

# Nite-Net

## New Report—Visibility, Environmental, and Astronomical Issues Associated with Blue-Rich White Outdoor Lighting

### Abstract

Outdoor lighting is undergoing a substantial change toward increased use of white lighting sources, accelerated most recently by developments in solid-state lighting. Though the perceived advantages of this shift (better color rendition, increased “visual effectiveness” and efficiency, decreased overall costs, better market acceptance) are commonly touted, there has been little discussion of documented or potential environmental impacts arising from the change in spectral energy distribution of such light sources as compared to the high-pressure sodium technology currently used for most area lighting. This paper summarizes atmospheric, visual, health, and environmental research into spectral effects of lighting at night. The physics describing the interaction of light with the atmosphere is long-established science and shows that the increased blue light emission from white lighting sources will increase visible sky glow and detrimental effects on astronomical research through increased scotopic sensitivity and scattering. Though other fields of study are less mature, there is nonetheless strong evidence for additional potential negative impacts. Vision science, much of it the same research being used to promote the switch to white light sources, shows that such lighting also increases the likelihood of glare and interferes with the ability of the eye to adapt to low light levels a particular concern for older people. Most of the research evidence concerning adverse effects of lighting on human health concerns circadian rhythm disruptions and breast cancer. The blue portion of the spectrum is known to interfere most strongly with the human endocrine system mediated by photoperiod, leading to reduction in the production

of melatonin, a hormone shown to suppress breast cancer growth and development. A direct connection has not yet been made to outdoor lighting, nor particularly to incidental exposure (such as through bedroom windows) or the blue component of outdoor lighting, but the potential link is clearly delineated. Concerning effects on other living species, little research has examined spectral issues; yet where spectral issues have been examined, the blue component is more commonly indicated to have particular impacts than other colors (e.g., on sea turtles and insects). Much more research is needed before firm conclusions can be drawn in many areas, but the evidence is strong enough to suggest a cautious approach and further research before a widespread change to white lighting gets underway.

*The report, in its entirety can be viewed on the IDA Web site at [http://docs.darksky.org/Reports/IDA\\_Blue-Rich\\_Light\\_White\\_Paper051710.pdf](http://docs.darksky.org/Reports/IDA_Blue-Rich_Light_White_Paper051710.pdf). This is an important work that was written in a collaborative effort amongst IDA members, the IDA Board, and dark sky supporters. The report is only 15 pages, including an extensive reference section. We encourage you to download it and distribute at your next council meeting, event or presentation.*

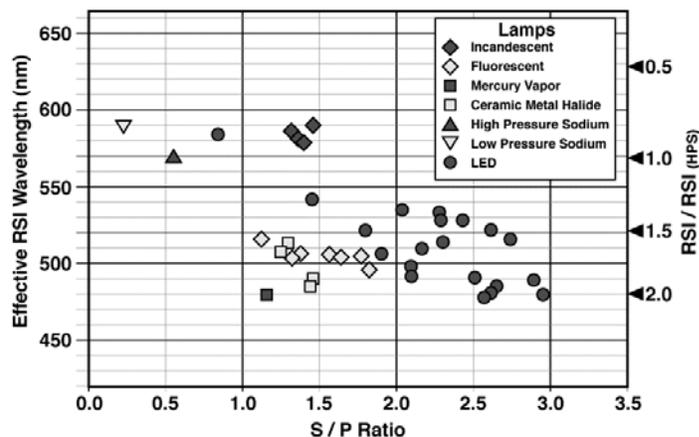


Figure 2. Rayleigh Scattering Index relative to HPS, and effective RSI wavelength for a selection of lamp types vs. their scotopic/photopic ratios S/P.

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### More AGM News!



