



11th European Symposium for the Protection of the Night Sky



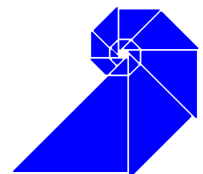
October 6 – 8, 2011
Osnabrück Germany



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11th European Symposium for the Protection of the Night Sky, Osnabrück

Program

Thursday 6th	
15:30	Registration
16:00	Measuring Light Pollution 1
	Talks and Workshop
16:00	The first light pollution map for the city of Amsterdam -Henk Spoelstra
16:20	Variability in measurements of the darkness - Wim Schmidt
16:40	Effects of atmospheric conditions on night sky brightness - D.E. Lolkema, M. Haaima, P.N. den Outer, H. Spoelstra
17:00	Night Sky Brightness Monitoring Network in Hong Kong -Jason C. S. Pun, Mr Chu-wing SO, Mr Terry C. F. Wong (via Skype)
17:20	Long-term Multispectral Measurement of Skyglow Using Sky Quality Meters - Christopher CM Kyba, Thomas Ruhtz, Jürgen Fischer, Franz Hölker
19:00	Dinner (Museum)
	Planetarium + Guide through the museum
	SQM calibration (BuioMetria Partecipativa, BMP)
	IDA International Committee meeting (Martin Morgan-Taylor)
Friday 7th	
9:00	Opening: Bürgermeister Burkhard Jasper mayor of Osnabrück PD Dr. Walter Bleeker, president natural science association Osnabrück Bob Parks, executive director IDA
9:30	Lighting and Society
9:30	Changing the culture of urban Light at Night (LAN): Or: "Is your research funded by muggers and rapists?" - Margaret Grose and Clare Mouat
9:45	Slovenia has survived 4 years since adoption of light pollution legislation - Andrej Mohar
10:05	Dark Sky ("Ciemne Niebo") Program in Poland - Julia Romanowska
10:20	What is the Effect of Public Lighting on Public Safety? - Paul Marchant,
10:40	Educational Activities for Dark-Sky in Japan - Nobuaki Ochi
11:00	Coffee Break
11:30	Measuring Light Pollution 2
11:30	Measurement of Night Sky Brightness in Turkey - Z. Aslan et al.
11:50	First observations of the polarization of urban sky glow - Christopher CM Kyba, Thomas Ruhtz, Jürgen Fischer, Franz Hölker
12:10	Participatory dark sky quality monitoring in Italy - Andrea Giacomelli, Francesco Giubbilini, Francesca Manenti
12:30	Lunch (Kreishaus-Kantine)

13:30	Measuring Light Pollution 3
13:30	Development and applications of a light pollution calculation tool - M. van Asten, W. Gerritsen, R. Schmidt, W. Schmidt, H. Spoelstra.
13:50	Light pollution in Belgium: general status and a low-cost city evaluation project - Thierry Hanon-Degroote
14:05	Light pollution in the near infrared, Zeljko Andreic, Doroteja Andreic and Kresimir Pavlic
14:20	The Night Sky Brightness Network in The Netherlands - D.E. Lolkema, M. Haaima, G.R. van der Hoff, P.N. den Outer, H. Spoelstra, W. Schmidt
14:40	Importance of nearby lighting on light pollution - Andrej Mohar
14:55	The protection of the night in Italy - Fabio Falchi (Skype)
15:15	Coffee Break
15:45	Planning Lighting 1
15:45	Lighting Masterplan – An appropriate tool to reduce light pollution? - Dennis Köhler
16:00	The Control of Obtrusive Light Through a Combined Approach: Guidance as well as Law - Martin Morgan-Taylor
16:15	Light Pollution Law in France – Pierre Brunet
16:30	Lighting plan and LED lighting in Osnabrück – M. Haselof, Stadtwerke OS, A. Hänel,
17:00	Excursion (coach)
17:30	Megalithic tomb Jeggener Steine
18:30	Dinner (Eichenhof/Wersche)
20:30	Observatory (~600 m by foot)
22:00	LED-Lighting Osnabrück Immelmannweg/Richthofenweg (~1 km by foot)
23:30	End
	Saturday 8th
9:15	Planning Lighting 2
9:15	Villes et villages étoiles – Nicolas Bessolaz, (presented by Pierre Brunet)
9:30	Light Vision of the Province Westlanders - Friedel Pas
9:45	Simulation and Analysis of Light Trespass of Advertising Signs on the Shophouse in Taiwan - Chen-Ying Ho, Hsien-Te Lin, Kuang-Yu Huang
10:00	A study of Light Trespass from Advertising Signs on building facade in Taiwan - Kuang-Yu Huang, Hsien-Te Lin, Chen-Ying Ho
10:15	Keeping the Stars in Our Eyes: A GLOBE at Night Campaign Update - Connie Walker
10:30	Touch the Cosmos: The 2011 International Earth & Sky Photo Contest - Connie Walker
10:45	Coffee-Break
11:15	Artificial Lighting and Nature
11:15	Insects meet LEDs - A Field Study Survey - Gerhard Eisenbeis
11:40	Insects and public lighting - Paula Parikrupova, Jan Kondziolka
11:55	Artificial Night Lighting Affects Dawn Song, Extra-Pair Siring Success, and Lay Date in Songbirds - Lotte Schlicht
12:10	Night-time obstruction lighting for offshore (and onshore) wind farms and birds: demands from different interest groups - Jan Blew
12:30	Lunch (Kreishaus-Kantine)
13:30	Dark Sky Parks
13:30	Light Pollution's Effect on Wildlife in Tucson, Arizona (USA) - Connie Walker
13:50	Qualifying Dark Sky Parks - Zoltan Kollath
14:10	Dark Sky Parks in the UK - Martin Morgan-Taylor
14:30	Dark Sky Park Rhön, Sabine Frank
14:50	Dark Sky Parks Germany - Andreas Hänel

