

XIII European Symposium for the Protection of the Night Sky

September 12-14 2013, Pamplona, Spain



PROGRAM



partner company



List of participants

Alduncin Garrido, Juan Antonio	Cel Fosc
Álvarez, María	Sociedad Astronómica de Álava
Andradas, Mikel Xabier	Red Astronavarra Sarea
Aristu, Esperanza	Gobierno de Navarra
Bará, Salvador X.	Universidade de Santiago de Compostela
Bereciartua, Aitor	
Bosch Ignès, Josep Maria	Cel Fosc
Bullon, Joan Manuel	As. Pro. de Agentes Medioambientales C. Valenciana
Capella, Santi	SACOPA - IGNIA LIGHT
Colomer Sanmartín, Francisco	Intituto Geográfico Nacional
Díaz Castro, F. Javier	Oficina Técnica para la Protección del Cielo - IAC
Galadí Enríquez, David	Centro Astronómico Hispano Alemán
Gómez Garmendia, Miren Karmele	Planetario de Pamplona
González, Aitor	Cel Fosc
Gordón, Nieves	Planetario de Pamplona
Grosemans, Eric	Preventie Lichthinder vzw, BE
Haaima, Marty	RIVM, NL
Hänel, Andreas	IDA, Dark Sky Germany, DE
Hänel, Birgit	Dark Sky germany, DE
Herranz Dorremocha, Carlos	Cel Fosc
Hoban Rickard, James	Borrego Springs Dark Sky Coalition, US
Horts Font, Pere	Cel Fosc
Jáuregui Sora, Fernando	Cel Fosc, Planetario de Pamplona
Jiménez, Alberto	Observatorio Astronómico El Castillo
Jiménez Garrido, José	Asociación Astronómica Hubble
Kyba, Christopher	Freie Universität Berlin, DE
Lannoy, Raoul	Preventie Lichthinder vzw, BE
Llorens, Ramon	SACOPA - IGNIA LIGHT
Malón, Susana	Lumínica Ambiental
Marco Soler, Enric	Universitat de València
Meier, Josiane	TU Berlin, DE
Mengeot, Jean-Marie	Preventie Lichthinder vzw, BE
Morales Rubio, Angel	Universitat de Valencia
Navarro Otano, Ignacio	Cel Fosc
Ochi, Nobuaki	Faculty of Business Administration, Toyo University, JP
Ollé Martorell, Josep María	Ayuntamiento de Reus, Univ. Rovira i Virgili
Palacián, Jesús	Universidad Pública de Navarra
Parks, Bob	International Dark-Sky Association, US
Pas, Friedel	IDA Europe / Preventie Lichthinder vzw, BE
Ribas Rubio, Salvador José	Parc Astronòmic Montsec - CCNoguera
Rickard, Grace	Borrego Springs Dark Sky Coalition, US
Rol de Lama, María de los Ángeles	Universidad de Murcia
Ros Zuasti, Carlos	Carlos Ros Ingenieros
Sánchez de Miguel, Alejandro	IDA, Cel Fosc, UCM, GPC
Sánchez Semberoiz, Íñigo	Durso
Senosiain, Vicente	Universidad Pública de Navarra
Spoelstra, Henk	Lumineux Consult, NL
Ursua Leon, Ana	CosmoCiencia
Veiga, X. Dositeo	Altega - Educación y Ocio
Yanguas, Patricia	Universidad Pública de Navarra
Zamorano, Jaime	Universidad Complutense de Madrid

Cel Fosc, Asociación contra la Contaminación Lumínica is honored to invite you to participate in the 13th European Symposium for the Protection of the Night Sky to be held in the **Planetarium of Pamplona**, Spain, from 12th to 14th September, 2013.

For three days, experts from different fields and countries met to address various aspects of light pollution, both in relation to its characterization, and in its impact on the environment, health, the economy, public security or culture.

It will be presented the latest research and proposals provided from the field of science and engineering and will discuss legislation and proposals for a more efficient and respectful of public lighting installations. The new lighting devices based on solid-state lighting (LED) are favoring the emergence of new practices that produce very significant savings in consumption but that have to be regulated with caution and common sense.

This year the Symposium will pay special attention to the effects of light pollution on health and the environment and will present the latest developments regarding measurement and control of the evolution of the phenomenon. The participation of lighting engineering professionals enable us to see the market trends and the best practices of the outdoor lighting.

The **13th European Symposium for the protection of the night sky** appears as a multidisciplinary forum to discuss the protection of the night from a holistic point of view, with the aim of advancing the consolidation of a new culture of light.

Thursday, September 12, 2013

16:00 - 18:00 Registration

18:00 - 19:30 Welcome. Opening Conference

Light at night: consequences for human health.

M^a Ángeles Rol de Lama. Universidad de Murcia

20:00 - 21:00 Official reception at the Palace of Navarre, seat of the Regional Government.

20:00 - 21:00 Time to visit the old part of the city and join the “juevintxo”

Friday, September 13, 2013

09:30 - 11:00 Talks. Session 1. Lighting

- 09:30 - 09:50 Moon days, energy saving lessons
Susana Malón and **María Álvarez**. Lumínica Ambiental. Soc. Astronómica de Álava
- 09:50 - 10:10 LED Street Lighting for Dark Sky protected areas
Ramón Llorens. SACOPA - IGNIA LIGHT
- 10:10 - 10:30 State of the art of the use of LED technology in the protected area of the Canary Islands
F. Javier Díaz Castro. OTPC - IAC
- 10:30 - 11:00 Light Decontamination of urban areas. Criteria to be used in the present economic situation
Josep M. Ollé. Ajuntament de Reus y Universitat Rovira i Virgili

11:00 - 11:30 Coffee break

11:30 - 13:10 Talks. Session 2. Measuring Light Pollution

- 11:30 - 11:55 Ground-based imaging spectrometry for light pollution measurement
Salvador Bará. Universidad de Santiago de Compostela
- 11:55 - 12:20 Measuring Light Pollution in Montsec: a protected area
Salvador Ribas. Parc Astronomic Montsec
- 12:20 - 12:45 Two years Night Sky Brightness measurements In The Netherlands
Marty Haaima. RIVM
- 12:45 - 13:10 Start of Monitoring the Colors of the Night
H. Spoelstra. Lumineux Consult

13:10 - 13:30 Poster session. Time to visit the poster section and talk with the authors

13:30 - 15:30 Lunch break

15:30 - 17:00 Talks. Session 3. Regulations

- 15:30 - 15:50 Control and inspection of light pollution by European Environmental Police
Joan Manuel Bullón Lahuerta. Asoc. Prof. Agentes MA. de la C. Valenciana
- 15:50 - 16:10 Sky Darkness conservation efforts in Andalucía
José Jiménez. Asociación Astronómica Hubble
- 16:10 - 16:30 18 years around the Catalanian law
Pere Horts. Cel Fosc, Asociación contra la Contaminación Lumínica
- 16:30 - 17:00 The renovation of the street lighting systems in Navarre
Esperanza Aristu. Gobierno de Navarra

17:00 - 17:30 Coffee break

17:30 - 19:30 Planetarium Session

Presentation of the IDA-promoted "fulldome pill" Losing the Dark
Live planetarium session on light pollution
Shows by the Planetarium of Pamplona: The girl who walked upside down (for kids) and Energy for Life (general public)

20:00 - 24:00 Guided visit to Puente la Reina / Gares and dinner

Saturday, September 14, 2013

10:00 - 11:30 Talks. Session 4. Public awareness and data collection

- 10:00 - 10:20 The establishment of IDA Tokyo and plans for raising public awareness about light pollution
Nobuaki Ochi. Toyo University
- 10:20 - 10:40 Zernike analysis of all-sky night brightness maps
Salvador Bará. Universidade de Santiago de Compostela
- 10:40 - 11:00 Preliminary Data from the Loss of the Night Android App
Christopher Kyba. Freie Universität Berlin
- 11:00 - 11:30 Temporal evolution of light pollution sources using ISS images and others: Madrid
Alejandro Sánchez de Miguel. Universidad Complutense de Madrid

11:30 - 12:00 Coffee break

12:00 - 13:40 Talks. Session 5. Protected areas

- 12:00 - 12:25 Protecting Dark Skies – An Ongoing Program of Diligence and Education in Borrego Springs, California
James Hoban Rickard. Borrego Springs Dark Sky Coalition
- 12:25 - 12:50 Monitoring the Valencian sky. Polluted natural areas and dark places to be preserved
Enric Marco. Universidad de Valencia, Cel Fosc
- 12:50 - 13:15 Protecting Dark Sky Areas: Global Issue - Local Interests
Josiane Meier. Tec. Univ. Berlin, Dp. Urban and Reg. Planning
- 13:15 - 13:40 Light Pollution in the Nature Park TerraVita
Andreas Hänel. Dark Sky Germany

13:40 - 14:00 Poster session. Time to visit the poster section and talk with the authors

14:00 - 16:00 Lunch break

16:00 - 18:30 IDA affairs

Annual report
2013 Galileo awards
presentation of the 2014 venue

19:00 - 20:00 Walk to the Cathedral of Pamplona

20:00 - 23:00 Closing ceremony

Visit to exhibition "Occidens"
Guided tour of the Cathedral
Dinner in the Refectory

Abstracts

Opening conference

Light at night: consequences for human health

María de los Ángeles Rol de Lama. Laboratorio de Cronobiología de la Universidad de Murcia, Spain

Since life formed on our planet, it has developed under a predictable rhythmic environment. Thus, every life form has evolved to ensure the temporal coordination with its resonating environment, a task performed by the circadian system.

The circadian system of mammals is composed of a hierarchically organized network of structures responsible for the generation and synchronization of circadian rhythms to the environment. It includes a central pacemaker, located in the suprachiasmatic nucleus (SCN) of the hypothalamus, and several peripheral clocks.

The SCN acts as a music director and generates oscillations of approximately 24 hours (circadian) orchestrating the endogenous rhythmicity in physiology, behaviour and metabolism. It diffuses its temporal signal to the organism thanks to melatonin, a hormone produced by the pineal gland known as the chemical darkness, which peaks at night and shows low levels during day. Therefore, circadian changes in its daily production are used both, as a daily clock informing the organism that it is night-time and as a calendar since the duration of night-time elevation changes seasonally... whenever no light is received by the organism during the night.

A conductor needs a score, and thus the SNC needs to be reset every day by light in order to avoid free-run. The light reaches the master clock through a nonvisual pathway consisting of the melanopsin ganglionar cells (a specialised cells in the retina which are particularly sensitive to light of 460-480 nm, that it is to blue light) and the retinohypothalamic tract and suppress melatonin secretion during the day or, if present, also during the night.

However, it has been only recently that night has been illuminated in order to satisfy the 24h/365 days continuous operations, and so an increasing number of people is working night shifts or engaged in nocturnal leisure activities, or just suffer from light intrusion in their homes. All of them imply exposure at light during the night.

A growing and increasingly convincing body of scientific evidence suggests that excessive exposure of bright light at night (LAN) generates circadian disruption or chronodisruption, that it is, impairments in the healthy internal temporal order. Evidences point to melatonin inhibition as the principal responsible, and blue light is the most effective in this suppression while longer time exposures are required with warmer lights.

Epidemiological studies show that chonodisruption is associated with an increased incidence of metabolic syndrome, cardiovascular diseases, cognitive and affective impairments, premature aging and some cancers such as breast, prostate and colorectal and the worsening of pre-existing pathologies, so light is not harmless anymore.

In modern societies, with the morbidity and mortality demonstrated in experimental animals associated with chronodisruption (CD), light hygiene is a major health concern. To date, we know some of the health consequences of CD; however, only a few attempts have been made to prevent circadian disruption induced by inappropriate lighting. Blue light should be avoided during the night in order to preserve our circadian physiology.

POSTERS

Practice of public lighting in proposed German Star Parks

Andreas Hänel. Dark Sky Germany, Museum am Schoelerberg

We made a lighting inventory of about 10000 luminaires for the proposed star parks Westhavelland and Rhoen in Germany. From these data we derive characteristic numbers for the energy use and light emission. We detect a significant difference between the two parks. And we propose a limiting value for street lighting for discussion.

Public awareness versus administrative sloppiness: light pollution in Valencia

Angel Morales. Dep. de Química Analítica, Univ. València; Coordinadora en Defensa de los Bosques del Turia

Enric Marco. Dep. d'Astronomia i Astrofísica, Univ. València; Cel Fosc Valencian Coordinator

Solving the problem of light pollution lies mainly in government (municipalities, state, regional and provincial governments). But these are reluctant to take the plunge or even refuse to lessen their impact. Only from social groups, especially environmental organisations, you can force change. We present two examples (Valencia airport and IVADIS residence in Manises, both located nearby the Parc Natural del Turia) in which the administrative authorities show sloppiness and negligence to solve the problem. We detail the initiatives undertaken by the Coordinadora in defensa de los bosques del Turia in order to reduce light pollution in these two cases.

Radiofrequency interference. Status and challenges

F. Colomer, J.A. López Pérez and J.A. López Fernández. Instituto Geográfico Nacional (IGN)

Radio astronomy observatories around the world face the challenge of achieving high sensitivity observations of the Universe while their sites are getting heavily affected by radio frequency interferences (RFI). Protection is difficult, and its extent depends on national laws. We describe the status and monitoring tools used in the IGN Yebes Observatory (Spain).

Public awareness through the observation of the night sky

X. Dositeo Veiga. Albergue Os Biocos - Altega S. L.

Light pollution has become an undesirable effect of outdoor lighting. A necessary step in this debate is public awareness. References to the waste of energy or to environmental issues tend to work well with any audience. However, these arguments can be used to address many other problems as well. We can get more visibility and draw the attention of the public appealing to their feelings, to their heart. This is possible if we show a clear evidence of what we are missing out due to light pollution. A simple tool can help us to achieve this goal: the observation of the night sky. In our contemporary societies, predominantly urban, people have lost the habit of observing the dark night sky, finding constellations, discovering the North Star, or just enjoying the Milky Way with a naked eye. Education and outreach programs such as astronomical observations, both in an urban setting and in a privilege location such as "Os Biocos" Hostel (Ourense), are the best solution to increase public awareness about light pollution. Through these scientific based activities, the general public understands the magnitude of the problem and realize what they are missing out when they are not exposed to the beauty of a night sky. Key words: public awareness, popular science, night sky observation.

Skies over Sierra Morena, protecting one of the darkest places in Europe

José Jiménez. Dark Sky Advisors, As. Astro. Hubble, Iberus Medio Ambiente S.L., ADIT-Sierra Morena

Sierra Morena is a huge range of mountains and valleys that extends more than 370 km in southern Spain and that includes five natural parks and one biosphere reserve. The quality of the night sky is simply amazing, reaching the stunning digit of 21.7 mag/seg arc² in many places. Nowadays, some efforts are taking place to protect this resource, this project is a good example about how to involve local administration and the private sector in this task.

Dark Sky Conservation in Sierra Sur Range. The astronomy as a tool of social revitalization and environmental conservation

José Jiménez. Dark Sky Advisors, As. Astro. Hubble, Iberus Medio Ambiente S.L., ADIT-Sierra Morena

Sierra Sur is a complex territory formed by high mountains that reach almost 2000 meters over sea level, impressive cliffs and rock walls are common in this region. The low density of population gives the chance of preserving a really dark sky at night, so during 2013 and 2014 a project to set in value this resource is taking place there. If you like astronomy in Spain, you probably has ear about Astromartos or the Observatory of La Pedriza, in fact local administration is doing a huge effort to remark this places as a destiny for amateur astronomers looking for a good place to observe. An important invest is being developed to adapt some observation places and also to certificate the region as Starlight Reserve in 2014.

Night Sky Brightness and Light Pollution in Comunidad de Madrid

J. Zamorano, A. Sánchez de Miguel, J. Gómez-Castaño, F. Ocaña, J. Gallego, B. Pila, M. Nievas, C. Tapia, A. Fernández & S. Pascual. Universidad Complutense de Madrid

Preliminary results of a study of the night sky background brightness around the city of Madrid using Sky Quality Meter (SQM) photometers are presented. Data retrieval methodology includes an automatic procedure to measure from a moving vehicle which allows to speed up the data gathering.

The night sky brightness, an astronomical quality parameter that accounts for luminous flux from the sky, is closely related with the light pollution. The map with the spatial distribution of the night sky brightness around Madrid has been compared to the light pollution as measured with calibrated satellite imagery and nocturnal images taken by astronauts aboard the International Space Station (ISS).

NIXNOX project: Sites in Spain where citizens can enjoy dark starry skies

J. Zamorano. Universidad Complutense de Madrid

A. Sánchez de Miguel, E. Alfaro, D. Martínez-Delgado, F. Ocaña, J. Gómez Castaño & M. Nievas.

The NIXNOX project, sponsored by the Spanish Astronomical Society, is a Pro-Am collaboration with the aim of finding sites with dark skies. All sky data of the night sky brightness is being obtained by amateur astronomers with Sky Quality Meter (SQM) photometers. We are not looking for remote locations because the places should be easily accessible by people with children. Our goal is to motivate citizens to observe the night sky. NIXNOX will provide information to answer the question: where can I go to observe the stars with my family?

TALKS

Moon days, energy saving lessons

Susana Malón. Lumínica Ambiental

María Álvarez. Sociedad Astronómica de Álava

Street lighting is an issue recurrently addressed for several hundred years. Analysing several historical documents, we get an understanding of the different solutions put into practice, depending on the technology available and applied in each period. We can also see the evolution of the concept of the public outdoor lighting service and the consideration of darkness and the natural light of the night. These historic documents show respect and care for the environment and nature as well as social awareness of the value of public services missing nowadays. Just looking back at what our great-grandparents did and applying current technology with common sense we can see the essential principles currently defended by dark sky protection groups.