**Correction to Door Prize Information:** Exciting News! Celestron, one of IDA's long time partners, will be donating a door prize for the AGM. They have generously committed to providing a NexStar 8SE (pictured at right) valued at \$1,199 for our members and supporters. For a detailed overview of this dynamic telescope go to <http://www.celestron.com/c3/product.php?CatID=138&ProdID=416>

*Thank you, Celestron, for your generosity!*



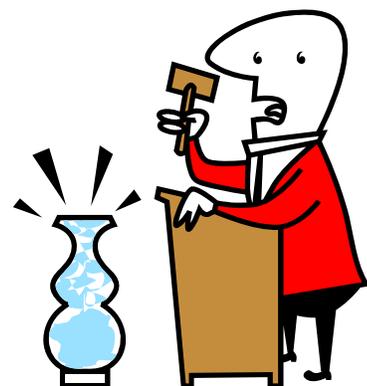
**Schedule of Speakers:** For a complete listing of events speakers and registration information go to the IDA Web site at <http://www.darksky.org/mc/page.do?sitePageId=55062&orgId=idsa>.

**Do you need a room mate?** If you are looking to keep costs down, please contact [Johanna](#) at the IDA Tucson office and we will keep a list of those attendees who would like to room with another attendee.

**Silent Auction Items:** Yes, I am in charge of the silent auction again this year. Last year we successfully raised over \$2,000 for IDA, and we hope to beat that number this year as well. Please send in any donated items to my attention to the Tucson office at 3225 N First Ave, Tucson, AZ, USA, 85719. The types of items that do well at a silent auction are:

Books, Gift Certificates (restaurants, stores, movies, coffee shops), wine, gift baskets, astronomy items (filters, software, sky viewing kit), and outdoor items (binoculars, bags, flashlights).

Art work is always welcome, however, IDA is not able to pay for shipping costs.

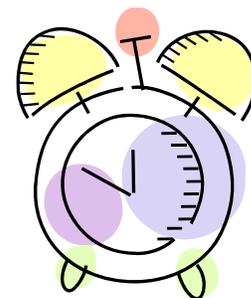


**Where to Stay:** We are pleased to announce that the Hilton East is full. Don't you love it when we're popular? The alternative site is the Hampton Inn which is approximately one mile down the street from the Hilton. The address is 251 S Wilmot and the phone number is 520-745-4665. This is a brand new hotel, completed within the year. It is within walking distance of four restaurants and there is a shopping mall across the street. The room rate is only \$72/night. A shuttle service will be provided in the morning and afternoon to the Hilton.

## The Potential of Outdoor Lighting for Stimulating the Human Circadian System

A report, by the Lighting Research Center, studying melatonin suppression at four different wavelengths shows a slight melatonin suppression for one hour of exposure to a 6,900K LED source. While this data does not suggest a correlation between realistic outdoor lighting levels and compromised health, the report acknowledges the significance of the light-dark cycle for regulation geological functions and expresses surprise that "so little has been done to quantify light and dark in industrialized societies as they might affect the human circadian system, 'asserting that'

continued investigations of light-induced disruption of the human circadian system are clearly warranted." Please read the entire report on the IDA web site at <http://docs.darksky.org/Reports/ASSIST-TechnicalPaper-OutdoorLightingCircadianAnalysis.pdf>



## Sections Event Calendar

Please send events, presentations, awards, dates of council hearings, or trade shows to Nite-Net

### June 2010

Sun	Mon	Tue	Wed	Thu	Fri	Sat
		1 Early ALCon Registration Rate of \$60 ends today.	2	3	4	5 World Environment Day
6	7 IDA Dark Sky Giveaway Ends.	8	9	10	11	12
13	14	15	16	17	18	19
20	21 First Day of Summer	22	23 European Sign Summit, Munich Germany	24 IDA Offices Closed Today and Tomorrow for ALCon Expo	25-27 ALCon Expo 2010 IDA AGM, Tucson AZ	26 ALCon Expo
27 IDA AGM, Tucson AZ	28 IDA Offices Closed	29	30 Meteor Day			

### July 2010

Sun	Mon	Tue	Wed	Thu	Fri	Sat
				1 European Youth Perspective Conference on Biodiversity, Beel,	2	3
4 U.S. Independence Day	5 IDA Offices Closed for Independence Day	6	7	8	9 -11 InterSoles 3 Eclipse Conference, Buenos Aries, Argentina	10
11	12	13	14 Bastille Day, France	15	16	17
18	19	20 Neil Armstrong walks on the moon, 1969	21	22	23	24
25	26	27	28	29 NASA's anniversary	30	31



### Important Reading

Draft Resolution from the Council of Europe Parliament concerning noise and light pollution: <http://assembly.coe.int/Main.asp?link=/Documents/WorkingDocs/Doc10/EDOC12179.htm>

**The IDA FSA logo gets around.** View this certification information Web site: <http://inhabitat.com/2010/04/06/demystifying-eco-labels/electrical-products/>

**A win against light pollution:** <http://www.yorkshirepost.co.uk/localnews/Christian-centre-withdraws-plans.6274076.jp>

**Light pollution is a quality of life issue:** [http://www.suburbanchicagonews.com/genevasun/news/2235054.3 | ELO5\\_Q2SKY\\_SI-100505.article](http://www.suburbanchicagonews.com/genevasun/news/2235054.3 | ELO5_Q2SKY_SI-100505.article)

**Dark sky work in Nepal:** <http://campaignagainstlightpollution.blogspot.com/2010/05/gam2010-expedition-dark-sky-movement-in.html>

**One Day Seminar in Nepal:** <http://campaignagainstlightpollution.blogspot.com/2010/05/one-day-seminar-at-hindu-vidya-peeth.html>

**Cherry Springs Park in the news:** <http://www.buffalonews.com/2010/05/16/1051945/a-dark-park-where-you-can-party.html>

**Review of new book from Dr. Tyler Nordgren, PhD.** "Stars Above, Earth Below:" <http://www.physorg.com/wire-news/3502854/searching-for-dark-skies-stars-above-earth-below.html>

**IDA in the news:** <http://media.www.nicsentinel.com/media/storage/paper1128/news/2010/05/10/Opinion/City-Lights.Shine.Too.Bright-3918565.shtml>

**New outdoor lighting ordinance is passed in Lloyd Harbor, NY.** Thank you Susan Harder. <http://huntington.patch.com/articles/lloyd-harbor-embraces-the-dark>

### IDA Arkansas gets a victory.

Because of their work "North Little Rock ended 15 months of debate, and approved legislation that would restrict electronic signs, with changeable messages to designated districts." For a fee, the article is at: <http://www.arkansasonline.com/news/2010/may/25/new-limit-signs-approved-nlr-20100525/>

**Wales is debating light pollution:** <http://www.welshicons.org.uk/news/politics/ramsay-wag-has-the-chance-to-act-on-light-pollution/>

### Mission Statement:

To preserve and protect the nighttime environment and our heritage of dark skies, through environmentally responsible outdoor lighting.

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## Dark Sky Vacation Sites

With summer vacations in the northern hemisphere coming up, we have recently been asked about dark sky places to visit. Below are some Web sites to visit that might help you decide the best place to see a natural night sky. The photo below was taken at Bryce Canyon National Park, Tropic, UT, USA. We at IDA wish you a safe and happy summer traveling season. You are always welcome to share your photos with us of your perfect natural night sky.

Best Places to see the night sky: <http://haha.nu/science/best-places-to-see-the-night-sky/>

U.S. National Parks Traveler: <http://www.nationalparkstraveler.com/2010/05/its-darker-big-bend-national-park-thanks-light-reduction-project-chisos-basin5855>

The Zselic Starry Sky Park, Hungary: [http://www.astro-zselic.hu/zselic\\_en.html](http://www.astro-zselic.hu/zselic_en.html)

Scotland's Galloway Park: <http://scotlandssecretsouth.blogspot.com/2010/05/bright-future-for-dark-park.html>

IDA Dark Sky Finder Here: <http://www.darksky.org/mc/page.do?sitePageId=71681&orgId=idsa>

To access this site you will need the Firefox browser.



Bryce Canyon—This image was taken on a full moon night when rangers take groups on a hike into the canyon by moonlight. On their return to the canyon rim there are telescopes set up for viewing. Many of the National Parks now have astronomy talks and observing programs at night.