15:30	Coffee-Break
16:00	IDA matters: Report, Awards, next conference
16:00	IDA updates, Bob Parks, IDA
16:30	IDA Europe – Friedel Pas
16:45	Discussion IDA matters
17:15	IDA Awards – Friedel Pas
17:30	12 th Symposium 2012 – Julia Romanowska
18:30	Walk to the conference Dinner restaurant (1.2 km by foot)
19:00	Conference Dinner (Huxmühle)
	<u>Sunday 9th</u>
10:00	Tour through the old city centre, meeting in front of the City Hall (B. Hänel)

Posters:

Christopher Kyba and Helga Kuechly, Berlin: Light Pollution Map of Berlin
Paul Marchant: Potential Hazards of Artificial Light at Night

Exhibition:

Siteco
BuioMetria Partecipativa
Light Pollution exhibition Osnabrück

Public Transport

Bus departure times:

Line 21 from Kreishaus/Zoo towards centre:
19:06, 19:36, 20:06, 20:36, 21:06, 21:36, 22:06, 22:36, 23:06, 23:51

Tickets:

single ticket 2,10 €
day ticket 4.30 €
4 travels 7,30 €
tickets can be bought at the bus driver.

Abstracts

Measuring Light Pollution 1

The first light pollution map for the city of Amsterdam

Henk Spoelstra - Lumineux Consult, Arnhem, NL

In 2009 the City of Amsterdam developed a light vision plan and energy reduction plan for the near future. The focus is to reduce public lighting as well as lighting of enterprises in such a way that Amsterdam stays an attractive capital for tourists, and that energy reduction by reducing lighting is done in a sensible way.

As light pollution is a result of waste of light and energy the City of Amsterdam wants to monitor if the envisioned plans will result in a measurable effect in the future. Therefore the present or "zero"-level of light pollution above and around the City of Amsterdam needed to be known.

To this Henk Spoelstra together with Wim Schmidt of Sotto le Stelle have measured the light pollution level for the City of Amsterdam at 110 measuring points during 5 nights in the winter period of 2009/2010.

The presentation will show the monitoring techniques employed, the uncertainty in the measurements, the results and the interpretation of the results.

Variability in measurements of the sky luminance

W.Schmidt, Sotto le Stelle, Utrecht, NL

A lot of people are measuring the sky luminance in different places, at different times and under different conditions. The results depend on a lot of factors and vary considerably. To measure only the artificial component of the sky luminance these factors have to be considered. The influence of the sun, moon, stars, milky way, conditions on the ground and the atmosphere will be discussed, also the influence of the time of the night on the time of the year.

The results are based on sky luminance measurements at 1500 locations and of two years of continuous monitoring of light at one location. The variability in the results is big. The variability in a small country like Holland is much higher than we earlier thought.

We hope to give also some insights in how big sources of light like towns and greenhouses are affecting the sky luminance in its surroundings.

Effects of atmospheric conditions on night sky brightness

D.E. Lolkema (National Institute for Public Health and the Environment - RIVM), M. Haaima, P.N. den Outer, H. Spoelstra, NL

Atmospheric conditions may amplify night sky brightness. We have performed night sky brightness measurements with three different lightmeters, namely the DigiLum, SQM and IYA lightmeter, at the Cabauw Experimental Site for Atmospheric Research (CESAR) for an almost one year period. Comparisons with cloud and atmospheric parameters already measured at this site show a clear correlation between night sky brightness and the cloud height and cover. So the light emission being the same, the night sky brightness can be quite variable. This means that also the exposure of humans, animals and plants to light at night varies. Information on the exposure is necessary in order to determine the impact of night time lighting. As shown, exposure depends on the light emission on the one hand and on the atmospheric conditions on the other. Light emissions can be monitored with future satellite instruments. It is already possible to determine the night sky brightness from these light emissions with model calculations, but only for one atmospheric condition. Up to now, night sky brightness cannot be determined with model calculations for cloudy, partly cloudy or dust polluted conditions. A thorough analysis of night sky brightness measurements under different atmospheric conditions is necessary to improve these models. We will present our results, which together with future research is essential to map night sky brightness for different atmospheric conditions.

Long-term Multispectral Measurement of Skyglow Using Sky Quality Meters

Christopher CM Kyba, Thomas Rutz, Jürgen Fischer, Franz Hölker, Institute for Space Sciences, Freie Universität Berlin, and Leibniz-Institute for Freshwater Ecology and Inland Fisheries, Berlin, D

In the ideal world we would have long-term, highly spectrally resolved measurements of skyglow at sites worldwide. Unfortunately, the relatively high cost of spectrometers makes both long-term and distributed coverage generally unfeasible. We investigate what kind of long-term measurements are possible using a small number of spectral channels, with the long-term goal of encouraging the development of a multichannel SQM-like device. We present preliminary data taken with an array of SQMs using Luminous, Red, Green, Blue, and the standard SQM filter.

Night Sky Brightness Monitoring Network in Hong Kong (Skype)

Jason C. S. Pun, Mr Chu-wing SO, Mr Terry C. F. Wong, The University of Hong Kong, Hong Kong

Hong Kong is a dense metropolitan city famous for its spectacular night lights and light pollution. With a highly mixed land utilization within a small area, along with a complex landscape and robust human activities, the night-sky condition of Hong Kong makes for an interesting case study for the effect of human activities on the quality of night-sky. The Hong Kong Night Sky Brightness Monitoring Network (NSN), consisting of light sensors and weather observing equipments stationed at 18 monitoring sites established strategically at urban and rural locations around the city, plan to continually measure the night sky brightness and other environmental conditions every night for a period of one year. The night sky brightness data are automatically collected and reported over the internet to generate a real-time night sky condition map. By studying the geographical and temporal variations of the night sky against both natural and artificial factors at multiple locations, we attempt to identify the effects of urban lightings on the night sky. Results from our studies will serve as an important database for a full comprehension of the current condition and for the public to assess whether new rules and regulations are necessary to control the use of outdoor lightings in Hong Kong. In this session, we will introduce the NSN project and present preliminary data from our pilot studies.

This project is supported by the Environment and Conservation Fund of the HKSAR Environmental Protection Department.

Lighting and Society

Changing the culture of urban Light at Night (LAN):

Or: "Is your research funded by muggers and rapists?"

Margaret Grose and Clare Mouat, University of Melbourne, Australia

The prevailing culture of urban light at night (LAN) is one of 'more is better' — more light is better — safer, progressive and necessary — than less light. Insufficient attention is given to reappraising practices and policies regulating lighting our urban nightscapes. Earth Day, when many cities turn off street-lights and lights on public monuments such as the Akropolis and the Sydney Opera House for one day, is both supported and ridiculed. The dimming of streetlights remains ridiculed despite knowledge of the ecological effects of LAN, which has been focussed on insects, turtles, bats, fish, and birds; however, it appears that most people do not know or do not care about such ecological impacts which makes it difficult to promulgate the idea that reduced and smarter urban LAN is safe, liveable and publically accountable. Not knowing and not caring are two separate positions. If we wish to address these two positions to improve the culture of LAN we need to (i) change the national and international conversations about LAN, (ii) change the policy climate in relation to LAN, risk, and insurance at local, regional and national levels, and (iii) educate to change the habits of heart, mind and behaviours to accommodate dimmed or 'smarter' LAN to change our daily practices of LAN.

There are recent movements in many local governments around the world to dim streetlights. Much of the imperative for this comes not from ecology but from carbon saving and reductions in energy costs. Emerging research reveals adverse effects on human health. In a project based in Western Australia we are moving towards dimming streetlights and motorways in three towns, with the impetus coming largely from Local Government and individuals working within government. This paper outlines trials for dimming and turning off streetlights in Western Australia and signals key features of public education necessary to achieve sustainable streetlighting in Australia, or elsewhere.

Slovenia has survived 4 years since adoption of light pollution legislation

Andrej Mohar, Dark Sky Slovenia, SLO

Dark Sky ("Ciemne Niebo") Program in Poland

Julia Romanowska, Dark Sky Poland, PL

Polaris OPP Association is one of Polish astronomical organizations. In the last few years, with help from many other people and municipalities, Polaris implemented a project named "Ciemne Niebo" ("Dark sky"). Its scope consisted mainly of educating people about the light pollution problem and also persuading local community to improve the night sky; for instance one of its achievements was changing street lighting in Sopotnia Wielka. The presentation will be about this and other projects run by Polaris.

What is the Effect of Public Lighting on Public Safety?

Paul Marchant, Leeds Metropolitan University, UK

Good evidence for the claim that public lighting reduces crime and road traffic accidents is elusive. The claim of a 20% reduction in crime made to justify costly new lighting schemes will be shown not to be consistent with evidence from 33 London boroughs, some of which have had new street lighting schemes. The presentation will also give an outline of research, which will be able to give precise, unbiased estimates of the effect of lighting on public safety.

Educational Activities for Dark-Sky in Japan

Nobuaki Ochi, Yonago National College of Technology, Japan

This presentation will be on topics of (1) education programs tried in elementary-school classes for energy and environmental education through light pollution, (2) promotions and results of the GLOBE at Night campaign in Japan, and (3) things after the 3.11 earthquake.

Measuring Light Pollution 2

Measurement of Night Sky Brightness in Turkey

Z. Aslan (Istanbul Kultur University, Turkey), O. Gölbası, D. Kocer, A. T. Yelkenci, E. Isik, Z. Tunca, A. Devlen, T. Özdemir, K. Yelkenci, D. Bagdas, M. Mutlu, T. Demirciler, U. İkizler, M. Kocer, U. F. Özyar, I. Kucuk, S. Cakmak, H. Yildiz, H. Kalkan, F. B. Deneri, S. Polat, A. Solmaz, A. Karamahmutoglu, H. Yuzer

An ongoing project for measuring the night sky brightness on a national scale in Turkey will be reported. The main aim of the project is to measure the sky brightness on moonless clear nights in selected urban, suburban, and rural areas, national parks, and wild life reserves. We also look for dark sites which are good for public viewing of the night sky and for star parties. 17 Portable Sky Quality Meters (SQM) are now in use in selected regions such as Istanbul, Ankara, Izmir, Bursa, Antalya, Malatya, Kayseri, Samsun, and Artvin. The measurements are made by colleagues from local universities and teachers from local schools. Two fixed stations, one in Istanbul and one in Eskisehir, will start taking continuous measures after October 2011.

First observations of the polarization of urban sky glow

C.C.M. Kyba (1,2), T. Ruhtz (1), J. Fischer (1), and F. Hölker (2)

(1) Institute for Space Sciences, Freie Universität Berlin, Berlin, Germany, (2) Leibniz-Institute of Freshwater Ecology and Inland Fisheries, Berlin, Germany

Rayleigh scattering of collimated sunlight by atmospheric molecules both gives the sky its blue color, and produces a strong linear polarization pattern at 90 degrees from the Sun's position. The sky glow produced by light pollution from urban light sources, in contrast, has generally been assumed to be almost unpolarized, both because the sources of light pollution are uncollimated, and because of additional scattering from aerosols. We obtained sky polarization measurements by taking multiple images using a linear polarizer and a research grade camera, and have observed linear degree of polarizations of up to 9% for an urban location on a moonless night in Berlin. We also show that the polarization pattern from searchlights stands out strongly from the polarization pattern of the sky glow, and is easily observed many kilometers from the base of the search light itself. We discuss the ways in which upward directed unpolarized city light may result in polarized sky glow, and address the limitations of our current measurement technique.

Participatory dark sky quality monitoring in Italy

Andrea Giacomelli (*), Francesco Giubbilini (**), Francesca Manenti (***)

(*) Attivarti.org, (**) Misterecolight, (***) Museo di Storia Naturale del Mediterraneo, Livorno, I

Italy hosts an extremely lively community involved in light pollution monitoring and studies. The presentation will provide an overview of such activities, with a specific focus on the coordinated efforts being conducted in the context of the participatory project known as "Buiometria Partecipativa" (BMP). This was started in 2008 by Francesco Giubbilini and Andrea Giacomelli, two environmental engineers with a passion for stargazing, a strong experience in environmental data management, and an established track record in awareness raising initiatives. The BMP campaign has now entered its fourth year, involving over 50 volunteers (the majority of which totally unaware of light pollution issues before joining the project) spread across the country, holding over thirty events, and reaching national media visibility. The project also won an award for its capability in integrating different technologies to stimulate citizen participation in relation to a substantial environmental issue.

As the participatory measures continue, the BMP team has started to deploy fixed monitoring stations, and to make available a data harvesting system allowing the merging of SQM data and meteorological data, all of which are published under the Open Database Licence.

Other points of interest in the BMP project are related to

- data quality procedures,
- experiences in parks and protected areas
- reports from citizens and other stakeholders who have changed their views on light pollution, and on dark sky quality as an asset, by participating to the BMP activities.
- use of innovative web and GIS (geographic information system) technologies to facilitate data exchange and visualisation.

As the participatory measures continue, the BMP team has deployed, together with Venetostellato (an umbrella organisation for stargazers in the Veneto Region), and under the patronage of Cielobuio and UAI (Unione Astrofili Italiani) CORDILIT. CORDILIT is a coordinating committee conceived to harmonise and integrate different efforts currently ongoing in Italy in the deployment and use of fixed monitoring stations.

The presentation will provide a summary of the work conducted to date, and will provide some outlook on activities for 2012, both for the BMP project and for CORDILIT.

More information on the project is available at <http://www.pibinko.org/bmp> – there is a section for English readers, and the team will be happy to answer any enquiries by e-mail: bmp@pibinko.org

Measuring Light Pollution 3

Development and applications of a light pollution calculation tool

M. van Asten (Provincie Utrecht), W. Gerritsen, R. Schmidt, W. Schmidt, H. Spoelstra, NL

Since a few years, Dutch provinces (regional public authorities) are incorporating the reduction of light pollution in their policy and its implementation. Whereas one province may have started because of the annoyance caused by assimilation lighting from greenhouses, another was motivated to protect its 'traditional darkness' and a third originally worked on saving energy in public lighting. Most provinces are now broadening their attention to the effects of light pollution on human health and well-being, nature and landscape. This invoked a demand for an instrument to predict both the effect from lighting of spatial developments, such as new residential or business areas, as well as the effect of technical measures in existing situations.

As there was no practical tool for this yet, IPO (the Dutch Interprovincial Organisation) commissioned for its development. A software package was developed that calculates two types of light pollution: zenithal sky brightness and the visibility of lamps in the distance (at the horizon). The most relevant areas from which light emanates – such as business areas, sports fields, residential areas and roads with public lighting - were identified and their characteristics such as type and distribution of light fixtures described. Another part of the work concentrated on the physics of the propagation of light from these light sources to the environment. The results and calculation method were incorporated into the software program "IPOLight", which is based on an existing software platform for sound propagation and air quality calculations.

We will present the studies on relevant light sources and its propagation, the software and its possible applications by provinces and other parties.

Light pollution in Belgium: general status and a low-cost city evaluation project

Thierry Hanon-Degroote, ASCEN, Belgium

Frank De Winne, Belgian's astronaut, had several times indicated that Belgium is one of the most visible countries from space. It's still true, but things are changing! After years of light pollution information, a real evolution had started since 2007 in both Belgium regions, and 2011 is a key period. This presentation will inform around today key realisations (law, norms & projects) and present shortly an "easy and low cost" light pollution evaluation technique (LPMD) used in several projects.

Light pollution in the near infrared

Zeljko Andreic (speaker)(1), Doroteja Andreic (2) and Kresimir Pavlic

1. Faculty of Mining, Geology and Petroleum Eng., University of Zagreb, Pierottijeva 6, 10 000 Zagreb, Croatia, Email: zandreic@rgn.hr

2. Faculty of Veterinary Medicine, University of Zagreb, Heinzelova 55, 10000 Zagreb, Croatia

We investigate the light pollution (LP) in the near-infrared part (NIR) of the electromagnetic spectrum (700-1000 nm) for sites at low altitude, as typical for small observatories in this region. Our measurements show that considerable light pollution exists in the NIR. The increase of night sky brightness towards the horizon is usually slightly slower in the NIR than in the visible. More, in cases when LP is mostly produced by high-pressure sodium lamps, the NIR part of light pollution is dominated by two close sodium spectral lines (818.3 and 819.5 nm) that can easily be filtered out with a dedicated filter. This can, however, change as sodium lamps are gradually replaced by metal-halide lamps whose spectra are complex, showing many lines over the whole visible/infrared range. Last, but not least, the low altitude of observing sites, together with climate characteristics of the region, result in a lot more

humidity and aerosols in the atmosphere, compared to the typical mountaintop observatory site. This results in enhancing the LP, compared to the clear, dry air situation of a mountaintop observatory.

The Night Sky Brightness Network in The Netherlands

D.E. Lolkema (dorien.lokema@rivm.nl), M. Haaima, G.R. van der Hoff, P.N. den Outer, H. Spoelstra, W. Schmidt, NL

The Night Sky Brightness Network in The Netherlands is fully operational since July 2011. It consists of nine locations where the night sky brightness is continuously being monitored with SQM-LE devices. Four sites are located in nature reserve areas, three sites are situated in cities, one is a rural site and one is located in the middle of a greenhouse area. Before installing the devices at these specific locations, an intercomparison campaign has been performed at the Cabauw Experimental Site for Atmospheric Research (CESAR) for more than one month. We will present the Night Sky Brightness Network, its first results and the results of the intercomparison campaign of nine SQM-LE's.

Importance of nearby lighting on light pollution

Andrej Mohar, Dark Sky Slovenia

Lighting industry would like to show that the most important source of light pollution are nearby light sources. Our measurements at Zaplana Observatory and at Lastovo confirm that lighting very close to observation place has very small influence on sky brightness.

The protection of the night in Italy (Skype)

Fabio Falchi, CieloBuio, I

We present the main results of the sky brightness measurements campaign in Italy since 1998. The instrument used is based on a CCD camera with photometric filters B and V. We found that the zenith sky brightness in the two measured sites in Lombardy's countryside did not increase in the 13 years time span. This despite an almost doubling in the installed flux. We also found that in all the six measured sites the overwhelming part of the sky glow is due to the direct light, not the reflected light.

Planning Lighting 1

Lighting Masterplan – An appropriate tool to reduce light pollution?

Dennis Köhler, research unit "Licht_Raum" at the University of Applied Sciences and Arts Dortmund, D

During the last decades, a lot of municipalities commissioned planning schemes which try to address the complex setting of artificial lighting within their town. It can be observed, that these strategies are coming down either as efforts of refurbishing the public lighting or as an arbitrary placing of allegedly aesthetical illuminations of historical or modern architecture – in both cases without comprehensible criteria that were delivered by the spatial constellations and demands of light and darkness in urban spaces at night. Since lately it can also be observed, that some of these strategies (eg. Lighting Masterplans) tried to face the ecological problem of the so called "Light-Pollution". Due to a lack of operationalization and a consequent consideration of avoiding Light-Pollution in different ways (eg. no light from the bottom by illuminating buildings or switching of streetlights according to differentiated concepts), it seems that this complex topic is only included as a formal aspect of a pseudo-ecological planning practice. When it comes down to realization, aspects of expenditure and putative safety prevail – who cares about a dark sky, there are some major problems on earth.

Nevertheless, the Lighting Masterplan can contribute to reduce Light-Pollution on a city level and become a feasible tool. But it needs to be enhanced in different ways and – this is the most important point – the topic needs to become a serious business within the work of the municipality. My talk will show some questions of an urban planner who tries to push forward a feasible planning tool, some experiences in the work with administrations as well a framework of demands when trying to reduce Light-Pollution on a city level. Furthermore I will present some research that deals with Light-Pollution on a regional level.

The Control of Obtrusive Light Through a Combined Approach: Guidance as well as Law

Martin Morgan-Taylor, Leicester Univ., UK

The UK is attempting to control obtrusive light by several means, including but not limited to binding legal means. First, key planning guidance, which does come from central government, which may now deal with, and not just

mention, obtrusive light for the first time. Second, planning guidance from local authorities, written following the above guidance from central government. This may further control obtrusive light, especially in areas keen to improve their environment generally, or protect the night sky at dark sky areas, or the flora and fauna. Thirdly, through guidance from lighting or building regulatory bodies. In the UK there is now guidance from BRE, which drafts its' own non-governmental guidance, as well as the ILP (Institute of Lighting Professionals) guidance which has existed for some years now. Together the combined effect of this law and guidance, may, for the first time, offer an opportunity to effectively regulate and reduce obtrusive light in the UK.

Light Pollution Law in France

Pierre Brunet (ANPCEN), Paris, F

The current legislative process in France: a three steps process.

- The "Law" #2010-788, voted in July 2010, giving general directions, with a new [article #173](#) on "Light nuisance prevention".
- The "Decree" #2011-831, voted in July 2011, precisising the application field of the law and the general ways to act, the physical grandeurs to be regulated.
- And the "Ministerial Orders" currently under work, with the preliminary consultation with whom may be concerned: lighting industry representatives, elected representatives, ONG,... that will detail the ways to act, giving all threshold figures on the regulated grandeurs. According to the terms of the Decree, the ANPCEN is making proposals concerning the Mean Lighting Power, the spectral distribution of sources, and the ULOR.

Lighting plan and LED lighting in Osnabrück

M. Haselof, Stadtwerke Osnabrück, A. Hänel, Museum am Schölerberg, Osnabrück, D

We describe the LED test roads in Osnabrück, that were used to select the LED luminaires for future installations.

Planning Lighting 2

Villes et villages étoiles

ANPCEN, F

Light Vision of the Province West-Flanders

Friedel Pas, Preventie Lichthinder, B

The Province government of West-Flanders noticed that their urban areas are still the darkest of Flanders. They notice also that light is becoming more and more an important policy element and instrument without that there is knowledge on the subject available in the municipalities. The Province decided to work out a light vision that need to be used as the policy document for lighting in the more rural environment. That was worked out by the research bureau Omgeving and there was set up a steering committee with participants from the net management companies, municipalities, partners and also Preventie Lichthinder vzw. The light vision became to be developed for several categories of locations and based on the following basic elements per type of space: Functionality, Experience value, Energy consumption, and light pollution. It resulted in an interesting process to come to the vision. The new vision were executed will result in reductions of light pollution on most places. Currently several cities are working out there master lighting plans using also this vision and resulting in serious energy savings, and removing of serious number of lighting installations.