LED Street Lighting for Dark Sky protected areas

Ramón Llorens. SACOPA - IGNIALIGHT

Artificial lighting for areas of Astronomical interest should meet the very strict requirements that until now could only meet Sodium vapor lamps. It happens the same with Ecology Protected areas in order to prevent that illumination could affect to the flora and fauna. The smart use of Amber and PC-amber LEDs in these areas opens up unthinkable expectations of light pollution control. The presentation shows the inconvenience of lighting these areas with white LEDs due to its high emission peak in 440nm, and how can it be solved using PC-Amber or Amber LEDs. This new technology used by SACOPA - IGNIALIGHT has been tested in terms of affecting to nocturnal wildlife, humans, photobiological safety norms and light pollution. Some success cases are shown in the end of the presentation.

State of the art of the use of LED technology in the protected area of the Canary Islands

Francisco Javier Díaz Castro. Instituto de Astrofísica de Canarias (OTPC - IAC)

In this communication we present the solutions we are providing to the use of LEDs in areas protected by the Sky Law of the Canaries. We present the spectra of LEDs currently replacing conventional discharge lamps specified in the Law and its advantages and weaknesses.

Light decontamination of urban areas. Criteria to be used in the present economic situation

Josep M. Ollé Martorell. Ajuntament de Reus y Universitat Rovira i Virgili

We present examples of decontamination light of urban areas, both residential as high for commercial use, lighting explaining the criteria that were used and how technology was used, with photographs before and after the performance. Based on the experience gained and given the current economic situation will propose more stringent limitations as advocate that the current regulations in Spain.

Ground-based imaging spectrometry for light pollution measurement

Salvador Bará, Raúl de la Fuente and Héctor González. Universidade de Santiago de Compostela

Airborne imaging spectrometers have been used in light pollution monitoring to measure the upward light emissions to the atmosphere and to detect and classify pollutant sources. In combination with suitable models of atmospheric propagation and scattering these data allow one to make quantitative estimates of the night sky radiance, whose increase over the natural levels is one of the most direct manifestations of the light pollution problem. However, several detrimental effects of light pollution at ground sites are determined not only (nor mainly) by the sky radiance but by the radiance directly received from the artificial sources through the line-of-sight and reflected paths. In this communication we report on the use of wide-field ground based imaging spectrometry to measure the spectral radiance of the nightscape, including both natural and artificial sources, and to estimate the spectral irradiance at the observer location. With these inputs several relevant light pollution magnitudes (e.g. the circadian light illuminance) can be computed and the main sources contributing to them can be located and identified.

Measuring Light Pollution in Montsec: a protected area

Salvador Ribas, Ramon Canal-Domingo. Parc Astronòmic Montsec - Consell Comarcal de la Noguera

Sergi Paricio, Lluís Gustems and Carmen O. Calvo. Servei per a la Prevenció de la Contaminació Acústica i Llumínica. Generalitat de Catalunya

Montsec Mountains are a special protected place in Catalonia (NE of Iberian Peninsula). Since mid-90's, this area was selected for amateur astronomers to install their astronomical observatories. In 2002 the Government of Catalonia started the project Parc Astronòmic Montsec with the aim to have two astronomical installations: one for research and the other for outreach and education. Dark skies are probably the most valuable thing in Montsec and for this reason this area is specially protected by Catalan Laws. In 2012, Parc Astronòmic Montsec and the official Catalan Service against Light Pollution have developed a measurement plan using different kind of data. The results of this study showed Montsec is one of the best places in Southern Europe with typical sky brightness better than 21.0 and in some places between 21.5 and 22.0.

Two years Night Sky Brightness measurements in The Netherlands

Marty Haaima, P.N. den Outer, G.R. van der Hoff and D.E. Lolkema. RIVM

Night Sky Brightness in The Netherlands is being monitored within the MHN monitoring network since 2011. This network measures night sky brightness continuously on nine locations. The measurement sites are located on industrial, urban, rural and remote locations. The night sky brightness is measured using the Sky Quality Meters (SQM-LEs). The SQMs have been intercompared prior to installation and one year later in the international CLIC campaign. One of the goals of the network is to determine actual levels and variability of the night sky brightness in The Netherlands. An analysis using the two year data set is presented, key features of the results are shown and the usability of the data beyond the primary goals is discussed.

