

Episode 48: LightBrite

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Travis: Welcome to Slacker Astronomy; a podcast about astronomy and just about anything else that floats over our heads.

Pamela: Every week or so we bring you a news event from the world of astronomy, and when there is nothing new to report, we'll continue shutting off all the extra lights everyone keeps leaving on.

Travis: The bathroom light, the kitchen light, the closet light, the garage light, the light over the back entrance, [STARTING TO FADE AWAY] the light over the front entrance, the light in the server room, the light in the other server room, the light in the library, (continue adlibbing)

Pamela: Leaving lights on does a lot of bad things. First of all, lights consume energy, which in most cases means using up fossil fuels or nuclear fuels, or damming up water, which can have negative environmental impacts, or building giant wind mills, which if placed in the wrong place means dead birds.

Travis: [FADING BACK IN] ...the light in the study from the butler with the candlestick [FADING BACK OUT], the light in the fishtank, (continue adlibbing)

Pamela: Second, leaving lights on messes up the mind. We're all born pre-programmed to be awake when it's light and asleep when it's dark. When we leave lights on it screws up our bodies – increasing fatigue and stress and decreasing sex drive and melatonin production.

Travis: [FADING BACK IN] ... turning off the light in the oven, the light on lover's leap, the light in the bedroom, the lights in the parking lot, [FADING BACK OUT] the big lot, the empty lot, (continue adlibbing)

Pamela: Light pollution also screws up the behavior of animals, including baby sea turtles who can't find the sea, moths that just can't navigate at all, and migrating birds who die crashing into tall buildings ...

Travis: [FADING BACK IN] ... turning off Aaron's office light, turning off Arne's office light, turning off Katy's office light, turning off Matt's office light, turning off my head lights.

Pamela: Um Travis, you might need you head lights to drive home. While light pollution's bad, some exceptions need to be made.

Travis: But I can see perfectly well without my headlights with all Boston's light pollution.

Pamela: Yeah, but other drivers can't see you, and if you die who's going to co-host this show with me?

Aaron: [From the back ground] ME ME ME – I CAN co-host. Really! Let me co-host!

Pamela & Travis: Never gonna happen, Aaron!

Aaron: But...

Travis: (Home boy – voice) Nope – not gonna happen. You ‘da dictator. Me ‘da pretty boy with ‘da lights on and everybody home inside.

Pamela: The lights may be on, but if more than one person is in your head, I’m a bit afraid.

Travis: (announcer voice) Could one personality produce such a diversity of voices? Of course there is more than one person in here.

Pamela: Um . . . Aaron we may need you later after all.

Aaron: (in back ground) Ha you see what did to Travis – I’m not going near that thing!

Travis: (normal voice) Relax Aaron you’re not needed. I have all the voices under control. Aaron, really... YOU’RE NOT GONNA CO-HOST. (baby voice) My mics. Mine. All mine mine mine MINE.

<pause>

Pamela: Travis, no one’s going to take your mic. Come on and sit down and just read the script. Think you can do that, co-host of mine?

Travis: [bratty teenager voice] As long as you don’t threaten to let him co-host again, I guess I can do it.

Pamela: Okay, that’s a good boy.

Pamela: ... Now, returning to light pollution... