members reading and commenting without establishing a non-profit or buying insurance, ever meeting face-to-face, or charging fees. James Callens' "Western NY Astronomers" Facebook group is a great example of just that, with members from around the world and active local contributors from the east in the Mohawk Valley Astronomical Society to the west in the Buffalo Astronomical Association. The benefits to amateur astronomers of such online groups can be highly advantageous! Not only can you be given early notice of meteor shower activity with enough time zone coverage, but observers separated by a few hours' drive can get reasonable expectations of approaching cloud cover – combined with Aurorasaurus, Admiral Robert FitzRoy himself could not have asked for a better real-time (amateur astronomy) forecasting service. The easy access to information does come at the cost of strong opinions or misinformation – cases where local organizations with knowledgeable members are still indispensable. One could be led to conclude that there is no introductory telescope worth purchasing based on reviews from people who look away from their Takahashi just long enough to focus an Astromaster. Perhaps most insid-

Attendees at a city-wide Syracuse "Maker Faire" playing an informational game of "Meteor Madness."

ious is the ease with which anti-intellectual conspiracy theories, such as Flat Earth and Moon Landing Hoax "movements," can gain support thanks to fancy websites and click-followers unconcerned with the consequences.

Problem and solution

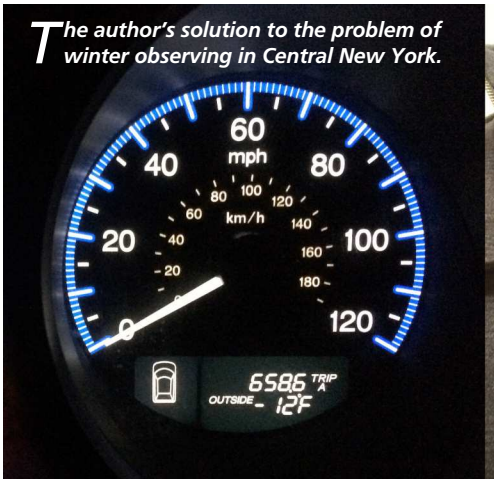
There is no hiding the nighttime sky, for which countless generations have seen it as a calendar, a stage, or an omen. Excluding the occasional supernova, you are observing the same stars in nearly the same arrangement as your ancestors have for several millennia. When we consider the profound roles of celestial mechanics and spectroscopy, we find that our rapidly-improving technologies owe their existence to stars that have changed little since even the most primitive theories were developed to describe them. Just in the last century has our view of outer space been dramatically altered by the inclusion of Earth itself as part of the backdrop thanks to missions programmed to "turn around" and take pictures. While the heavens have not changed significantly in all this time, our ability to see what is up there has. The most significant change to amateur astronomy recently is how our access to high-resolution images from world-class equipment has changed our relationship to the personal telescope. In CNY, Attilla Danko's Clear Sky Charts are more famous for the announcements a subscriber doesn't get due to overcast conditions. It is difficult to argue against the speed, convenience, and weather-indifferent accessibility of using your web browser as an eyepiece, this at a time when the mass production of observing equipment from reputable companies provides new observers with telescopes that can

Observers under the Autumn skies of West Monroe, NY.

CNY Observers Larry Slosberg (left) and Bob Piekiel (standing at right) at a joint solar observing session, Baltimore Woods Nature Center in Marcellus, NY.

exceed the quality of those used throughout the history of amateur astronomy.

The purists among us would argue that the only thing an amateur astronomer should have on their screen is red acetate. At arm's length, our smartphones cover five degrees of sky, yet can account for all of our attention. Bright screens are not only a star party annoyance, but have become invasive enough that nomophobia, fear of being without/losing a mobile device (as in "no-mo"bile phone), is being considered for addition into the Diagnostic and Statistical Manual of Mental Disorders. Those who have ever run a public observing session know how some attendees would rather spend time taking saturated pictures of the Moon through an eyepiece than simply giving the Moon a look.



The author's solution to the problem of winter observing in Central New York.

Quality articles and galleries are always worth a click, but those who see Jupiter through quality optics know that there is something special about photons from the source. This message, and conveying it to the public, literally and figuratively keep the astronomy outreach community up at night. The solution is as simple for amateur astronomers as it is for some extraterrestrials – let others know you are out there. Contrary to the alien agenda, amateur astronomers need to let themselves be found.

Safety (and preservation) in numbers

If you've ever setup in a dark area, heard commotion in the distance, and shined a flashlight around only to see a pair of eyes blink and disappear, you know why some people love group observing. Astronomy clubs provide a place where like-minded people can talk astronomy or let the discussion vary while observing (among a few clubs I've attended meetings for, a "no religion, no politics" discussion rule is enforced). Members know the usual benefits – comparing eyepieces and listening to complaints about a scope brand, people reporting on recent discoveries, seeing an academic lecture or slides from yet another eclipse tour, then hopefully rolling back a roof to see a few Messiers and NGCs. I pay dues to several CNY clubs for these reasons, and one of the best things you can do to help support the hobby even without attending meetings is to keep local clubs viable. Mirrors do not recoat themselves, donation boxes do not auto-fill, and the board members

Ryan Goodson of New Moon Telescopes lecturing on telescope history and design for TACNY Jr. Café Scientifique at the Milton J. Rubenstein Museum of Science & Technology, Syracuse, NY.

A CNY Observers presentation table at a NASA-sponsored Ying Tri Regional Science & Engineering Fair (Ying-TRSEF) event in Syracuse, NY.

running observing sessions, answering phone calls from local reporters, and maintaining the social media presence appreciate knowing the member support – both financially and in greater attendance – is there. Public sessions are also the best form of local outreach the hobby has – the combination of membership and media has pro-

The Kopernik Astronomical Society (and friends) corner at the Cherry Springs Star Party, Coudersport, PA.

CNY Observers hosting a solar observing session outside of the Milton J. Rubenstein Museum of Science & Technology, Syracuse, NY.

duced the largest public events I've ever attended, including the Venus Transit of 2012 from downtown Syracuse (350 attendees), a multi-library session for the 2017 solar eclipse (300 attendees), and the close approach of Mars in 2003 (well over 500 in a six-hour period).

Clubs not only provide a place to learn from established members, but are key to keeping the observatory sky dark. This is not hyperbole. Strong parallels exist between light pollution and climate change – the effects of both are rapid in terms of human history, but the actual changes from "subtle" to "measurable" are ones that have received attention over just a few decades as, for astronomy, observatories have seen their horizons glow brighter with urban development blending with suburban sprawl. For both, there is no quick fix – the changes are upon us and, for now, the immediate solution is to adjust to the new normal, accept that things will get worse in the near-term, and hope the will exists to keep matters from getting worse. True to both, nothing will change unless people take action.

Astronomy clubs should be at the forefront – attending city council meetings where ordinances and acceptable lighting standards are discussed, making the community aware of studies linking excessive lighting to health issues, and even starting to organize against the unnecessary use of the nighttime sky for corporate promotion. A March-April 2019 article in this magazine is

Solar observing session in Baader, H-alpha, and with NASA Night Sky Network resources for the Syracuse City School District in Syracuse, NY.

worth reading for those unaware of efforts to make such orbiting displays a reality. If Sputnik taught us nothing else, it is that low-Earth orbit is an excellent place to make the world aware of your brand – an equally inescapable aspect of SpaceX's Starlink effort.

CNY was fortunate to have the dark sky champion Dr. John McMahon, whose actions and emails kept clubs and the community aware of both the science of light pollution and legislation being developed to make New York a darker place to observe – actions he continues to take now from north of the bright lights of New York City.

Buying larger aperture telescopes is easier than changing public policy. That said, clubs organize members, organized members make for louder voices, and louder voices get heard. Joining the chorus locally also helps counter the inevitable ebb and flow of membership some smaller astronomy clubs experience over time, keeping their voice loud. The International Dark Sky Association, Commission for Dark Skies, and CieloBuio are excellent resources for those wanting more information.

Bright lights in outreach

Moore (Sky At Night). Tombaugh (Pluto). Simmons (Astronomers Without Borders). Burnham Jr. (Celestial Handbook) Bopp, Levy, Lovejoy (Comets). Dobson. There are global names in amateur astronomy, people who have made others say "I want to do that." Hopefully, you have local "stars" that make similar impacts in your community, just as CNY has its share.

Robert "Barlow Bob" Godfrey founded the NEAF Solar Star Party and, upon settling in CNY, made himself and his solar scopes available to local clubs. His star chart contained one star at -26.8 magnitude and he had no interest in anything dimmer. His solar and other astronomy articles were published in several local club newsletters, earning the praise of those responsible for content. When he passed, the Kopernik Astronomical Society in Vestal, NY dedicated a plaque in his name.

Some may know Robert Piekiel from his 1800-page magnum opus – Celestron: The Early Years. Bob has run observing sessions on New Moon weekends and major events at Baltimore Woods Nature Center in Marcellus, NY for well over a decade. Besides writing books on telescopic topics, Bob also makes himself available to local clubs to lecture on the history, testing, and maintenance of modern telescope equipment.

David Bishop of the Astronomy Section of the Rochester Academy of Science is internationally known for

his supernova website. He also presents to local clubs a special "Year In Space" lecture – a collection of sights from the previous year that he narrates with context and a clear sense of enjoyment. He has found an excellent balance of internet give-and-take – using web sources for his lectures while maintaining a go-to website for the most impressive of stellar phenomena.

CNY Observers co-founder Larry Slosberg has perfected timing and location – bringing his trusty New Moon Telescope Dobsonian to a local ice cream shop to thrill young and old alike with views of the Moon and bright planets. With kind permission from the owners and a stack of napkins close by, one can only imagine how many leave inspired to learn more.

The common thread is outreach – they could all be observing in a dome, but instead make themselves and their equipment available to the community. It is the nature of the hobby to constantly improve on aspects you enjoy the most. Some take the extra step of allowing the public to benefit from their efforts. You can absolutely make a lasting contribution to amateur astronomy in your area simply by the fact that you know more than others about *some* aspect of astronomy.

In CNY, this has happened by way of local libraries, where long relationships give the libraries and clubs well-attended opportunities to promote amateur astronomy. A social media presence or a simple email is enough to make introductions and start you on your outreach path. There are likely STEM organizations in your area that would be delighted to host a lecture or observing session. You might even be fortunate enough to have something like the Technology Alliance of CNY, an "organization or organizations" where many STEM groups keep in contact through lectures, a large email list, and a monthly youth version of Café Scientifique.

Marty Pepe of the Astr Section, Rochester Academy of Science, demonstrating his DishTV solar observing rig at a NEAF Solar Star Party.

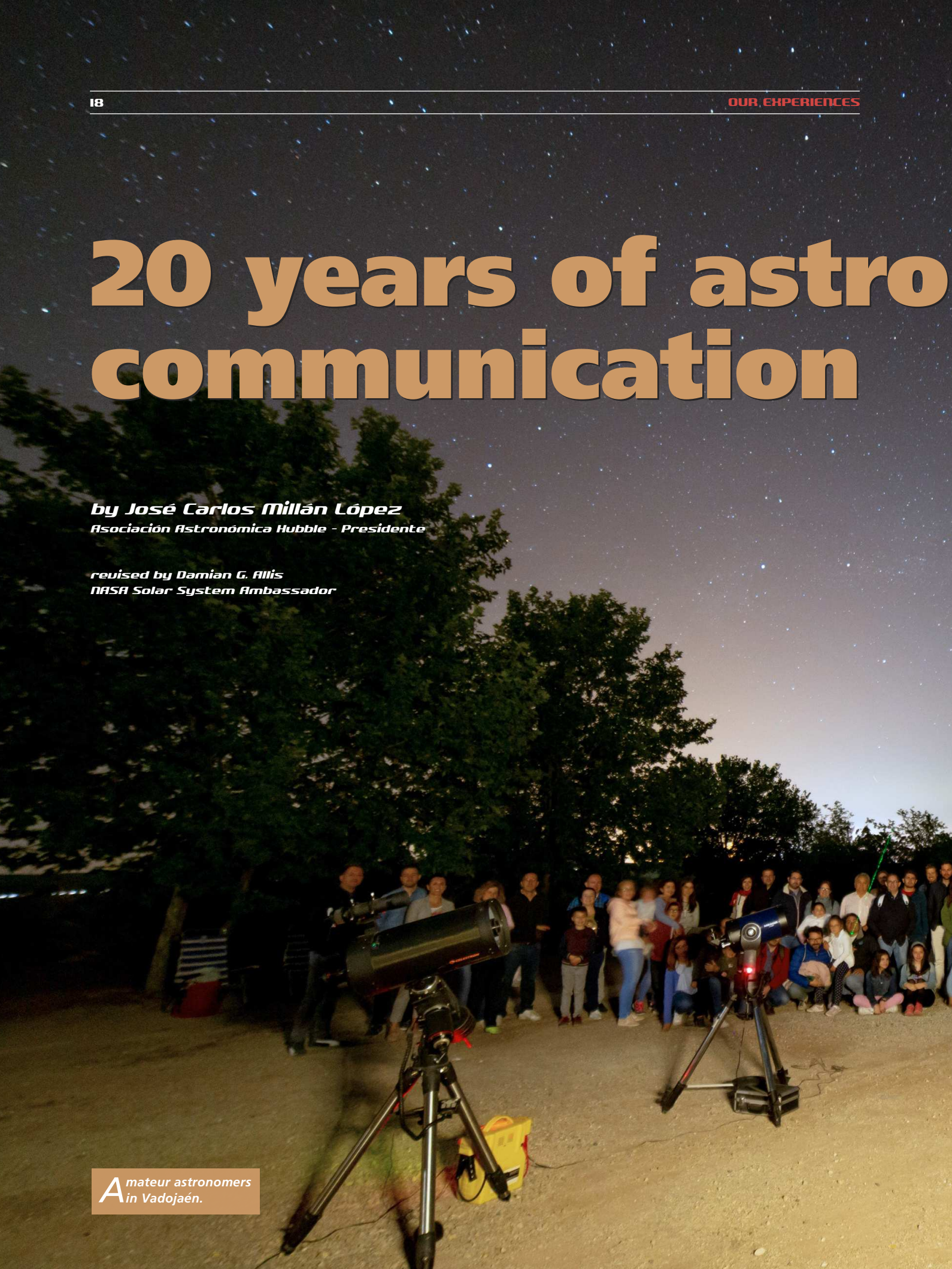
Add to the solution

Preserving the nighttime sky, keeping the community growing, and giving interested people a place to go to encourage their astronomical pursuits is vital to preserving the hobby and the nighttime sky. If there are things that you have found to work, do not keep them to yourself! Consider adding to the discussion on this issue's Facebook announcement. ■

20 years of astro communication

by José Carlos Millán López
Asociación Astronómica Hubble - Presidente

revised by Damian G. Allis
NASA Solar System Ambassador



Amateur astronomers in Vadojaén.

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The digital knowledge society in which we live, the so-called "Society 5.0," requires reliable, real-time information to move through all of the multiple communication channels we enjoy. The scientific fields are, sometimes by their very nature, the ones which lag behind in many respects in terms of this rapid communication, mainly due to three factors: confusion from untested or unverified information, a lack of technical-scientific training among non-specialized journalists, and the inability of some scientists to communicate. For many years, there have been courses and study modules focused on and specialized in science communication within both university and postgraduate scientific organizations. Some great discoverers have likely gone unknown throughout history precisely because of the lack of communication of their discoveries, with credit instead going to other scientists who communicated their new findings effectively and adequately. Reaching the unskilled public is not easy. The communicators, in addition to needing a solid and specialized scientific training, must also be capable communicators to arouse the interest of the people to whom an article, an informal speech, or a conference is directed. The communicator must be very flexible to adapt to the audience and situation at all times and know how to connect with an audience that is sometimes more varied in its combined level of understanding than the one expected. Empathy is essential.

Comparison between the size of the Moon in the apogee and perigee.

As popularizers, one of the funniest anecdotes we can tell is of a child's fear during a speech about the probability of an impact of an asteroid, since he had not understood the meaning of "probability" and we could only convince him of the low probability with examples understandable at his 8 or 9 years of age - an oversight, perhaps, of his parents by bringing him to an astronomy speech addressed to adults.

Dissemination is one of the objectives of the Asociación Astronómica Hubble, as clearly stated within its statutes from its founding in November 2001. For this reason, we take great care in the smallest details in readings, conferences, seminars, and public observations in schools and institutes. Our goal is not only to spread astronomy information, but also to communicate it correctly, in a bidirec-

Dissemination Outreach and observation activities in the Castle of Jaén on the occasion of the International Year of Astronomy 2009.

Image of the Xauen-1A probe on the ground a few days before the launch.

tional way, and adapt it to the public, to whom the activities are addressed.

If the communicator does not achieve such a connection, then there will be no interest from the public – even if the listeners are interested momentarily, their attention will be inconstant.

One of the first areas that the association worked to popularize was that of amateur weather observations. We currently hold the position of secretary within the Sociedad de Observadores de Cometas Y Meteoros de España (SOMYCE), representing the International Meteor Organization in Spain. The study of meteors is a very practical route for getting closer to astronomy since, with a suitable methodology, it is possible to obtain valuable, scientifically useful data. Furthermore, it is an activity that, thanks to its extraordinary beauty, helps to arouse interest in science in general and astronomy in particular. As part of this type of activity, in the years when the moon phases allow it, we organize public observations of the Perseids. Since 2004, the association has managed the www.asociacionhubble.org website. It highlights what have been the most visited Spanish astronomy forums on the web for many years, with over 10k users and a documentary database of with over 50k discussions. The database has over 50 GB of information. Due to the technological "fashion", we subsequently started to be added our presence to in social networks such as Facebook (https://www.facebook.com/AsociacionHubble/) and Instagram, where we "landed" just a few months ago.

Our goal is to give more visibility to our activities and highlight the scientific milestones of every moment.

One of the many public events organized by the Asociación Astronómica Hubble.

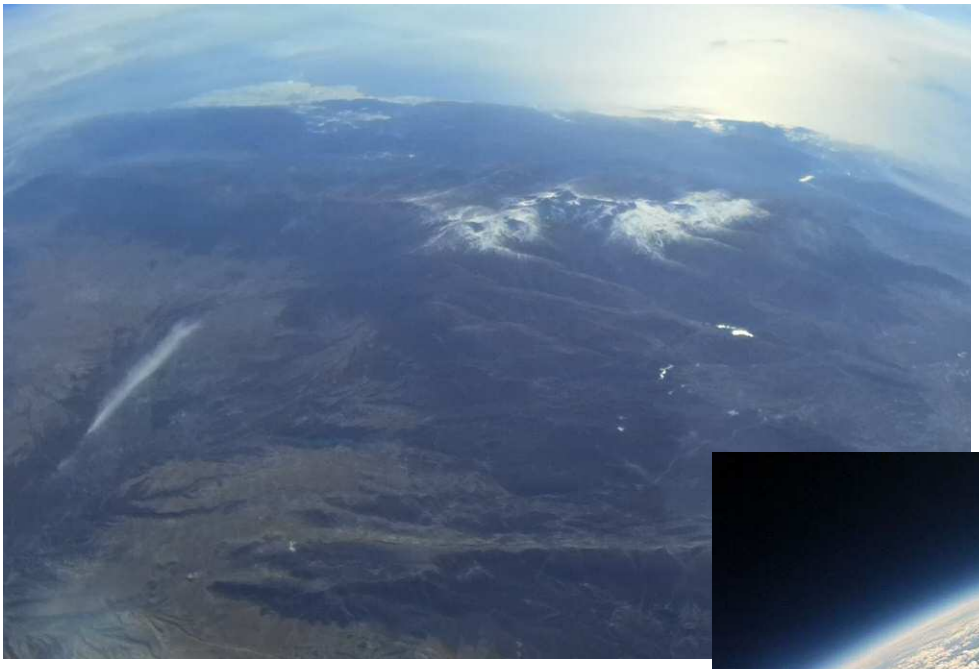


Foto estratosférica de la provincia de Jaén con el Parque Natural de Cazorla, Segura y las Villas en primer plano.

Stratospheric image of eastern Andalusia. You can see the Sierra Nevada and the Mediterranean Sea in the background.

Although in the association, there are excellent astrophotographers of both night landscapes and deep-sky objects, the members of the association have always tried to make images with a clear, informational component. Therefore, with many of our images, we do not strive to be first-rate astrophotographers (of which there are many in Spain). Instead, we look for topics and subjects to propose a process for in conferences presentations or to aid in explaining simple concepts.

Photo of the participants atin the VII AstroMartos Astronomical Meeting 2008.

Of all dissemination activities, the central one in our activity plan is the Encuentro Astronómico Astro-Martos, of which eleven editions have been held since 2002. In the meeting, amateurs from all over the national territory meet in our locality to participate in conferences and presentations made by top-level scientists. There is also a night observation activity open to the public, which

usually includes an informational seminar on constellation recognition, meteoric observation, and meteor video recording. We have the privilege of having counted more than 200 participants from all over Spain in some editions.

One of the most intense significant moments of for our popularization task effort was in 2009 for the International Year of Astronomy, in 2009, held 400 years after the first telescopic astronomical observations by Galileo Galilei. As members of the Organizing Committee, we have participated in various meetings and joined a multitude of activities that have highlighted the importance of astronomy in all areas of our society: Astronomy in the streets, The 100 hours of astronomy, The stellar parties, etc.

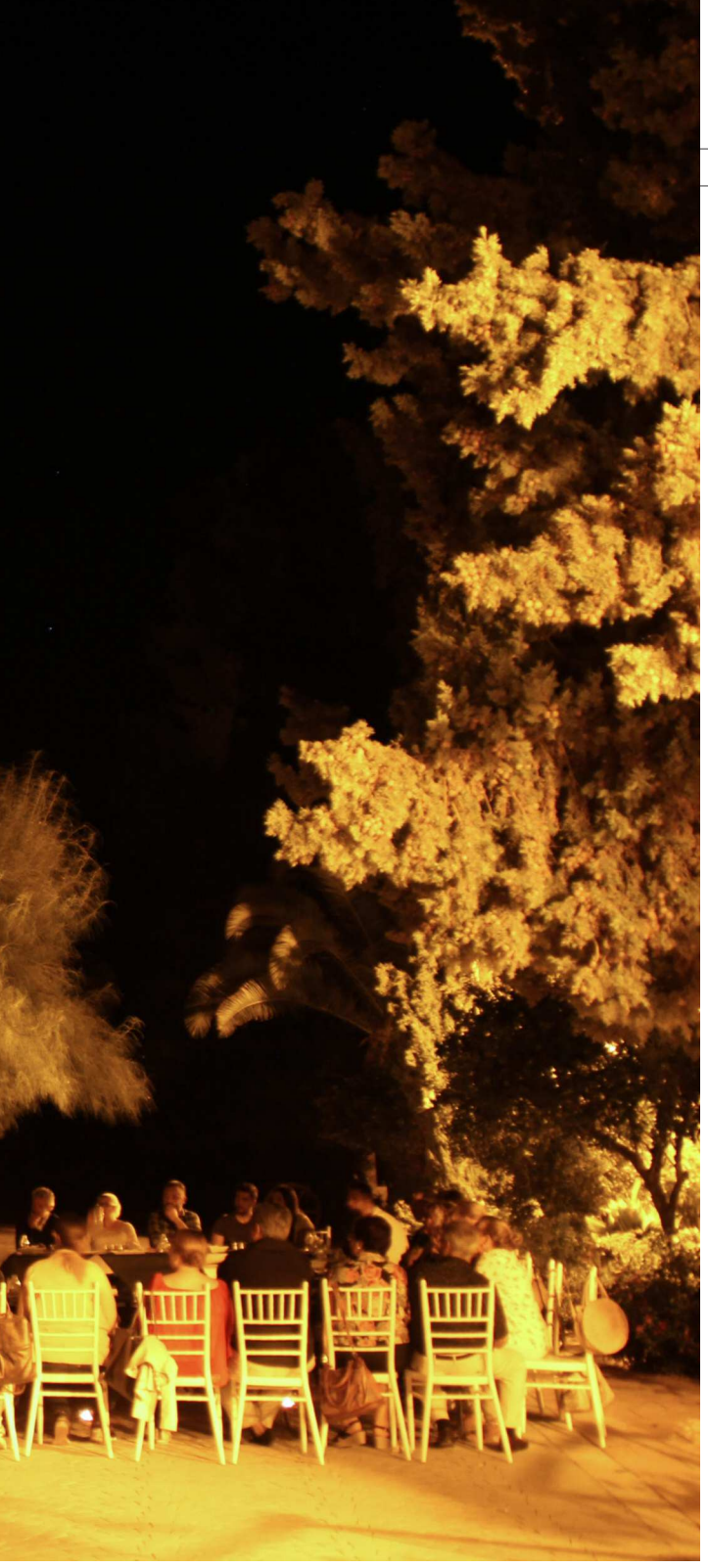
Another activity that has attracted more attention in recent years was the launch in 2016 of a probe balloon into the Earth's stratosphere thanks to a dissemination project financed by the Diputación de Jaén. We had built an effortless, simple probe, with containing two image recording systems (one lateral and one vertical) and a GPS for tracking. The total weight of the system had been calculated in detail, as well as the quantity of helium to be introduced into the 2-meter diameter balloon. It managed to reach an altitude of reach 34,000 kilometers of altitude, taking beautiful images of our Earth. One of the most ambitious objectives we set for ourselves at the beginning of our journey was to raise awareness of and the fight against the light pollution that was already starting to threaten our sky. It was the dawn of 2000 and an unprecedented waste of energy accompanied economic development across the country. We have begun to catalog the light sources in our municipality and province, and the first steps have been taken to increase awareness of our light pollution problem. Eventually, our association and other realities

Children's workshop for the construction of a celestial planisphere. V Jornadas de Turismo de la Ciudad de Martos, September 2019.

Delivery of the 2008 Andalusian Flag award.

environmental groups in the field of the environment proposed to the administrations and development associations of the territory how to combat this terrible problem, by way of the certifications offered by the Fundación Starlight, an association of the Instituto de Astrofísica de Canarias. This initiative culminated in 2013, with the formation of the Iberus-Hubble consortium and the completion of certification work such as Reserva y Destino turístico Starlight de la Sierra Sur de Jaén y Sierra Morena (España). The estimates analyses were made by the Foundation's technicians, and the involvement of the local administrations was achieved, since all the municipalities, without exception in each of the two areas described above, joined the Declaración de la Palma and opted for a strong stance against this type of light pollution, and as well as for sustainable economic development policies aimed at reducing the emission of light towards the heavens.

Since the association was founded as a "youth association", and we



Combined olive oil tasting and astronomical observation activity. Without a doubt, experiences for the senses.

have always considered children and young people to be the targets on which to focus our dissemination outreach efforts. The goal has always been to create a scientific culture in the public in general and in children in particular, to guarantee a future with that promotes scientific vocations and a critical way of thinking in every situation. For this purpose, a multitude of practical seminars have been organized, as well as cross-cutting science-centered activities, but often with a more attractive youth-engaging common thread for to them, such as a game, a tale, or a story or an activity of discovery (the so-called "rallyes de pistas"). The latest activities for children carried out by the association have been involved working groups for the construction of a planisphere and a vertical sundial, in the context of the fifth Jornadas de Turismo de la Ciudad de Martos.