Start of Monitoring the Colors of the Night

H. Spoelstra. Lumineux Consult

The introduction of LED lighting in the outdoor environment may increase the night time blue color level and light pollution caused by the stronger Rayleigh light scattering. Blue light may also have an impact on circadian rhythm of humans due to the breakdown of melatonin. At present no long term data sets of color levels of the night sky are available. In order to facilitate the monitoring the levels and variations in the night sky colors a low cost multi filter instrument is presented. Design considerations are presented as well as the choice of suitable filters, which showed to be critical especially in the green band from 500 to 600 nm. In this spectral band available astronomical filters showed to exclude some or all of the low and high pressure sodium lines from lamps which are important in light pollution research. For this band filters from the optical industry were chosen. Correction factors were calculated to correct for the detector response and filter transmissions. The first results at a suburban monitoring station showed that the light levels between 500 and 600 nm are dominant during clear and cloudy skies. The relative contribution of blue light increases when the night sky becomes clear (without moon). The impact under moon lit skies showed to be more complex and is still under study.

Control and inspection of light pollution by European Environmental Police

Joan Manuel Bullón. Asociación Profesional de Agentes Medioambientales de la Comunidad Valenciana

Enric Marco. Cel Fosc, Comunitat Valenciana

The European Environmental Police is responsible for ensuring a healthy Environment in the European Union. Most nations in the world have got this service through their respective civil servants, known as Rangers. In Spain, each region is endowed with its teams dedicated to these problems with different names. In the Valencian Community environmental agents, as also for other environmental bodies in the other Spanish regions, come from the State Forest Rangers of the extinct "Instituto para la Conservación de la Naturaleza" (ICONA). The idea of this paper is to propose that the staff officer in charge of caring for forest and environment should be prepared and able to measure light pollution, urgently enforce environmental regulations on the protection of the dark sky and also trying to decontaminate as much as possible from polluting sources, as is done in other types of pollution, such as spills, noise etc.. This is the reason why we should require to Spanish regional governments and also to the European countries to incorporate into their environmental departments the fight against light pollution, work that would be generously developed by officials belonging to the European Environmental Police in collaboration with the corresponding environmental public prosecutor's offices.

18 years around the Catalan law

Pere Horts. Cel Fosc, Associació contra la Contaminació Luminica

In the mid 90s a group of friends in Catalonia, united by our love for astronomy began to take the first steps to try to solve a problem that was stealing the night, light pollution. The objective was clear: to get the lighting of the streets be more respectful and intelligent. To do this we decided to promote a regional law committed to protect the night. We have this law since 2001, but the main goal has not been reached yet. However, as Konstantinos Kavafis said, what matters is not reaching a *Ítaka* but the road leading to it. On this way we met a lot of wonderful people like Dr. Ramon San Martin, whose memory will always be with us, we founded Cel Fosc as a national association and got together many of those who are outraged by having to bear and pay so poor lighting. Today we can say that all this was worth it.

Sky Darkness conservation efforts in Andalusia

José Jiménez. Asociación Astronómica Hubble, ADIT, ADSUR

Andalusia is located in the south of the Iberian Peninsula. Its landscape context is formed by a huge mix of different habitat that includes from high mountains at the east and south to big plains of open forest in the north. The population is mostly centered in the down lands, where it's possible to find big cities like Sevilla or Malaga. This fact makes possible to find many regions where the density of people is almost nule, and that's why in this region a very well preserved dark sky is still present nowadays. Two of these regions are in this moment under a complete program of conservation and certification under the figure of Starlight Reserve. Sierra Sur Range in the province of Jaén and Sierra Morena, that involves four provinces, Huelva, Sevilla, Cordoba and Jaen. The entity called Dark Sky Advisors (formed by the consortium of Hubble Astronomy Association and Iberus Medio Ambiente) is running both projects. We have accumulated a lot of experience taking measurements of the night sky background brightness and having many meetings with the local authorities. With the process of making of the sky a valuable resource, we're achieving our goal of preserving the darkness in our skies. In this short conference we would like to share our experiences with anyone interesting in starting similar projects.

[The renovation of the street lighting systems in Navarre](#)

Esperanza Aristu and Fernando Señas. Departamento de Industria. Gobierno de Navarra

In this presentation we will proceed to explain the actions on public lighting implemented by the Government of Navarre in the last years. These actions take place at the legislative level, in the sectoral plans and in the calls for aids for the renewal of public lighting. The Regional Law 10/2005, regulating the lighting system for the protection of the night and Foral Decree that develops it, along with the national RD1890/2008 are the legislative framework in which we have worked in recent years.

