

CONTRIBUTION OF AMATEUR ASTRONOMERS TO THE CONSERVATION OF SKY QUALITY

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Introduction

This conference offers a great variety of reasons to observe the sky at night. Of all these reasons we prefer to choose the simplest one: its spectacular beauty.

The authors of this communication are amateur astronomers, members of the Group of Astronomical Observers of Tenerife (GOAT), who dedicate part of their free time to the contemplation of the landscapes of the universe and, some of them, make valuable scientific contributions with great dedication and effort. All of us are directly implicated in the problem of preserving the quality of the sky and, in this communication, we will briefly detail the activities and projects that, to preserve the possibility of ever being astonished by the cosmos's landscapes, we can make from our condition of amateur astronomers.

Some famous amateur astronomers

The definition of amateur astronomer is very broad and includes a great number of people interested in observing and knowing the firmament. Amateur astronomer could be a person who observes the sky periodically and is interested in the study of its origins, evolution, its relationship with Mankind throughout history and its artistic and/or technical aspects in greater or smaller measure, not being this activity his main source of income.

The difference between professional and amateur is not clear, sometimes someone who at first observed the sky as a hobby later has dedicated to it exclusively. On the



Figure 1: Mount Teide, a privileged area for astronomical observation, recently declared a World Heritage Site. Photograph: Rafael Barrena.

other hand, we have also the examples of those who working for important observatories and universities dedicate their free time to activities like observation or astrophotography.

There are many and varied examples. Hevelius, famous by its engravings of the constellations in the XVII century, studied Law and worked at the familiar business, a brewery in Poland, before devoting himself to astronomy exclusively.

Percival Lowell, who predicted the existence of Pluto, studied mathematics and for a time he worked in the field of diplomacy in different countries until, obsessed with the Martian channels, he founded its own observatory on Arizona in 1894, which continues its activities nowadays.

Heinrich Olbers practiced medicine as a profession between XVIII and XIX centuries, devoting himself to the study of physics, mathematics, the orbital calculation of comets and asteroids, discovering several ones (Ceres, Shovels, Vesta...), postulating the theory of a planetary cataclysm as the origin of asteroids. He also considered the origin of the tail of comets, and postulated his famous paradox about why the sky is black if we are surrounded by millions of stars, solved much later by the theory of the expansion of the universe.

William Herschel was a musician and student of philosophy, languages and mathematics until he was 35 years old when he became interested in astronomy. The discovering of Uranus completely catapulted him to fame and, being named Royal Astronomer, he devoted himself to this activity. He studied the binary structure of the Milky Way, the stars and the sun movements, compiling data that would give origin to Deyer's General New Catalogue.

Edwin Hubble studied Law and was an outstanding sportsman before devoting himself to cosmology, making many valuable contributions like the discovery of the expansion of the universe and the calculation of its age and size. Even Einstein developed his theory of relativity while working in an office of patents.



Figure 2: From right to left and from up to down: Hevelius, Heinrich Olbers, William Herschel and Percival Lowell.

More recently we can honour famous Alan Hale, a contractor engineer of the Jet Propulsion Laboratory, and Thomas Bop, headmaster in a factory of construction equipment, discoverers simultaneously of the comet that takes after their names, Hale-Bop, one of most shining comets ever observed seen in 1997. We may cite also Yuji Hyakutake, professional photographer and comet hunter for pleasure, who with powerful prisms binoculars discovered the comet that takes after his name. In 1993 the Spanish Francisco García Díez discovered the most shining supernova in the north hemisphere in the last twenty-three years (the SN 1993J) and two years later in 1995, the British George Sallit found a small planet with his telescope installed in the back garden of his house.

During the Space Race era there were many ama-

teur astronomers who with their observations data contributed to the plans for choosing the best places for moon landing of the vehicles of the North American lunar program, although this selenitic interest declined after the cancellation of the program. Today, prestigious amateur associations compile many data about binary stars, comets, asteroids, novae and supernovae that are used by professionals in their own studies.