The transversality quality we have always tried to achieve in our activities has culminated in general recreational activities with an important component of astronomy. We can highlight, for example, the combined activities of night hiking with and the interpretation of the sky or, if they are carried out in the phase of a Full Moon, a hiking presentation themed with on our natural satellite. For example, each of the breaks along the way is used to talk about a different topic related to the Moon, whether it's its mythology, its geological history, the history of its observation, or surface details and the nomenclature used. Local history and our intangible heritage are common themes often recur in our activities. We can combine with the topics of Andalusian and medieval astronomy during a tourist visit to with the cultural heritage of our province and region, or combine the immense heritage linked to the olive oil of our land with astronomical observation. Undoubtedly, we can confirm from our experience of over these past years that the public, even when not particularly interested in astronomy, can become involved in it thanks to this the use of such type of "hook" activities.

The Association is proud to have been awarded, as best youth association in the province, the Jaén Joven Prize in 2003 for its promotion of science, a prize awarded to the best youth association in the province, because of the promotion of science, and well as the Bandera de Andalucía Award 2008 in the category of associations, for the popular projection outside our sphere. These awards have been an additional incentive and motivation to make all of our members see the importance of the mission that has been developed.

After over 300 activities and collaborations with over 100 different entities, both public and private and, including schools and institutes, these almost 20 years of activity have been, without doubt, a solid foundation on which to build a structure in that supports support both our scientific science culture and that the culture of the public we have reached. This structure must remain useful to ensure that, in the future, our children and young people will be increasingly more interested in science and will develop critical analytical abilities in many aspects of daily life. We will continue to work to achieve this. ■

The experiences of the Safor

by Marcelino Álvarez
Agrupación Astronómica de la Safor

revised by Damian G. Allis
NASA Solar System Ambassador

The Agrupación Astronómica de la Safor (AAS), based in Gandía in the autonomous Valencian Community, was founded in 1994 with two main goals: to bring together all astronomy and space science enthusiasts from Gandía and the Safor region, and to promote the diffusion of this beautiful science in any social and cultural area in an active and selfless way.

The activities carried out by the Agrupación Astronómica de la Safor are very differentiated. On Friday evenings we meet at the headquarters, which is located in the center of the city of Gandía. We publish a bulletin, *Huygens*, which is distributed among members, public centers and libraries. It has been bimonthly, although it is currently quarterly. It is based on what the members themselves write and what other authors send us. Its reading is fun and suitable for everyone. We also have a library: general astronomy books, exchanges of magazines from other groups, astronomy software, etc. Additionally, we run conferences in various educational or cultural centers in any Safor municipality. For astronomical observations, we move to the outskirts of Gandía, provided it is not cloudy. Lately, we have agreed with the city council on the use of a stone building, located in the Marxuquera district, where we can mount telescopes and also have a room to rest. Observation days are Fridays. We also organize observations for extraordinary events, such as the passages of comets, falling star rains (meteor showers), eclipses, etc.

The AAS has spread astronomy in schools and institutes for 25 years,

Photo of the Sun passing through "La Foradá" of Benialí, illuminating with its rays the chapel of San Francisco de Assisi, in the disappeared Monastery of Benitaia.

Family photo of those attending the XX Congreso Estatal de Astronomía, organized in Gandia with the assistance of more than 200 people.

for cultural weeks organized in many municipalities of Safor, in seminars held in libraries, through photographic exhibitions, conferences, public observations, and through communications to the press, radio and local television about astronomical phenomena of general interest.

Together with didactics and educational work, to which a great effort is dedicated, the AAS, through working groups created within it, has emerged as a participant in the field of amateur astronomical research through the discovery of several asteroids.

Apart of the expedition of several astronomical associations, which went to China to observe the longest solar eclipse of the 21st century.

In the field of archeoastronomy, the AAS located the position of an old monastery now disappeared in the Gallinera Valley, where the Sun's rays passing through a perforated rock on the day of San Francisco of Assisi (October 3rd) hit the saint's altar, illuminating it while leaving the surrounding environment in the shade. The AAS also provided context for an ancient legend in Penáguila, a city near Alcoy (according to which, pregnancies were given favor by the Sun's rays if those rays crossed another perforated rock and touched a woman during the winter solstice).

A glimpse into the past and the present

In 1999, an expedition to Turkish Kurdistan was planned to observe the total solar eclipse of August 11. The observation from Basnik, near Diyarbakir, was a great success, and the trip was an unforgettable experience. Other members went to Paris, but they were unlucky, as the rain prevented them from admiring the spectacle.

In 2005, the region of La Safor was touched by an annular eclipse, with Gandía in the centrality of the event during the October 3rd patronal feast of San Francisco de Borja. To better enjoy the phenomenon, an exhibition with large posters was prepared, presented in the Municipal Library and at the Hotel Bayrén, where we received over 200 amateur astronomers from various groups, along with their observational instruments. Even amateur astronomers from Italy, Belgium and France attended.

The fact of organizing, spreading and finally carrying out the observation gave us the definitive stimulus to aspire to more relevant activities for the future. It is interesting to note that on the beach, where several telescopes had been installed, the influx was considerable, with more than 1000 people present at some times.

Sundial of Beniganim, also this by Joan Olivares, which has the "particularity" of projecting the shadow in a circle, and the hour is illuminated above the metal support.

Visit to one of the Sundials by Joan Olivares, located in Salem, a town in the Albaida Valley region, near Safor. It is a multignomon clock, since each edge corresponds to a shadow cast on a face and changes as the day progresses. In addition, it has a sign (imperceptible in the photo), which indicates where the shadow runs on the day of San Miguel, patron of the town.

We had just recovered from the eclipse when our member Josep Juliá, who had already discovered two asteroids, announced the discovery of a third, which was the first to receive the initials "VI" (Virtual Impactor) as one of the most "grazing" of the Earth, passing up to a third of the Earth-Moon distance – about 120,000 km.

In March 2006, just six months after the annular eclipse, a new trip was organized to Turkey to observe a total eclipse. In this new journey, 90 participants filled two buses.

In 2008, we participated, together with other organizations, at the Semana de la Ciencia y el Cambio Climático (SECICA), which had its first

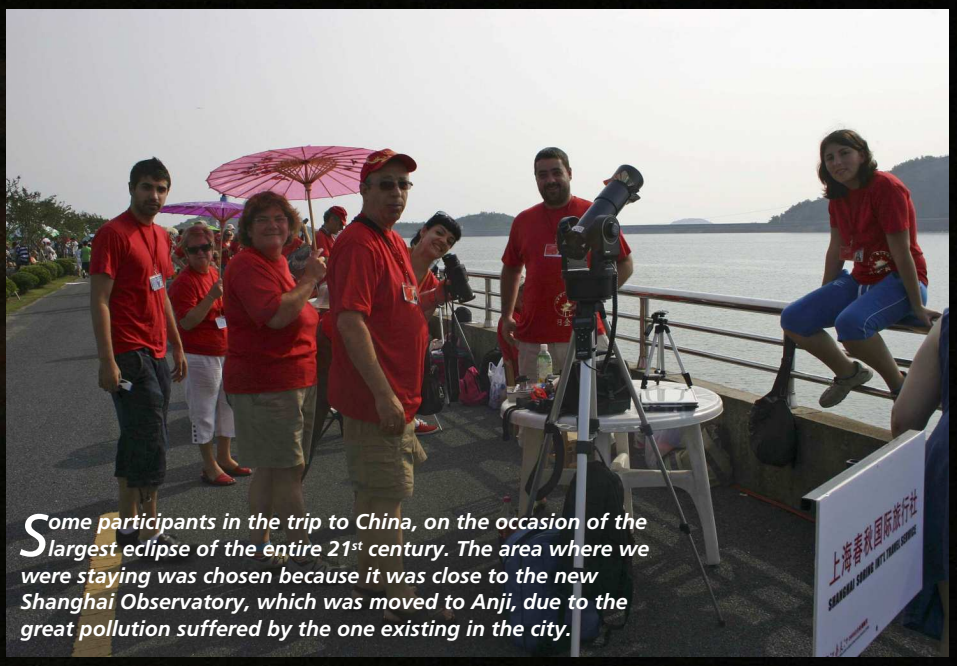
A part of the telescope area inside the Bayren hotel during the annular eclipse of 2005.

edition that year. It was a whole week of hectic activities, serving over 2500 students from all Safor schools, establishing visits to the various seminars and exhibition stands mounted for the occasion, and with a guest conference every day that filled the main hall of the Casa de la Marquesa, which is the cultural center of the city. Guest speakers included the Spanish astronaut Pedro Duque and the scientific director of the Ciudad de las Artes y las Ciencias de Valencia, D. Manuel Toharia. In 2009, on the occasion of the celebration of the International Year of Astronomy, a collaboration was established with the Musical Union of San Francisco de Borja and an astronomical concert was offered, during which images following the rhythm of the music were projected. A new total solar eclipse, although this time in China,

A view through the clouds of the partial solar eclipse, visible from Gandía beach at dawn on January 4, 2011. The clouds gave a ghostly appearance and served as a decoration.

Observation zone of the total solar eclipse of 2006 in Turkey. We were in the city of Side, in a place specially equipped for observation, inside the Temple of Apollo. The stones on which we put the material and around which we were would have delighted any museum.

was the opportunity for organizing a new trip. On this occasion, and despite the distance to be covered, the number of participants reached 60, including amateurs from other associations, who appreciated both the trip and the eclipse. Despite being cloudy in most of the region, they were able to see the phenomenon almost entirely. The observation area was located near the new Shanghai Astronomical Observatory, the site the Chinese government had chosen to observe the eclipse. During the summer of 2010, we also participated as organizers in the Reunión anual de Constructores Aficionados de Telescopios (RETA), which is an annual meeting of amateur telescope manufacturers. It took place in Aras de los Olmos, with a participation of over 100 people. In December 2012, we organized and celebrated the XX Congreso Estatal de Astronomía, a meeting of most of the astronomical associations of Spanish amateurs. For four days, presentations, workshops, conferences and round tables were organized, attended by over 200 people from all over Spain. The fact that the Congress headquarters was made up of the buildings of the Universidad Politécnica de Valencia, Campus de Gandía, contributed to its success, since we were able to broadcast some of the essential presentations live on the Internet and record the rest for the final publication. Despite all this activity, the current situation is far from lively. After those years of euphoria, today we are immersed in a profound crisis that can have serious consequences, as collaborations that maintain the activity are lacking.



Some participants in the trip to China, on the occasion of the largest eclipse of the entire 21st century. The area where we were staying was chosen because it was close to the new Shanghai Observatory, which was moved to Anji, due to the great pollution suffered by the one existing in the city.

Aspect of the stand of the Agrupación Astronómica de la Safor during the celebration of Science and Climate Change Week (SECICA).

What about the future?

Since 2007, probably due to the economic crisis that has particularly affected Spain, the entry of new members has slowed down and only slightly recovered in the last year. The active participation of the members has, however, decreased a lot. Where before there were several cars loaded with telescopes, tables, batteries, etc., now there is only one to take everything, and the merriment enjoyed at each observing outing has significantly decreased. Among the possible causes, we have mentioned the severe economic crisis suffered by Spain, from which we have not yet fully recovered, but it is likely that there are other factors, such as the following. The first is the natural change we are experiencing due to the evolution of personal life, since the former students are now current workers, many with children dependent on them and therefore with less time to devote to the association. On the other hand, the offering of astronomical stuff is today abundant, of excellent quality, with much higher performances and much lower prices when compared with those of a few years ago. In past times, every amateur astronomer would have to belong to an association if he wanted to

The visit of the Spanish astronaut Pedro Duque to the stand of the Agrupación Astronómica de la Safor during SECICA 2008.

Comet Holmes, in November 2007 after the outbreak that brought up its luminosity several magnitudes.

progress in astronomical knowledge, learn to use a telescope or even make observation equipment himself. Today, many tutorials exist on the Internet that simplify learning and practical construction of different instruments.

Furthermore, the arrival of digital electronics in this field has meant a complete revolution, and it is, therefore, possible to achieve results that were previously the prerogative of professionals, large companies and institutions with amateur instruments. These new possibilities have segmented amateur astronomers, who have fallen into different classes, some very specialized.

Due to, or thanks to, all the above, the market has been flooded with infinite possibilities. Something that didn't exist many years ago has now become abundant. It is not bad that this happens, but regardless of the pleasure or disgust it produces, it has completely changed the conditions of the amateur astronomers' market.

And so it happens that we don't have to wait for information, but now have less certainty in the days or times we gather together and share knowledge, since we have everything we need directly at home. Finally, the terrible light pollution we suffer causes many amateurs not to see stars normally, and this prevents newbies from growing alongside more expert members.

Amateur astronomer groups and publications are languishing and gradually being replaced by emails, WhatsApp and other forms of communication, relegating to last place the merriment in social observing.

At least, this is what we have suffered in the AAS. The "specialist" members have gradually moved away from the "normal" members, and the result is a weak association that fails to fulfill the purposes for which it was created, such as the dissemination of astronomy.

The passion for the stars can suffer ups and downs, but there will always be this passion, and times will come that will not be like ours now, but instead will be excellent for the new amateurs. ■

The astrophysicist Francisco Sánchez Martínez, during the inaugural conference of the XX C.E.A. He was the founder and then director of the Instituto Astrofísico de Canarias. Fue el impulsor del Gran Telescopio Canarias, que es el mayor del mundo todavía.

The popularizati of astronomy in Jerez

by Manuel Jiménez del Barco Ruiz Herrera
Agrupación Astronómica Magallanes

revised by Damian G. Allis
NASA Solar System Ambassador

on

The society of the 21st century changes at a dizzying rate in many ways, including its needs, concerns and fears. The customs of individuals, their habits, their training and their relationships with peers do not resemble those of twenty or thirty years ago. Science is continually evolving, and if you want to be aware of the changes, you have to update yourself continuously. My vocation as a popularizer created a need that stimulated me to keep up-to-date in my fields of astronomy and astrophysics. To explain some complicated concepts to ordinary people, you have to master what you are talking about and you must know how to invite people to listen to you before they see you as a chatterer who is saying annoying things. During my stay at university, I had my first experiences as a popularizer, but I recognize that those beginnings were more comfortable. I talked to college students and people related to that world, which favored communication.

Portrait of the Agrupación Astronómica Magallanes in a night sky observation session.

Spreading astronomy on the radio

The situation changed when I left the university, dedicating myself to teaching, joining an astronomical group and, above all, taking the opportunity to collaborate on a radio program of scientific popularization. The program in question is called "Un Punto Azul" in honor of Carl Sagan, a popularizer admired by all who probably triggered the spark of astronomy and the desire to spread it among many of us.
We started as an experiment, but it stopped being just an experiment many years ago. In this 2019-2020 season, we have completed twenty years of transmission, a duration that very few radio programs can boast. As the reader may imagine, in that period, we went through many different situations: crises, successes, interruptions, changes of all kinds. The site of diffusion and the collaborators have changed, but above all we have personally experienced the evolution of the media, of the tools that must be used to reach the listeners, and also the change of our listeners' wishes. A striking example of this evolution is the way we broadcast the program. We started from a modulated frequency (FM) station called "Radio Frontera," which took its name from the city from which we still broadcast, Jerez de la Frontera, broadcasting live, sometimes without recording the program and without replicated broadcasts. Afterwards, we were able to record the broadcasts, thus being able to replicate them. At the time, we learned to take advantage of the Internet and the ability to upload our programs to the web in order to allow our listeners to follow them when they wanted – what we now call podcasts. This step was our first big revolution, to go beyond traditional listeners (with a radio device) and open up to anyone who had a computer or music player and, of course, wanted to listen to science and expand their knowledge.
The other great revolution we experienced (and we still experience) was technical and decisively influenced the quality of the program. In the radio studios we frequent today (belonging to the University of Cadiz, in particular, those of Radio INDESS), in addition to having modern audio equipment and facilities, the simple incorporation of the Skype app into our recording device has allowed us to conduct interviews that we never thought of doing. We no longer have geographical barriers with our respondents, and we can interview Spanish scientists everywhere in our country and even those who work abroad. At the same time, we also noticed an evolution in the type of listeners who follow us. We moved from the neighborhood listener, with mere curiosity about some scientific topic, to the student who uses multiple social networks and digital devices, up to other astronomy amateurs or scientific professionals who listen to us and also collaborate sporadically in our broadcasts. This result makes us happy and enriches us considerably. One thing has not changed since our inception: we always have opened the program to questions and doubts from listeners to clarify fake news or misunderstandings of scientific news, and these questions have not diminished, as might have

Photo of the first broad- casts of "Un Punto Azul" at the facilities of Frontera Radio, in Jerez de la Frontera.

Snapshot from season 2019 of "Un Punto Azul" in the studies of Radio INDESS, at the University of Cádiz.

been expected with the universality of Internet access and ease of access to news.

The problem has perhaps increased, which shows that over-information interferes considerably and free access is not the problem; rather, it is the lack of criteria by some of choosing reliable sources and establishing a scientific culture strong enough to allow for the distinguishing of fake news or exaggerations of reliable news.

I think one of the strengths of our podcast is that we make it very pleasant and fun. Of course, we have had diverging opinions, but we believe that, to spread science, it is necessary to give it that playful touch, to transmit that science is not boring. This does not imply neglecting scientific rigor. In my opinion, you can be rigorous and fun at the same time. This is what we try to do with "Un Punto Azul."

Other dissemination activities

In addition to the realization of a radio program for scientific popularization, our group carries out training activities in schools and institutes. We are fortunate to have teachers, professors and education-related people among our associates who have made bridges between their centers or knowledge and the group. In these years, there has been no shortage of conversations about planets and stars, observations of the Sun with different instruments, and even nocturnal observations after school hours. The age range is also broad, from children (up to 6 years of age) and primary school (from 6 to 12 years), to secondary school (from 12 to 18 years) and adults. We, therefore, have a complete idea of the evolution of our kids in these years of experience. Curiosity and interest among young people have not changed, but what we have noticed is a change in the age of children interested in astronomy. For some time now, secondary school teachers asking for collaborations have declined, while activities for younger children have increased, from kindergarten to primary school. Another aspect that changed is the activity in schools after school hours, which allowed us to make nocturnal or even early morning observations.

I take this opportunity to thank the efforts of the teachers who organize these activities due to the complexities it entails.

One of the most successful activities among the youngest, and also one

Jose Luis Espí is taking the "Curso de Iniciación a la Astronomía" in 2018.

of the most requested by the teachers who contact us, is the launch of water rockets. It is a very complete experience, since there is the first part of manual work and group collaboration, in which the working groups build the rockets with empty plastic bottles, cardboard, scissors and adhesive tape, and a second part outside the classroom, where we launch their rockets, thanks to a launching platform created by us and an air compressor.

An annual event in which we work to spread astronomy among the youngest is our participation in the "Feria de la Ciencia en la Calle." Organized by the Centro de Profesores de Enseñanza Secundaria, the idea is that the students themselves explain scientific experiments to their classmates from other schools. Although almost all participants are schools, companies, awareness centers, and associations (as in our case) are present. Every year, by spring, we have to devise an experiment that can be performed on the road and that allows us to explain something related to astronomy or astrophysics. In the three or four days of the fair, over a thousand students eager to learn more about astronomy pass through our stand.

Another activity we carry out every year are courses in astronomy, astrophysics, and night and astronomical photography.

In these courses, we have a double task. On the one hand, we attract an audience who wants to expand its astronomy knowledge more seriously, and on the other hand, we take this opportunity to train our associates. We cover from novices

and "first contacts" in this hobby with an initiation course, through learning more specific aspects, such as astrophysics or astrophotography. Attendance at these courses is currently low, but we see an increase year after year.

Our workhorse, as in many of the activities we carry out, is to make the right advertising and direct it to the most appropriate audience so that more people participate.

Learning to differentiate between weight and mass at the Feria de la Ciencia.

Joaquín Barroso explaining the movements of the Earth and the Moon with a tellurium at the Feria de la Ciencia.

Another idea that we had a few years ago, which unexpectedly managed to interest the members of the group and made perfect their photographic techniques, was the creation of a large format calendar, in which we included the best astronomical images taken by us. At the end of the year, we ask

the associates to send us their best pictures taken that year. Afterwards, our most experienced astrophotographers made a selection to choose the 13 final images that will appear on our calendar the following year. The healthy competition between us has improved the quality of our photos. We try to host all types of astronomical images, not only those made with the CCD at the telescope. We also include photographs of large fields, planets and night

In the video above and in the photo to the side, the launch of water rockets.

landscapes, and even those made with cell phones. Every year, it is more difficult for each photo to be selected, since, although our group is not very numerous, we are fortunate to have astrophotographers who have already published images in specialized magazines, both Spanish and international.

As an astronomical group, we also carry out public activities on scheduled dates, such as on August 13th or close-by days to observe the Perseid meteor shower, or on the equinoxes, both in spring and autumn, where we observe the sunset from a special location close to our city, where there is a particular alignment between the Sun and a castle only on those days. We do not miss the opportunity to take photos of that particular landscape, nor do we let the eclipses escape, both of the Sun and the Moon, that we observe and photograph.

We then collaborate with public and private institutions, such as the municipalities of our city and neighboring cities. A company devoted to the trade of organic

Night conference under the starry sky.

foods, mainly honey, relies on our group to organize sessions with conversations and observations of the summer night sky. We also collaborate with nearby amateur astronomy associations in their activities to help our colleagues, providing speakers to hold conversations and conferences, or monitors and tools for public observations across the province. Another peculiarity of the Agrupación Astronómica Magallanes is that it is part of the Red Andaluza de Astronomía (RAdA), which includes many amateur astronomy associations in our region. Shortly, we will also belong to the Federación de Agrupaciones Astronómicas de España (FAAE), which will allow us to strengthen ties with many more amateur astronomers in the region and throughout the country, as well as participate in significant events. In addition to everything we do in the Agrupación Astronómica Magallanes, the most important thing for us is the friendship and harmony that exists in our group. This is what has allowed us to remain united in these almost twenty-five years and to overcome the difficult moments that occur in all groups.

I hope the story does not end here and we will continue to spread astronomy and science in general for many more years. I believe that society needs amateur astronomers, people who, with a simple hobby, enhance science and whose priority is to teach those who do not know it, spreading their passion. Culture is not only literature, theater and art; it is also science. We have to fight myths and prove that science is not boring. If the right tools are used, it is not even that difficult. In this world, where it is convenient for the ruling class that society is easy to manage and entertain, we must contrast with knowledge, which is the only thing that allows human beings to differentiate and choose freely, rather than be manipulated. ■

New times for amateur astronomy

by Aniceto Porcel, Jesús Carmona y Miguel Sánchez
Sociedad Astronómica Granadina

revised by Damian G. Allis
NASA Solar System Ambassador

It was around 1984 when amateur astronomy in Spain underwent an unprecedented boom. The reason was Halley's Comet, to which the media gave exhaustive coverage.
At that time, the Internet was still an embryo and, if you wanted to deepen your knowledge of the comet, you had to resort to libraries, specialized press, and amateur astronomy associations (especially the latter if you wanted to observe the comet or other stars, as they organized the star parties).

From that time on, associations gathered new members who wanted, with the enthusiasm acquired by popularization programs such as Carl Sagan's "Cosmos" series and by following the passage of the comet, to be direct witnesses and protagonists of astronomical knowledge. The global spread of the Internet was at least ten years away and the whole landscape would change when it entered the scene, providing more updated information than books in libraries could, as well as providing forums with more participants (and, therefore, more answers to questions) than local astronomy associations. Moreover, you didn't have to go to the newsstand to buy an astronomy magazine to read the latest articles and news; you had it at your fingertips with a click of the mouse.
In particular, the astronomy associations suffered a substantial drop in attendance at their meetings. Everyone became so self-contained by finding information on the web, that we wondered if the time for

amateur astronomy associations would end. In our specific case, we noticed in the Astronomical Society of Granada a remarkable decrease in the influx of new membership in the first decade of the 2000s, probably in part attributable to the factors mentioned above.

A different change then began to happen for some observers, and soon it became clear that sharing and teamwork (albeit with a colleague who was on the other side of the world) yielded a richer experience than just reading content on the Internet.

We rediscovered the human side of astronomical observation, which had always been there, with the difference being that we expanded its reach on a planetary scale.

In the second decade of the 2000s, we started to gather interested people again.

Curiously, the same cause for the reduced number of visitors previously became the new catalyst: the Internet. Perhaps, this was because content on the web had evolved and increased to such an extent that, instead of helping, this content sometimes overwhelmed the neophyte. We meet many people who want to buy a new telescope, to learn how to use what they already have, or to make progress in their hobby after their first contact. In that respect, someone like an association member, who has selected some information available on the web and summarized it a little according to individual needs, can be of great help.

Additionally, the amateur astronomer who wants to leave the city in search of dark skies encounters many difficulties in finding optimal places to ob-

serve in terms of darkness, distance, and general comfort for having the most pleasant night possible (conditions improved by the presence of observing company).

It is in these cases that many people ask themselves: "Where could I take my next steps?" After searching the Internet for a while, the search engines show, among all the results, associations like ours in their own town, something that they might not otherwise have known existed. So, in this sense, it could be said that, over time, the Internet has benefited us since, although it leaves more people at home, it also reaches a greater number of amateur astronomers who want to make progress in their hobby. Traditional astronomy societies have had to adapt (a word we will use several times in this article). Instead of pasting ads in universities to advertise our events, we now create "posts" in the media the web offers us. That said, social networks are also a double-edged sword for this hobby.

Internet media and social networks

Dissemination in the era of digital mass media is highlighted by a few very delicate points. The web has allowed rapid and widespread popularization with a few simple steps, reaching an audience with very different levels of understanding. That said, the content posted on Facebook, Twitter, and other platforms, for example, are produced indifferently by doctors in physics, by young people in training, or by people without any knowledge in the field. Those who publish should choose who they are trying to reach with their information, as the choice of who to target is subject to difficulties in having to reach a base without sacrificing the rigor of the content. In publishing on social networks, a direct and rapid approach to the content problem prevails, often with the display of a "hook" that attracts the desired "click" or "like." The approach to concepts that go beyond the human scale, especially prevalent in astrophysics and cosmology, leads us to make comparisons that, on many occasions, either lower the intellectual level or over/underestimate the public's understanding instead of illustrating the issue. On the other hand, having data on an astronomical scale as one's working material can make us fall into the temptation of grandiloquence one might consider unnecessary when the subject is treated in context. All of these behaviors are almost symptoms of the society in which we live, but they give relevance to an area that had not even been dreamed of 30 years ago.