[The establishment of IDA Tokyo and plans for raising public awareness about light pollution](#)

Nobuaki Ochi. Toyo University

IDA Tokyo was established in January 2013. Scientific researchers, lighting designers and amateur astronomers collaborate to raise public awareness about light pollution. We present plans of educational actions which will be done around Tokyo, one of the brightest areas in the world.

[Zernike analysis of all-sky night brightness maps](#)

Salvador Bará. Universidade de Santiago de Compostela

All-sky night brightness maps -calibrated images of the night sky with hemispherical field-of-view taken at standard photometric bands- provide useful data to assess the light pollution levels at any ground site. We show that these all-sky images can be efficiently described and analyzed in terms of the Zernike circle polynomials. Besides compressing the relevant image information into a small-sized data vector, providing analytic expressions for the spatial distribution of sky brightness, and alleviating the effects of noise, the finite Zernike expansions allow to discriminate the spatially smooth radiance distribution due to atmospheric scattering from that associated to pointlike natural or artificial sources. The Zernike coefficients also allow to quantify in a straightforward way the average sky brightness, its variation across the field of view and its degree of asymmetry, providing an easy framework to analyze the evolution of these magnitudes throughout the night.

[Preliminary Data from the Loss of the Night Android App](#)

Christopher Kyba. Freie Universität Berlin

Annette Krop-Benesch and Franz Hölder. Leibniz Institute of Freshwater Ecology and Inland Fisheries

The last four years have seen a major increase in the amount of information available on the levels of external light at night. The radiance of the sky is now continuously monitored at many tens of locations worldwide, the new VIIRS instrument on the Suomi NPP satellite has greatly enhanced spatial and radiance resolution over DMSP, and imagery from the ISS and nighttime flights have allowed high resolution analyses. It is likely that many or all of these devices will be replaced within the next decades by advanced instruments with different sensitivities, and this is problematic from the perspective of developing time series. The slow evolution of the human eye makes it an ideal instrument for developing time series over a period of decades. We have developed a smartphone app that allows citizen scientists to quantify the naked eye limiting magnitude (i.e. the faintest visible star). This parameter is very highly correlated with skyglow, is easy to understand, and should be very stable with time. The ubiquity of smartphones means that skyglow luminance data could be acquired worldwide, and in particular in areas undergoing rapid development. We present the methodology of the app, and preliminary results based on data taken in spring and summer, 2013. In addition to providing valuable data, the app has educational and cultural value. Its use requires no prior observational experience, and users can very quickly become familiar with the names of the brightest stars and some constellations, bringing urban dwellers into closer contact with the cosmos. Finally, the app also provides an instrument for students to assess skyglow luminance without purchasing a lightmeter. Students can thus conduct their own projects, while at the same time participating in a worldwide citizen science project.

[Temporal evolution of light pollution sources using ISS images and others: Madrid](#)

Alejandro Sánchez and Jaime Zamorano. Universidad Complutense de Madrid

The study and control of light pollution presents several difficulties. The first of them is that the sky background brightness depends on many factors, not only on the artificial sources of light. To study the variation of these sources, we prefer to study them directly. The images of the International Space Station (ISS), provide us a wide range of resolutions from several kilometers to a few meters. In these images is relatively easy to identify sources of light. However its calibration is rather complicated. Then, the images must be related to variations in sky background brightness. In addition to the images provided by the ISS crews, other direct detection methods such as ground imaging and the data collected by luxometers aboard balloons and airplanes are used by our team. We'll show an example for the case of Madrid.

[Protecting Dark Skies – An Ongoing Program of Diligence and Education in Borrego Springs, California](#)

James Hoban Rickard. Borrego Springs Dark Sky Coalition

Obtaining the Dark Sky Community designation from IDA was just the beginning. There is an ongoing program to maintain and improve local lighting. DILIGENCE means identifying new violations of dark sky criteria by annual surveys of lighting fixtures and informing the owners of non-conformity. This is coupled with offers of advice about the commercial availability of dark sky friendly fixtures. EDUCATION means generating articles for the local media, providing a postal brochure for every resident, information for visitors at local hotels, and a new program for business recognition. We will show the kind of certificates to be awarded to businesses to keep dark skies in the public eye. In this way everyone in the community can participate in protecting our night sky.