Simulation and Analysis of Light Trespass of Advertising Signs on the Shophouse in Taiwan

Chen-Ying Ho^{1,a}, Hsien-Te Lin^{2,b}, Kuang-Yu Huang^{3,c}

¹Department of Architecture, National Cheng Kung University, Tainan City, Taiwan

Because of the commercial prosperity at night, lighting advertising signs play an important role in outdoor lighting environment in urban areas in Taiwan. Shophouse, a traditional kind of dwelling type most commonly seen in Asian societies, consists of shops on the ground floor and residential accommodation upstairs. They are typically located alongside the street, with advertising signs installed densely on the facade of these shophouses. Therefore, to define the impact levels of the intrusive light of these advertising signs, we should not only focus on the luminance of a single sign but also discuss and analyze all of these signs comprehensively.

Vertical illuminance on facade is often used to regulate the light trespass of outdoor light source to the ambient environment. However, it is actually quite difficult to measure the vertical illuminance on facade by illuminance meter because of the height of buildings. To solve this problem, both the advertising sign luminance measurement and simulation by lighting software were thus adopted in this research to quantify the distribution of vertical

illuminance on the facade and the status of light trespass by shophouses with densely-installed advertising signs. Vertical illuminance of 3 meters high was still measured by illuminance meter to prove the simulation results are accurate. The results show that the average difference values of vertical illuminance of simulation and measurement on 20m- and 28m-street samples are 14.9% and 14.0% of measurement values, respectively. In addition, the distribution of vertical illuminance on the facade of 20m- and 28m-street samples was simulated and analyzed. Based on the simulation results and the criteria of No.150 technical report of CIE, although the luminance of almost all the advertising signs on the shophouses in Taiwan is much lower than the limit of CIE for residential area, these advertising signs still result in serious light trespass due to their large coverage area and high density distribution. For both 20m- and 28m-street samples, 100% of the facade area exceeds the limit of vertical illuminance by CIE for residential area before curfew. There are even 64% and 39% of the facade area exceeding that limit for commercial area before curfew. Generally, vertical illuminance on facade mainly comes from the advertising signs parallel to the facade across the street. However, the advertising signs perpendicular to the facade also result in considerable vertical illuminance to the adjacent area of the facade on which they are located and thus should not be installed on residential floors. In order to effectively control the light trespass, this research suggests that not only the luminance but also the coverage area, the density, and the installed position of the advertising signs be taken into consideration and further regulated.

A study of Light Trespass from Advertising Signs on building facade in Taiwan

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Residential and commercial environment are mess in Taiwan. As the times progress, advertising lighting has become the way to show one of the city's factor. Especially, the development of LED lighting was used in more publicity and effective in recent years. In order to discuss the problem of light trespass by advertising lighting in residential environment, this research selected 8 streets in 4 cities which are important commercial area in Taiwan as samples. To comprehend the light trespass issue by measuring the vertical illuminance of building facade. Survey sample in this study were 249 cases, the LED light source exposed the average luminance of the signs over traditional signs. The results showed that all streets were suffered light trespass, more than CIE illumination limit of 25 lx. Each advertising sign set up, vertical illuminance of buildings increased at least 22 lx. That is, any building set up more than two signs exceed the CIE limit on 25 lx.

At Night, over five kinds of advertising signs exceed CIE150 specification limit (5 lx), while only three types of signs meet the specifications below CIE150 residential cap (2 lx), it is proposed to be closed at night time, to reduce the surrounding environment of impact.

Finally, this study recommends a lighting design of advertising signs and planning stage should consider the problems for light trespass, especially after the night curfew. Need to control the signs lighting on the building facade with the opening of the structure, the living environment of the region to reduce the harm of light pollution. This could be the foundation for improving advertising lighting design concept and quality of urban outdoor lighting to create a comfortable environment.

Keeping the Stars in Our Eyes: A GLOBE at Night Campaign Update

Connie Walker, Globe at Night, NOAO, Tucson, USA

The emphasis in the international citizen-science, star-hunting campaign, GLOBE at Night, is in bringing awareness to the public on issues of light pollution. Light pollution threatens not only observatory sites and our "right to starlight", but can affect energy consumption, wildlife and health. GLOBE at Night has successfully reached a few 100,000 citizen-scientists. What has contributed to its success?

Foundational resources are available to facilitate the public's participation in promoting dark skies awareness. The GLOBE at Night website explains clearly the simple-to-participate-in 5 step program and offers background information and interactive games on key concepts. To promote the campaign via popular social media, GLOBE at Night created Facebook and Twitter pages. The program has been expanded to include trainings of the general public, but especially educators in schools, museums and science centers, in unique ways. Education kits for dark skies awareness have been distributed at the training workshops. The kit includes material for a light shielding demonstration, a digital Sky Quality Meter and "Dark Skies Rangers" activities. The activities, some with video tutorials, address how unshielded light wastes energy, how light pollution affects wildlife and how one can participate in a citizen-science star-hunt like GLOBE at Night.

To increase participation in the 2011 campaign, children and adults submitted their sky brightness measurements in real time with smart phones or tablets using the web application at www.globeatnight.org/webapp/. With smart phones and tablets, the location, date and time register automatically. For those without smart mobile devices, user-friendly tools on the GLOBE at Night report page were reconfigured to determine latitude and longitude more easily and accurately.