James G. Hill; Rainwater Observatory & Planetarium

## Bat Studies

There was a recent article about the spread of a 100% fatal plague to bats, called white nose syndrome, which has now been detected west of the Mississippi. It is believed that the disease has affected 6 of the 45 bat species in the U.S. You can read the entire CNN.com article at <http://news.blogs.cnn.com/2010/05/12/group-warns-of-mysterious-bat-plague-sweeping-country/?iref=allsearch>

In addition to this disturbing information, it needs to be noted that there are three studies available about the effects of light pollution on bat populations. Two are available on the Chapters page of the IDA Web site <http://www.darksky.org/mc/page.do?sitePageId=56418&orgId=idsa>

The first study, title *Bats and Lighting in the U.K.* was sponsored by the Bat Conservation Trust. This report gives a basic analysis of how outdoor lighting affects bats, their habits and recommendations about mitigating those affects.

IDA has recently received a new study on the affects of light pollution on bats. This study was sponsored by the Arizona Game & Fish Department and is titled, *Urban Movement Patterns of Lesser Long-nosed Bats...* This is an endangered species of bat in the Southwestern United States and Game & Fish are looking into ways to increase their population in the area. According to the research, the bats did not fly in a straight line from their day roosts to their night foraging areas. Instead they chose routes that

had lower levels of light intensity. The report states, "...proposed developments...should curtail light pollution in identified flight corridors and foraging areas."

This is a similar conclusion from a bat study presented by Emma Stone at the 9th Annual Symposium on the Protection of the Night Sky in 2009. Ms. Stone's work stated, "Artificial lighting schemes can damage bat foraging habitat directly, through loss of land and fragmentation or indirectly by severing commuting routes from roosts." You can read more about this study at <http://www.lightpollution2009.eu/>.

This is very timely research that is being done and I hope you all have time to read up on this information. Bats are a benefit to human populations because they keep insect populations under control, and they are night time pollinators. Growing human development into wildlife areas is increasing and being prepared with this information can only be beneficial to your work to reduce light pollution.



## Science Fair, Ontario Canada

by Mark Coady, Director Light Pollution Abatement, RASC

On May 17th the Royal Astronomical Society of Canada (RASC) and the Peterborough Astronomical Association, both IDA organizational members, were represented at the Canada Wide Science Fair at Trent University in Peterborough, Ontario. John Crossen of Buckhorn Observatory, RASC Kingston Centre, and the PAA ran six sessions with our portable Star Lab Planetarium while I ran six sessions of safe solar viewing. We also had light pollution abatement (LPA) displays on view and

handed out our LPA brochure. I also had the opportunity to talk to the six groups about the need for light pollution abatement. As there were several optional seminars that attendees could sign up for, we were limited to about 75 people which worked to about one eighth of the total group. Well, it was a start and, for some, it was their first exposure to the fight to reclaim our night skies.



Student using a safety filtered telescope to view the sun.

Students in front of the Star Lab Planetarium Dome.

**News from IDA North Georgia** by Jim Reeves, IDA North Georgia

Several months ago a new Dollar General store opened nearby, and the lighting made it look like the Mother ship from Close Encounters! *For those of you outside the United States, Dollar General is a discount retail chain that sells everything in the store for \$1.*

I contacted their corporate headquarters as President of Dark Sky North Georgia, and got a decent response, and some changes were made, but they fell short of what I envisioned. I kept after them for months, and they ultimately took off many of the fixtures, changed bulbs, and added timers so the place is almost completely DARK after midnight. I also wrote a letter to the editor for two regional papers, and the *Northeast Georgian* did a follow up story of their own, praising Dollar General's actions in correcting the problems.

I also offered to award a certificate to that particular Dollar General

store in recognition of their efforts, with the hope of additional positive media coverage for them and our group. They haven't taken me up on that yet.

But here's the kicker! The lady at DG corporate had their construction engineer contact me for guidance on what types of lights to use going forward, and modifications are being made to problem areas on over 4600 of their stores nationwide!! I think that's pretty huge.

