YEAR(S) OF DARK SKIES

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Abstract: The *Year(s) of Dark Skies* workshop introduces the 2009 International Year of Astronomy (IYA2009) and U.S. programs that will address the theme "Dark Skies are a Universal Resource." Several in-dome demonstrations illustrate glare, light trespass, and sky glow while allowing learners both to discover the dark sky issues and to propose action to minimize the impact of outdoor lighting. Workshop participants will simulate the Globe at Night program, a Cornerstone Project of the worldwide IYA2009 effort, and will get insight on using Sky Quality Meters available for free to successful applicants. Supporting material is at www.nightwise.org.

While the 2009 International Year of Astronomy (IYA2009) will showcase both the historical and the modern aspects of astronomy, the prevalence of light pollution challenges the future of human interaction with the night sky. The *Year(s) of Dark Skies* workshop offers ideas and tools to inspire audiences to challenge the quiet threat to our world's nighttime heritage. With the rest of the world gradually awakening to the issues, planetarium leaders are well-positioned to guide the public into informed action.

The goal of the U.S. node for IYA2009 is "to offer an engaging astronomy experience to every person in the country, and build new partnerships to sustain public interest." Supporting the goal are several themes, including "Dark Skies are a Universal Resource." Borrowing from the language of the other themes, the Dark Skies Working Group proposes to:

> Address lighting issues at "star parties, observatory open houses, binocular experiences…"
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> Advocate dark skies "in Arts, Entertainment & Storytelling—documentaries, TV specials, public events, lectures, Native American traditions…"
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> Generate light pollution "research experience for Students, Teachers, and Citizen-Scientists..."
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> Highlight lighting issues "through New Technology programs at science centers and planetaria, blogging, podcasting, social networking…"
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> Generate new ideas and activities to highlight Dark Sky issues, including "public health and economic issues…"

The *Year(s) of Dark Skies* workshop introduces the proposed U.S. plans and solicits feedback from participants. The "Dark Skies are a Universal Resource" working group, chaired by Connie Walker of the National Observational Astronomy Observatory (NOAO), is planning observing opportunities, podcasts, a planetarium component, star counts, educational resources, and other events related to dark skies.

The workshop features demonstrations and hands-on activities in small and portable planetariums that support a proposed planetarium program. For example, with the starfield aglow, put a couple of Maglites® in "candle mode" (in which the bare bulbs are exposed) to simulate acorn lights along a roadway. Set up a figurine or doll under the flashlight's dark shadow, and place a toy car nearby. Put another doll on a toy bed to simulate the effect of light trespass from the Maglites® into a bedroom.

In a discussion with the participants, acknowledge the need for nighttime lighting and how technology serves the public. Yet get the students to observe and to think critically about the impact of our lighting. What are the observed side effects of our technology? Lead them to note the in-dome impact of the simulated streetlights and to identify three unwanted consequences—glare in the audience's (and car driver's) eyes, light trespass into the sleeping doll's space, and sky glow on the portable dome.

Ask the audience whether these three shortcomings should be challenged, and if so, what simple action would rectify the problem. Eventually guide them to place their hands, and later the small PVC pipe caps, over the bare lights to simulate fully shielded fixtures. What do they observe as the result of their action?

In a second demonstration, open the book *There Once Was a Sky Full of Stars* to a nighttime street scene. Hold a Maglite® in "candle mode" against the page so it aligns with an illustrated

streetlight. Note several ways the light impacts the nightscape on the book itself. Then shield the bare light and compare. Under a dome of stars, simply read aloud this fine children's book about light pollution.

In a third demonstration, while acknowledging the improved nighttime environment from better lighting, show the vast environmental gain from not turning on an outdoor light in the first place. If the group leader permits it, use 100 individual pieces (*e.g.*, candy M&Ms®) to represent the amount of energy extracted from Earth. Subtract losses along the energy chain to demonstrate how the light pollution represents a small fraction of the total energy lost. Sky glow is the tip of an iceberg of waste.

With the audience, discuss other upsides of improved outdoor lighting, including energy and money savings, benefit to animal habitats, and lessening of greenhouse gas emissions. Introduce the participants to new aspects of light pollution, such as the reduction of melatonin production in humans, that are under investigation. Challenge misconceptions, such as "more light necessarily means better security," with concrete counterarguments and provided visual examples.

If we are to make inroads into lessening sky glow, we have to motivate the public through *their* nighttime experiences, not ours. At the workshop, planetarians also simulate in-dome the Globe at Night international star count. After learning how to find Orion, students will count the number of stars visible within that constellation. They match their observations with a selection of magnitude-limited star charts and send their respective limiting magnitude to the online global database. Later they can compare their local sky conditions and population with global counterparts.

A digital version of Globe at Night correlates the observed limiting magnitude to a numeric value obtained from an instrument that quantifies sky glow. Students will use Sky Quality Meters (SQMs) to determine the sky's brightness in magnitudes per square arcsecond and compare that number with what they see with the naked eye. In a discussion with planetarium visitors, compare local SQM readings with requisite lighting levels for other activities, such as doing brain surgery or walking in a theater without tripping.

The multinational IYA2009 effort will include Globe at Night as one of the IYA2009 Cornerstone Projects. At the workshop, attendees will get tips on how to apply for free SQMs to conduct Globe at Night observations in their communities.

The world media will soon be highlighting varied aspects of astronomy, including the modern scourge of poor outdoor lighting. Many people, especially youths and urban residents, are not even aware of the starry grandeur they are missing. Fortunately, a groundswell of dark sky advocacy is rising. Being a community that observes and quantifies sky conditions, astronomers have been on the forefront of the campaign to advocate responsible outdoor lighting. I invite you to energize your small dome by enabling your visitors to prioritize their night sky and outdoor lighting decisions. Year(s) of Dark Skies is (are) coming soon.

If you would like to contact me with advice or ideas related to the Dark Skies Working Group, I truly welcome your input and suggestions. The U.S. IYA website, to which astronomy educators can add content, is at www.astronomy2009.us. May IYA2009 be the beginning of many years of dark skies.

Links

http://www.astronomy2009.org
IYA2009 home page.

http://www.astronomy2009.us
IYA2009 United States node home page.

http://www.nightwise.org
Nightwise lighting issues from Chuck Bueter.

http://www.shopatsky.com/index.asp?PageAction=VIEWPROD&ProdID=1161
There Once Was a Sky Full of Stars; by Bob Crelin, illustrated by Amie Ziner; ISBN: 1-931559-37-6; Sky Publishing Corp., Cambridge, MA; 2003.

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Dark Skies Are a Universal Resource