Monitoring the Valencian sky. Polluted natural areas and dark places to be preserved

Enric Marco, Martin Giner. Departament d'Astronomia i Astrofísica, Universitat de València

Angel Morales. Dep. de Química Analítica, Univ. València; Coordinadora en Defensa de los Bosques del Turia

It is well known that Valencia is usually considered one of the more light polluted city in Europe. Astronomers are not the only one affected by its pollution. It has been well reported that excessive number of artificial light points and incorrect installation of luminaires exert strong influences on nocturnal wildlife. Three Valencian natural parks, located nearby to the Valencian metropolitan area, are strongly polluted due its unshielded public lighting system. The introduction of LED technology into the street lighting in many Valencian towns, supported and financed by Valencian public administrations, is the reason of the migration from the now widely used high-pressure sodium lamps to white lamps with a strong emission peak in the blue band. This action, promoted as an enhancement of the energy efficiency, is going to increase very quickly light pollution and even to exert greater pressure on natural ecosystems and human health. This work presents measurements of night sky background obtained in Valencian natural parks and some areas of interest. It also detects and characterizes pollutant hot spots and the first effects of the cold LED lighting systems. Although very polluted areas are found near Valencia and the main Valencian cities, it is worth noting that there are still some natural areas, such as the Natural Park Chera-Sot de Chera, and the regions of la Serranía, el Rincón de Ademuz and els Ports with excellent dark sky. These must be protected from future environmental assaults such as white LED lighting or flashing white light projectors for wind turbines.

Protecting Dark Sky Areas: Global Issue - Local Interests

Josiane Meier. Technische Universität Berlin, Department of Urban and Regional Planning

As a consequence of growing light pollution, areas with naturally dark nights have become scarce in many countries and are increasingly considered to be worthy of protection. The currently most prominent way of doing so is the designation of dark sky areas. A growing number of such areas has been designated in recent years. In order to be certified as a dark sky area by organisations such as the IDA or RASC, public policies must be adopted and political and public support are necessary. This presentation will first provide an overview of designated areas and designation options. Using three case studies, it will highlight the broad range of actors and interests that play into the designation of dark sky areas.

Light Pollution in the Nature Park TerraVita

Andreas Hänel. Dark Sky Germany, Museum am Schoelerberg

During the last 4 years we have studied the night sky brightness in the nature (and geo) park Terra.Vita around Osnabrück. We tried to: - study the sky quality at the observatory - find the darkest places in the region - study the influence of different light sources (like parking areas, industrial areas, cities) - developed lighting guidelines for artificial lighting to reduce light pollution (also within the projects of star parks in Westhavelland and Rhoen). This work has been partially funded by the Bingo! environmental protection foundation of Niedersachsen.

The planetarium session on light pollution

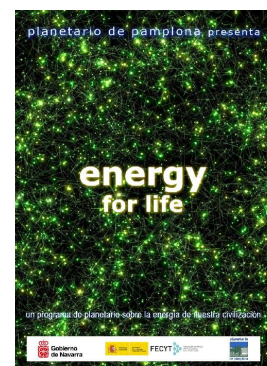
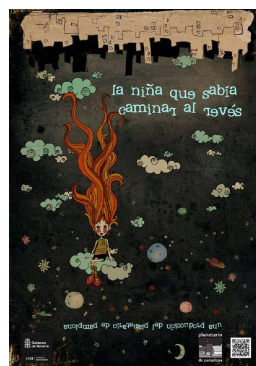
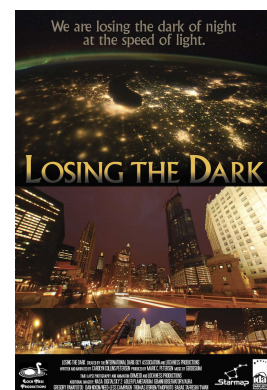
Fernando Jáuregui Sora.

Cel Fosc, Asociación contra la Contaminación Luminica and Planetario de Pamplona

The **Planetarium of Pamplona** is honored to present in this **XIII European Symposium for the Protection of the Night Sky** the premiere in Spanish of the awarded fulldome show **Losing the Dark**, a short piece of fulldome video promoted by the **International Dark Sky Association** in collaboration with the **International Planetarium Society** and produced by **Loch Ness Productions**. **Cel Fosc, Association against Light Pollution** is promoting the translation and production of this short show in all the other Spanish official languages: Catalan, Vasque and Galego in order to facilitate its distribution around our country.

As an example of our daily work with students and general public, we 'll present a traditional live planetarium show centered of the effects of light pollution on the sky observation. Light pollution kills one of the most beatiful natural landscapes on Earth: the starry sky in front of a pure black background.

Two more examples on popularization of light pollution problem and on the energy consupcion of our society will followthis live presentation: one directed to kids (The girl who walked upsidedown) and other to general public (Energy for life).





www.cielooscuro.es