As a proto-type for taking multiple measurements, people in Tucson found it easy to adopt a street and take measurements every mile for the length of the street. The grid of measurements canvassed the town, allowing for

comparisons of light levels over time (hours, days, years) or searching for dark sky oases or light polluted areas. The increase to 2 campaigns in 2011 re-enforces these studies. In 2012, the campaign will be offered 4 times for 10 days a month: January 14-23, February 12-21, March 13-22 and April 11-20. The eventual intent is to offer the program year-round for seasonal studies. The data can also be used to compare with datasets on wildlife, health, and energy consumption. Recently, NOAO and the Arizona Game and Fish Department have started a project with GLOBE at Night data and bat telemetry to examine a dark skies corridor in Tucson where the endangered bats fly. In addition, a 2nd new Web application (www.globeatnight.org/mapapp/) allows for mapping GLOBE at Night data points within a specified distance around a city or an area of choice. The resulting maps are bookmarkable and shareable.

While providing these updates to the GLOBE at Night program, the presentation will highlight the education and outreach value of the program's resources and outcomes, lessons learned, successes and pitfalls in communicating awareness with the public and attracting young people to study science.

Touch the Cosmos: The 2011 International Earth & Sky Photo Contest

Connie Walker, Globe at Night, NOAO, Tucson, USA

Beauty, it is said, is in the eye of the beholder. When viewing a pristinely dark night sky, most people would agree as to its beauty. When people have lived most of their lives in urban locations and do not have the opportunity to view a starry night sky, pictures can be the next best substitute.

The National Optical Astronomy Observatory in partnership with The World at Night organized the Second International Earth and Sky Photo Contest on the importance of preserving dark skies for the Dark Skies Awareness theme of Global Astronomy Month in April 2011. The University of Hawaii's Institute of Astronomy provided the technical support and server for photo submissions. The World At Night (TWAN) is a program to create and exhibit a collection of stunning photographs of the world's most beautiful and historic sites against a nighttime backdrop of stars, planets and celestial events. Global Astronomy Month is an annual program coordinated by Astronomers Without Borders for the international astronomy community to share the beauty of the night sky with others and connect with other astronomy enthusiasts around the world. And Astronomers Without Borders holds international events that use the night sky as a common meeting place that has no boundaries between people.

Within the first 3 weeks of April 2011, 240 submissions to the photo contest were received from 58 photographers from over 30 countries. The style of photography showed both the Earth and the sky – combining elements of the night sky set against the Earth horizon with backdrop of a notable location or landmark. This style of photography is known as "landscape astrophotography." The contest was open to anyone of any age, anywhere around the world. Nearly 25% of the entries were from the United States. Other major contributors were Iran, Germany and China. According to the contest theme of "Dark Skies Importance," the submitted photos were judged in two categories: "Beauty of the Night Sky" and "Against the Lights." The 10 winning images are those most effective in impressing people on how important and amazing the starry sky is and/or how bad the problem of light pollution has become.

Artificial Lighting and Nature

Insects meet LEDs - A Field Study Survey

Gerhard Eisenbeis, Universität, Mainz, D

Artificial lighting is a key factor for nocturnal insects, which are attracted in huge numbers to many sorts of light sources. In the summer of 2008 the City of Düsseldorf initiated a study to evaluate the insect flight activity to street lights. We compared modern lamp types such as metal halide and LEDs to older lamp types, e.g. high pressure mercury lamps, high pressure sodium lamps and fluorescent lamps. Traps were exposed in a daily pattern and we analyzed 964 nightly samples containing 33,896 insects belonging to 13 insect orders. In comparing the flight activity we used the attraction to the high pressure mercury lamps as reference (=100%). On this basis we determined a sequence of attraction for all insect orders down to -80%. The 7 most common orders behaved very differently, e.g. the moths were attracted to minimum values in the range of -95%. In the meantime newer studies with LEDs have been known. Summarizing all the data the question finally will be: Can we recommend the LEDs as insect friendly?

Insect and public lighting

Paula Parikrupova, Jan Kondziolka, Czech astronomical society, CZ

One of the most visible effects of light pollution on nature is the negative effect on insects. Our work describes actual case of effects on local ecosystem. First I selected insects species trapped in spider nets which are close to lamps on the bridge over Olše river in Karviná. Because the methodology of collecting and its selective phenomenon I determined just representatives of may flies and midges included their maggots. This insect is

attracted into the nets by disruptive light of bad chosen lamps and then it is consumed by colony of spiders (araneae). This apparently banal relation could have huge consequences into the river ecosystem and also into its neighbourhood because these insect species are at the beginning of food chain of many other species. In the second phase of two-year project we chose new methods of picking, this time collecting of living samples with flypapers, then also with vacuum cleaner. These methods eliminate that insects could be caught in the nets during day (which was reproached work last year). Another change compared to last year is also expanding of picking from one to three places – that is why samples should be different.

Artificial Night Lighting Affects Dawn Song, Extra-Pair Siring Success, and Lay Date in Songbirds

Bart Kempenaers, Pernilla Borgström, Peter Loës, Emmi Schlicht, and Mihai Valcu, Max-Planck-Institute for Ornithology, Seewiesen, D

Associated with a continued global increase in urbanization, anthropogenic light pollution is an important problem. However, our understanding of the ecological consequences of light pollution is limited. We investigated effects of artificial night lighting on dawn song in five common forest-breeding songbirds. In four species, males near street lights started singing significantly earlier at dawn than males elsewhere in the forest, and this effect was stronger in naturally earlier-singing species. We compared reproductive behavior of blue tits breeding in edge territories with and without street lights to that of blue tits breeding in central territories over a 7 year period. Under the influence of street lights, females started egg laying on average 1.5 days earlier. Males occupying edge territories with street lights were twice as successful in obtaining extra-pair mates than their close neighbors or than males occupying central forest territories. Artificial night lighting affected both age classes but had a stronger effect on yearling males. Our findings indicate that light pollution has substantial effects on the timing of reproductive behavior and on individual mating patterns. It may have important evolutionary consequences by changing the information embedded in previously reliable quality-indicator traits.