This brief summary of historical personalities gives us a perspective of the importance of this hobby in the development of astronomical studies.

Astronomy and society

Nowadays, one of the paradoxes of our society of the information era is the breach between society and the scientific community. Although there are good popularising programs, documentaries on television and access to web pages by Internet, the complexity of the different scientific issues and the fact that publicity is so aimed at the spectacularity of achievements or discoveries influences in a kind of dissociation between the specialized scientific world and a society that is practically only interested in tangible, useful and immediate results.



Perhaps astronomy is one of the less valued branches of science because the direct application of its discoveries is not perceived as something ready to use at once. Thanks to the space exploration we have got great improvements in things useful in every day life, but it is much more difficult to show the advantages that exploring the universe may give to a consumer society.

In this point is where amateur astronomers can be useful as a bi-directional nexus between both positions, appreciating the advances that take place in the fields of astronomy we also contribute to the attainment of results or the verification of them like, for example, the collaboration between professional scientists like Joe Patterson, astronomer of the University of Columbia and a group of about thirty amateurs worldwide, dedicated to the study of the binary systems of cataclysmic variables. Collecting this data needs a time of observation impossible to get in an observatory and that is demanded from amateur astronomers. The same could be said of the study of the Sun, asteroids, meteorites, planets and comets. In particular, several members of our Group are active collaborators in locating and cataloguing new smaller planets, comets and asteroids through the Minor Planet Centre, supported by the Astronomical International Union, with interesting results so far.

As amateurs we are as interested in the latest discoveries as in the historical evolution of astronomy or in a great variety of other individual interests due to the different kinds of amateurs. We are as hinges in a context in which, without being strictly members



of the scientific community, we approach it and pass what we have learned to relatives and friends who know less about it.

The improvement of the quality of equipment and better communication in Internet have allowed the rapprochement of the amateurs to areas previously exclusive of professionals, and that same equipment is available and used, in an altruistic way, in events that due to their spectacularly attract the

interest of the great public serving as a contact point between both communities.

Contribution of amateur astronomers to the conservation of sky quality

Is evident the interest that we have in maintaining and improving the quality of nocturnal sky. But only interest is not enough to stop the progressive deterioration of the quality observations; it is necessary to act. We are now going to enumerate the different ways in which our Group has participated directly or through our members to face the deterioration of this quality, as well as proposals for the future.

Of course, the possibilities of a group of amateurs are limited and its greater potential is as organizers of activities of spreading and awareness. The diversity of occupations of members of an association have effects on the possibility of access to other people who, without being enthusiastic of astronomy, can value the virtues that a sky clean of contamination entails. It is not a question of going out with placards but of attracting and teaching the public so that, interested in the activity that is being made, can perceive the problem of light pollution and, sensitised about it, can be more receptive to activities of protection. Nevertheless a sum of citizen denunciations can contribute a lot to awareness, the adoption of specific measures and also to the application of protective laws against light pollution. In this aspect, specific denunciations by means of writings to the City Council of La Matanza and La Orotava in Tenerife have been made, and has been constituted a specific group to deal about this problem.

It is obvious that the international associations or those with more members have greater weight at the moment of demanding authorities to make laws and programs of protection, especially if they go with official organizations. But smaller associations can also make contributions in different ways. The first one is with the behaviour of its members, giving example of citizenship and protection of the environment, being careful of the observation places wherever they go. Another way is through the organization of specific events used for promotion of astronomy and awareness of the values related to it. Events as the "Celebration of Stars" organized by Cienciamanía in Güimar, in 2006 July, in which the GOAT participated together with the Museum of Science and the Cosmos, Astroamigos and Alpha Cygni in a day of observation in Puertito de Güimar

with a great attendance of public.

The “Marathon Messier” also attracted a big number of curious people to participate in the observation of the 110 objects of the famous Messier catalogue during two consecutive weekends in March. Without any budget and by worth of moth publicity this activity allowed all assistants to observe through telescopes of members of the Group, waking up more serious interests in some of this people who later on have become one more of our group.

Another activity in which we also participate is this Conference with an exhibition of astrophotography that, with the title “Canarias, a balcony to the Universe”, can be seen for the first time in this Conference. Later on it will be exhibited in the Assembly Hall of the School of Engineers of Santa Cruz de Tenerife and become an itinerating exhibit going from the Museum of Science and the Cosmos to many other different cultural places.

We also have collaborated in diverse mass media, from specialized magazines to digital news bulletins that promote local and provincial cultural activities. One of our supporters directs the program “Star Dust” in radio “Onda CIT”, a weekly program of one hour dedicated to astronomy; one of our members take part as collaborator in the sundays radio program in the channel SER “Objective the Moon”, commenting astronomical events and talking about the importance of darkness for star observation.

We cannot forget those astronomers who have turned their hobby in a way of earning their lives, having created a small business to sell equipment and organize excursions where groups are made conscious of the importance of the degradating effects of luminescence in the sky. This is a small sample of the increasing interest that astronomy is arousing in the population, generating enough demand to maintain business with sales and popularising excursions on a weekly basis. Although this activity can be considered professional, it is the one which makes that more new people find a real interest in astronomy and it is the most interesting one to sensitise about the problem of light pollution.

In addition all and each one of us advertise these activities in our daily lives, to our family, friends and in our workplaces. In this respect the amateur astronomers related to teaching and education can reach greater approaches to the goals of awareness and popularising astronomy. The work in this field is, obviously, very important, being fundamental the accomplishment by young students of activities that attract their interest by means of observation and experimentation.

Between the teachers related to the GOAT, Héctor López is a wonderful example to illustrate these multiple aspects that an amateur can perform. Apart from making small excursions that include observation, he serves as a reference to other teachers in his Center in questions related to astronomy.

Continuing in this field of activity, one of our members, Federico Fernandez Porredón, now president of the



Association for the Teaching of Astronomy (ApEA), a national association of teachers of schools related to this activity. It is remarkable that, in some secondary schools, learning of astronomy has turned from being a sporadic activity to become a subject matter within the curricula of the students.

Internet is, of course, another window to show our activities. By means of its web page (<http://www.astrosurf.com/goat/>) and forum associated to it the GOAT maintains a permanent contact with local amateurs, as well as with amateurs from all over the world, advertising the wonders of our skies with our photos and commentaries. In addition, by this way of communication hundreds of associations get to be known and promote its activities. We need only enter in a web finder to reach thousands of web pages, many from official organizations, but a lot more from amateurs. organizations and forums that contribute to the spreading of this subject and the contact between people with same interests.

But it is still possible to do more activities in local communities, youthful associations, schools and high schools, programming events to observe and giving lectures that need a little budget, since the necessary equipment for the observation and time are afforded by the amateurs. It is usual that in spectacular events, like for example the past total eclipse of the moon, many curious people meet around the telescope of an amateur who allows them observe the event. That is the most valuable contribution that can be complemented with information that could lead to create new enthusiasts of astronomy or people well aware of the importance of the quality of the sky.

Conclusions



Throughout history astronomy has been one of the main motors of philosophical change and there have been many amateur astronomers who have contributed with their discoveries to scientific evolution.

At the present time, the complicated lines of research have produced a gap between the scientific community and a society that asks for immediate results of scientific research. The difficulty in finding resources for the observation together with the great quality and low cost of observations made by amateur astronomers is giving way to a symbiosis between both groups, favoured by the tremendous advance for the communication that is Internet.

In addition the amateur astronomers are useful to spread historical and scientific knowledge being able to exert a positive influence in the rest

of society predisposing it to the importance of conserving the light of stars to benefit future generations.