As with any topic, the exaggeration of these points, especially in an infinite space such as the Internet, sometimes reverses the message. The direct approach to information

astrology are clear examples of the interference of pseudo-sciences. The web offers equal opportunities in the online forums of publications of astronomical observatories and to companies that follow pseudo-scientific principles. Some companies, to the detriment of science, handle the direct approach, "hook," and lack of scientific support very well. They attempt only the most basic level of understanding in order to reach an audience, then provide no higher level. Legitimate institutions and associations must use their prestige in each publication to distinguish themselves from pseudo-sciences, weighing scope, level, pur-

provides an independence from the reasoning behind the presentation of a scientific method or any context that distorts the message. The search for a "click" via a "hook" involves hyperbolic statements that can be far from reality in the presentation titles and, in the best of cases, are nuanced and inserted in the context of the development of the article. As an example, "an asteroid the size of 'n' soccer fields threatens or grazes the Earth every five days." This message is the typical hook in which we later understand that "grazing" means a passage of interplanetary distances of several million kilometers (or miles) and that asteroids the size of "n" soccer fields are more common than most people know, regardless of if they're a danger to Earth.

Progress offered by the web clearly has some negative points – both on the parts of the communicators and the public, previously unthinkable situations have arisen. We talk about pseudo-sciences that fight for their part of visibility and the figure of the "troll" of the network that pol-

lutes the work of the scientific popularizer, calling them into question in a hasty manner. This requires the popularizer to have to then have a certain temperance and respect to be able to defend positions and scientific rigor. The flat-Earth idea and

sued idea, and responses. The dissemination of knowledge has never been more extensive, but, at the same time, it has never been as equally complicated.

For all these reasons, the same issues we highlighted above happen to many amateur astronomers: they are overwhelmed by information and unable to find reliable and quality sources. This means that, sooner or later, they will turn to specialized sources to find out more about a topic. Although it is true that, since the advent of the Internet, paper astronomy magazines have become increasingly rare on newsstands, the same is not true of online publications, which have increased in recent years: magazines, articles on specialized websites, and even blogs have all ousted some of the print publications. In our country, for example, several years ago, more astronomy magazines were available – now only one survives. We imagine that there will always be some who prefer the paper version. Still, it is a fact that, as the digital world has imposed itself, publications, like associations, must adapt to the new times. More than anything else, this is because the new generations that arrive are immersed in a digital society as never seen before in any era.

The era of technology

We still remember the day when, after a meeting of the Astronomical Society of Granada at the Faculty of Sciences, we decided to try the latest planetary observation technology, a webcam. In the gardens of this faculty, we placed a small telescope, to which we joined the camera connected to a laptop. The celestial object chosen was Saturn, which was high in the sky. After centering the object with some difficulty and focusing, there it was. We were all speechless for what we saw, a huge planetary disc (at least by the standards we were used to) surrounded

by impressive rings. Until then, Saturn had only been a ball ringed in the image of an eyepiece. We were amazed by the new resource, and what we saw was unthinkable until then. Several passersby, probably science students, joined our group and came to snoop around. To our surprise, not only were they *not* amazed by the images of the planet and its rings, but they commented that the images were very poor compared to what they had seen in the books and, most likely, on the Internet.

For us, as amateur astronomers, it had been indisputable progress. At the same time, for the curious accustomed to the vast quantities of images of the sky on the Internet and the emerging social networks of that time, it was only a blur on the computer screen.

This situation made us think "something new has been adding to the passion for the stars." On the one hand, observational technology would undoubtedly have offered us surprising resources but, on the other hand, our role as communicators had to face the new times and new challenges.

Perhaps there is a tendency to think that, due to new technologies, young people might lose interest in astronomy. And, in part, this makes sense, since not only does it cost more and more to look at the sky and see the stars in it, but young people now spend more time glued to the screens of their mobile phones than on the balcony of their home to have fun looking at the Moon with binoculars, as perhaps most of us did as children.

Leaving aside the problem of light pollution (which certainly influences and must be seriously addressed from a governmental point of view, with effective measures to illuminate correctly), the emergence of new technologies and the digitalization of the media should not be such a problem to drive young people away from astronomy and science in general. We believe that we have not been able to channel the

whole, and now we have to adapt. How do we adapt when you can show Mars through a telescope and the audience only sees a "red dot", while a mobile app shows much more detail, special effects and sounds? Very simply, two formulas work well for us in our activities. The first is to give a context to what the public sees: to tell mythological legends or curiosities that the apps do not contain to make people understand that what they observe is not simply a "red dot." The second is that, if you cannot rival technology, embrace it. We live in a time when it has never been easier to get photographs of planets or nebulae, where we can appreciate much more detail than we can with the naked eye. With so much material about astronomy circulating on the Internet (looking for "spectacularity" to get clicks), impressing a teenager seeing the Andromeda galaxy through an eyepiece takes effort. But surely, if we put a reflex camera (like the one he might have at home) in the eyepiece holder and if we show him a snapshot, we would undoubtedly hear a "wow." And this is not so much for the spectacular image, but rather for the apparently simple and immediate nature of the in situ acquisition. These solutions cannot be implemented by many of those who seek to capitalize on astrotourism, pretending to "bottle astronomy" and do business with something that has never been commercialized, using very basic telescopes and showing the Moon and little else. Instead, they can be implemented by real amateur astronomers, who better understand all these factors, are able to communicate to the new generations how exciting this passion can be, and have learned how to do it even better by riding the wave of technology. ■

The evolution of magazines

by Michele Ferrara
Astro Publishing

revised by Damian G. Allis
NASA Solar System Ambassador

Amateur astronomers have always existed, and the former, perhaps, were not even human. Contemplation of the night sky in the pre-industrial era was usual. This is demonstrated by the countless myths and legends that the most disparate peoples created by admiring the night sky. Over the past two centuries, this link between human beings and Nature's wider spectacle has increasingly weakened due to various forms of pollution, which have gradually erased the stars above the most densely populated areas. Observing the night sky thus began to become an activity for a few willing, rarely in contact with each other, but all eager to learn more about what they observed in the sky and how to optimize techniques and instruments.
Between the last decades of the Nineteenth Century and the early Twentieth Century, this loose movement of

astronomy

amateur astronomers was given the opportunity to grow rapidly, thanks to the birth of the first astronomy magazines aimed at a wider audience than the strictly professional one. As examples of those magazines, we can cite the French *l'Astronomie*, founded in 1882 by Camille Flammarion (still published, edited by the Société Astronomique de France), or the Italian magazine *l'Astrofilo*, founded in 1900 by Isidoro Baroni (and published until to 1908), or even the American *The Telescope* (1931-1941) and *The Sky* (1935-1941). Thanks to these and other publications in different countries and different languages, the movement of amateur astronomers not only managed to organize and structure itself, but soon became an increasingly attractive commercial target for manufacturers and retailers of instruments dedicated to observing the sky.

The boom in amateur astronomy

Until the 1960s, astronomy magazines were mostly made with very classic criteria and published in a decidedly retro style, comparable to that of nineteenth-century publishing. The few advertisements that appeared in those magazines were certainly not irresistible to the few readers, and often the products offered, although modest, were far beyond the economic possibilities of the average reader. Not rarely, those pioneering telescope and accessory traders disappeared from the market along with the magazines in which they placed their ads.

It was evident that, without a sufficiently large number of readers and adequate advertising revenues, no astronomy magazine could have afforded a wide distribution, an attractive layout, diversified contents, or long-term editorial planning. Starting right from the 1960s, but especially in the following decade, the world of amateur astronomy underwent a decisive turning point: the market was flooded by mass-produced telescopes at relatively low costs. At that point, the relationship between the manufacturers and retailers of these instruments and astronomy magazines became symbiotic. The telescope symbol of that turning point was probably the 8" Schmidt-Cassegrain reflector produced by well-known Californian firms. It was the dream of many amateurs – an instrument of the future compared to small Japanese refractors – but it was quite expensive, just like the many other innovative models of those years. As a result, a lot of ads were required to be able to sell many of them.

From the 70s until the mid-90s, the most suitable channel to advertise the new generations of instruments for amateur astronomers was that of astronomy magazines, which in turn, recognizing the business, began to sell advertising spaces at exorbitant prices. The only ones who didn't earn were the amateur astronomers, but everyone was happy anyway. In this idyllic scenario, amateur astronomy boomed. Although the apex was reached at different times in different countries, we will not be very wrong if we place that golden pe-

riod between 1985 and 1995. The associations of amateur astronomers multiplied and the telescopes were sold like candies, so much so that numerous dealers of photographic material, totally deprived of astronomy-related knowledge, gained significant amounts by selling any telescope. Even astronomy magazines increased in number: it was possible to buy 4-5 or more of the same language at newsstands. To these magazines, the most assiduous (and least "spend-thrift") readers could add others sold on the international market.