Night-time obstruction lighting for offshore (and onshore) wind farms and birds: demands from different interest groups

Jan Blew, Bio-Consult SH, Husum, D

International and national regulations regarding ship and air safety require that wind mills have to be marked with obstruction lights during night-time. Bird migration is known to cross large waterbodies - e.g. the North Sea - during night-time; orientation of these migrating birds relies on different mechanisms from magnetic compass over polarized light to night cues like sunset and stars. The disturbances of night-migrating birds by artificial lights ranges from desorientation to exhaustion and/or collisions.

The requirements regarding ship and air safety will be described. Potential effects on night-migrating birds will be presented. After an overview on the status of the current knowledge and knowledge gaps, potential mitigation options will be discussed.

Dark Sky Parks

Light Pollution's Effect on Wildlife in Tucson, Arizona (USA)

Connie Walker, Globe at Night, NOAO, Tucson, USA

A project using night sky brightness data and bat telemetry data to do scientific research in the classroom is underway. The study looks at the effects of light pollution on the flight paths of threatened and endangered (T&E) bats between their day roosts and night foraging areas. A jump-start in getting U.S. secondary school students involved with future projects like this one will be the BioBlitz event in Tucson, Arizona, U.S.A. in October 2011. During the 24-hour event, night Sky Quality Meter (SQM) data will be taken across the Saguaro National Park West, through Tucson, Arizona, and across the Saguaro National Park East. The program had its beginning with a pair of Research Experiences for Undergraduates (REU) students and their advisor. Through the collaboration of the U.S. National Science Foundation's REU program, the U.S. National Optical Astronomy Observatory's GLOBE at Night program (www.globeatnight.org) and the Arizona Game and Fish Department (AzGFD), two REU students along with their advisor (C. Walker) used data from the GLOBE at Night project and telemetry tracking data of lesser long-nosed bats to study the effects of light pollution on the flight paths of the bats between their day roosts and night foraging areas around the city of Tucson, Arizona, USA. During the summer of 2010, the first REU student used the visual limiting magnitude data from GLOBE at Night and, with the assistance of the AzGFD, ran compositional analyses with respect to the bats' flight paths to determine whether the bats were selecting for or against flight through regions of particular night sky brightness levels. The bats selected for the regions in which the bimodal distribution of limiting sky magnitudes that suggested that the lesser long-nosed bat can tolerate a fair degree of urbanization. Three areas of systematic uncertainty were identified of which 2 could be addressed the

following summer. Due to a relatively large uncertainty in each individually measured visual limiting magnitude, Sky Quality Meter (SQM) measurements were subsequently used as a more objective source of data. In addition, the area over which the data was taken was expanded to redress spurious edge effects in making contour maps. During the summer of 2011, the second REU student took more SQM data and, with the SQM database from GLOBE at Night and the assistance of the AzGFD, performed a logistic regression analysis with respect to the bats' flight paths to determine whether the bats preferred or avoided flight through regions of particular night sky brightness levels. A preliminary analysis suggests that this federally endangered species does prefer less lit areas when flying from roost to foraging location. With the success of this prototype project, it will be used as a template for secondary school research projects on endangered animals across the U.S. affected by light pollution. We would like to propose a project with secondary school teachers to develop a program for middle school and high school students, which could begin with research on the lesser long nosed bat and then extend to research on other animals whose habits and habitats could be affected by light pollution. With the bats preferentially staying in darker areas, a next step for students and teachers could also include helping to maintain a dark corridor where the T&E lesser long nosed bats travel between roosts and foraging areas.

Qualifying Dark Sky Parks

Zoltan Kollath, Konkoly Observatory, Hungary

Dark sky places applications provide different types of measures on the quality of the night sky. Then it is hard to compare them with each other and with IDA's tier levels. Another problem is that most of the objective measurements rest on the photopic luminance of the sky, while the subjective methods rely on human night vision. We demonstrate the possible discrepancies among the different methods and recommend a minimal set of measurements that can be easily obtained.

Cold white lighting provides a well know hazard to dark sky parks.

Regulations in lighting codes should reflect these facts, as well.

Recommendations are provided based on measurements and light-pollution modelling. Finally we provide a comparison, how the topology of nature parks (continuous or mosaic like) makes different problems in developing dark sky places.

Dark Sky Parks in the UK

Martin Morgan-Taylor, Leicester Univ., UK

The UK is making progress towards adding to its' existing IDA Dark Sky destinations. Galloway Forest Park in Scotland has now been followed by Sark, in the Channel Islands (not legally part of the UK). Other parks are now following suit, being led by Exmoor, with the Orkneys, the Peak District and the Brecon Beacons all at different stages of planning. This paper will discuss this wide range of areas and the benefits which they will bestow, whilst also addressing some of the various problems which they have encountered.

Dark Sky Park in the biosphere reserve Rhön

Sabine Frank, Dark Sky Germany, Fulda, D

The idea of a dark sky park in the biosphere reserve Rhön will be presented.

Dark Sky Parks in Germany

Andreas Hänel, Dark Sky Germany, Osnabrück, D

We will report on selection, measurements and realisation of Dark Sky Parks in Germany. The regions studied are different categories of the "National Natural Landscapes": nature parks Terra.vita, and Westhavelland, biosphere reserve Rhön, national park Harz. A comparison with other European Dark Sky regions will be made.

IDA Matters

IDA Update

Bob Parks, IDA, USA

Bob Parks will discuss plans, progress and challenges at IDA. Topics include launch of the Night Sky Brightness Monitor project, International Dark Sky Places, collaboration with the US National Park Service on night sky preservation, the Model Lighting Ordinance and the NOAA study of the impact of light at night on air pollution.