*Great work Jim, and thank you for sharing this terrific success story. Below are before and after pictures of the store near Jim's house. What a dramatic difference!*

Before



After

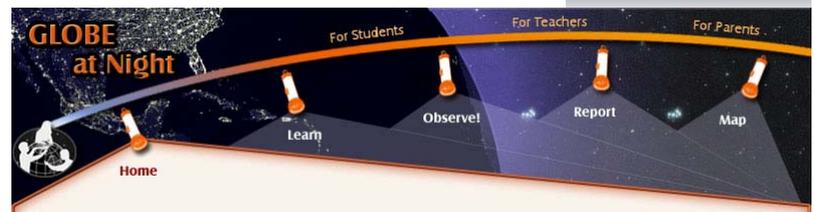


## GLOBE at Night Results

Copied from their Web site at [www.globeatnight.org](http://www.globeatnight.org)

GLOBE at Night is an annual citizen-science campaign that encourages people all over the world to record the brightness of their night sky. For two weeks every March, when the Moon is not out during the early evening and the constellation of Orion can be seen by everyone everywhere, children and adults match the appearance of Orion with 7 star maps of progressively fainter stars found on the website, [www.globeatnight.org](http://www.globeatnight.org). They then submit their measurements (e.g., which star map they chose) on-line with their date, time and location.

This year the GLOBE at Night 2010 campaign (which took place March 3-16) set a record high of over 17,800 measurements from people in 86 countries. The dots (or points) on the resulting world map represent the contributed measurements of night sky brightness: the lighter colored the dot, the brighter the sky and the darker the dot, the darker the sky. The lightest colored dot (e.g., "Limiting Magnitude 1") represents a night sky you might see from a very large city. Then, only a handful of stars are visible across the whole sky. The darkest dot (e.g., "Limiting Magnitude 7") represents a night sky you would see from a national park where no city lights are visible. Then there would be so many stars across the sky



(14,000!) that it would be hard to distinguish one constellation from another.

In the United States, 49 out of 50 states plus the District of Columbia contributed more than 10,900 measurements. The top three states were Arizona (over 1800), Michigan (over 1200) and West Virginia (over 1000). Puerto Rico had over 1,000 measurements; Poland over 800; Romania and Chile each over 600; the Czech Republic over 400; Argentina over 300; Hungary close to 300; Canada, the United Kingdom and South Korea just over 200; and China just under 200.

Thanks to everyone who participated! Through GLOBE at Night, students — alongside teachers, parents and community members — are amassing a data set from which they can explore the nature of light pollution locally and across the globe.

## IDA Certification Programs

There was a recent article in the Sunday, May 16, 2010 issue of *Parade* magazine. Page six carried a story title, "Can 'Energy Star' Ratings Be Trusted?" This article goes on to explain that, "fifteen fake products received federal certification," from the Energy Star program. Sometimes stories like this have a way of painting a broad brush across other certification programs. Specifically, the IDA's Fixture Seal of Approval (FSA) and the International Dark Sky Places (IDSP) program. We would like to assure all of our Chapter Leaders that our certification process is valid, stringent and reliable.



place at the IDA headquarters.

Each FSA application is reviewed by our technical staff, Pete Strasser and Matt Root. Any lighting for commercial use must submit the photometric

One of the recommendations that will be instituted to improve the Energy Star process is that, "each application will be reviewed individually by an EPA staff member." This is a wonderful idea and let me assure you, this is the process already in

information of the fixture. Each subsequent device submitted for certification from a previously certified manufacturer is also reviewed before being certified.

When the IDSP program receives an application, that application is reviewed by each member of a committee who can make comments and suggestions for the dark sky applicant to improve their night sky. This is a very involved, very tough process. Why? Because IDA wants this certification to be a respected honor. Many of our certified sites receive national and international media attention. It is important that the process is above reproach.

Energy Star is undergoing some needed reforms and we applaud their efforts. It is a good program and IDA supports its work. As Chapter Leaders on our team, we want to assure you that you can be proud to promote FSA and IDSP programs whenever you speak or attend events.