CCDs arrive, a downward revolution

The whole mechanism worked perfectly: the manufacturers and retailers of telescopes financed the magazines, which were the nursery of new customers of those same merchants. What should have been the primary purpose of these magazines, the dissemination of astronomy, was in many cases relegated to the background or, even worse, tailored to the target liked by the most influential advertisers.
Luckily, at least until the end of the 1980s or a little beyond, almost all the content of the astronomy magazines were still the prerogative of expert popularizers who often had a remarkable practical knowledge of the sky. At that time, texts were even more important than images, and "to be" was even more important than "to appear."
This scenario was overturned starting from the early 90s with the spread of CCD devices for astrophotographic use. In the world of traditional amateurs, improvised astrophotographers began to infiltrate, which, just for being wealthier than others, could afford more expensive CCDs and computers, and therefore more spectacular images. Astronomy magazines began to give more and more space to purely aesthetic works, sacrificing scientific information in many cases. Inevitably, the world of amateur astronomy, having the magazines as an example and reference, followed the same evolution, producing a quantity of astrophotographers expert in CCD sensors and image stacking, but often unaware of the nature of what they were photographing. The average amateur astronomer was no longer interested in collecting directly with

his own eyes the photons emitted by the wonders of the cosmos. Still, now he preferred to observe the light emitted by the pixels of an image created starting from the electric charges accumulated by an integrated circuit!
The possibility of rivaling professional astronomers, at least in terms of images, was real but ephemeral because right in that period the gap between the two worlds became irreversibly unbridgeable. Although many years later (in our present) "Citizen Science" would bring amateurs and professionals closer together, the role of the former in the discovery of new celestial objects and the study of those already known would remain marginal.

The "culture" of appearing

Astronomy magazines have significantly benefited from the success of CCD astrophotography. Filling the pages became easier and cost nothing; it was sufficient to satisfy the vanity of the authors of the images. Also, to sell more CCD cameras, manufacturers and retailers bought new advertising space in those same magazines. Even, in 1994, an *ad hoc* magazine was created for the population of digital astrophotographers. Still, it lasted only 2-3 years, like the "career" of many CCD owners who entered the world of amateur astronomy in those years.
Making readers protagonists by dedicating more and more space to their images, the techniques used to obtain them and the CCD cameras offered by the market might have seemed like a winning strategy. In reality, this was the first step towards the end of traditional astronomy magazines. Historical readers, those fond of and accustomed to contents of a certain level, recognized themselves less and less in those magazines, which instead began to appeal to new generations of occasional readers often interested in purchasing only the releases that contained their images and their name.
While the publishers gloated, taking advantage of the desire for self-promotion of some of their readers, an infinitely more lethal threat (this too widely underestimated) was emerging on the horizon: the Internet. In the second half of the 90s, this revolutionary instrument irresistibly attracted amateur astronomers (and not just them).

Selling or giving away, that's the dilemma...

From 2000 onwards, the Internet has experienced a real explosion, reaching almost 4.5 billion users today. For many amateur astronomers, it has replaced all the other instruments that were indispensable for acquiring knowledge about the cosmos. Of course, the publishers took the opportunity to widen their audience, taking advantage of the new resource in many ways and also starting to produce digital publications. But there was, and continues to be, an unsolvable problem: the defense of the content.

Defending content on the Internet is practically impossible. Any publication, even the best protected, can be copied, stolen and violated in any way. Only the most powerful institutions can deal with this problem. It goes without saying that no amateur magazine can sell content on the Internet with any certainty that all readers are paying for it. When the Internet started to spread like wildfire, almost all astronomy magazines opened their own websites and, in a case of short-sighted self-harm, they started to publish for free, in real-time, the same news and the same images that they would have sold months later on newsstands or in the form of digital copies via the Internet itself. It is clear that this is a foolish policy and it does not matter if the same news published in print months later is more thorough: the news is old, and there are dozens more articles and images just coming online waiting to be read. Why waste time and money on reading content from months before? Why buy my astroimages published in a magazine when that same magazine inserts them immediately, for free, in its gallery, where everyone can see them?

This process of self-cannibalization of the paper magazines is irreversible, and all magazines in the same sector and the same language are damaged when only one of them chooses to offer news on its website. But, even if no magazine were to publish news online, there are hundreds of websites that publish only such news (an example for everyone: https://phys.org/space-news/sort/date/all/). When we launched our magazine in 2008, we

were aware that we had to go through a period of experimentation (which lasted 5 years) to find the best way forward, or, even better, the only way possible. After carefully studying the market and discarding several possibilities, at the end of 2012 we understood that the only solution capable of ensuring a future for the magazine (that is, a lot of readers and the trust of advertisers) was to offer it for free in digital format on the web and to create other language versions with a potential audience far greater than that of the original language (Italian). We were the first to do this with a long-term editorial project and with an almost total dedication to sacrifice. We didn't want to end up like the twenty free e-magazines whose wrecks still surface in the obscure meanders of the web. Either give away all the issues of the magazine or succumb; this was the dilemma...
Today, almost 13 years after the beginnings, we are the most widely spread free astronomy magazine on the planet. Randomness or farsightedness?

The party is over

As if all the problems mentioned above were not enough, the Internet has dealt another deadly blow to astronomy magazines: it has put their symbiosis with the telescope market into crisis. The manufacturers and retailers of instruments for amateur astronomers quickly understood that, through the pages of a well-structured website and appropriate online advertising campaigns, they could reach a larger audience than that declared (but seldom guaranteed) by paid magazines. In reality, the two audiences are not exactly superimposable, and the less presumptuous traders have just as quickly understood the usefulness of continuing to present their products in sector magazines. However, competition from the Internet caused publishers to lower their price lists. There was no alternative: accepting more poor income or losing advertisers and, therefore, revenue. The result did not change.
It is understandable that, in such a scenario, a paper magazine (it doesn't matter if it also has a digital version) cannot last very long. We had the most sensational confirmation of this

easy forecast last December, with the bankruptcy of the publisher of *Sky & Telescope*. The world's second best-selling magazine for amateurs has left the free market and has gone into the management of the American Astronomical Society, the leading non-governmental organization of astronomers in the States, founded in 1899 by George Ellery Hale. Today, AAS has over 7,000 members and can apparently afford to publish a magazine in a deficit.

The near future of astronomy magazines

The destiny of all paid magazines for amateur astronomers is to cease publication in the coming years or, at best, to be absorbed (the most optimistic) by scientific institutions external to the free market. Only magazines offered for free on the web will have any hope of avoiding closure. Will the magazines of the first group be able to enter the second? Only very few of them will be able to make the leap because, in the transition from a paid magazine to free magazine, advertising revenues can drop by 5-10 times, and it becomes impossible to maintain the same editorial structure and satisfy the requests of external collaborators.

The magazines for amateur astronomers of the near future will necessarily have to be produced by a minimal number of people, with skills so vast as to be able to do (in the same period) the work typically assigned to dozens of people. But even a similar effort may not be enough, because the overall advertising revenue of the sector magazines is continuously decreasing. This trend could worsen after Meade leaves the scene, which also went bankrupt last December after getting a super-ticket imposed by way of California antitrust laws.

Finally, distributing a magazine on a global level also imposes the problematic task of detaching oneself from one's nationality and communicating astronomy so that every reader perceives the magazine as belonging to their own culture.

Hard times for astronomy magazines! We have been pathfinders. Others may (perhaps) do better, but knowing how difficult it will be to join the "club," we conclude by quoting the universally known Dante Alighieri: "*Abandon all hope, ye who enter here.*" ■

NortheK

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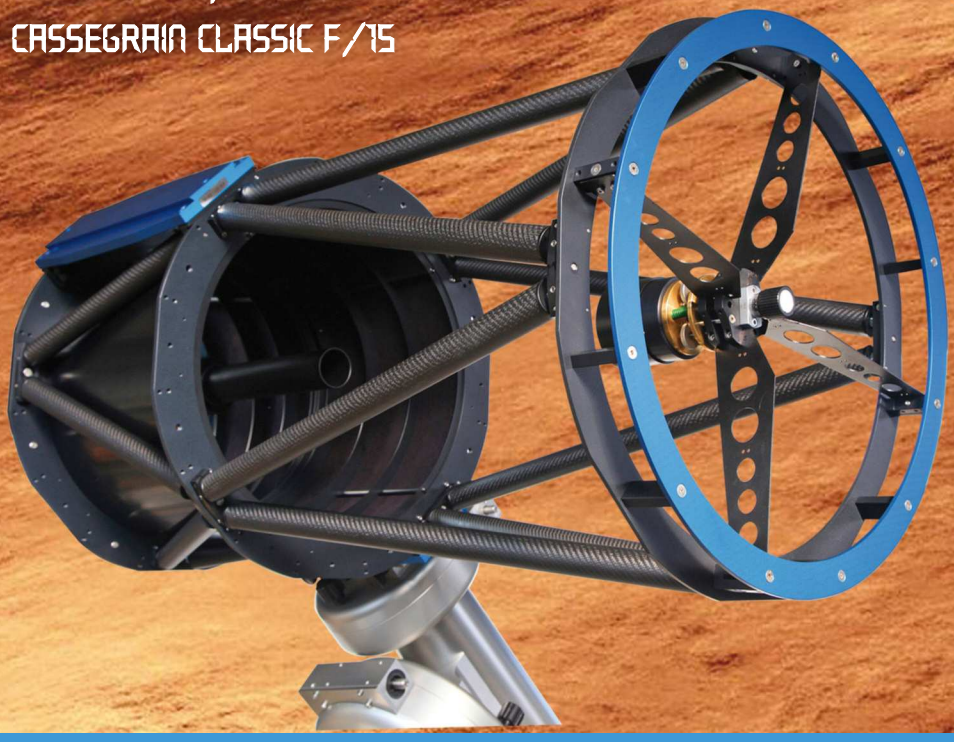

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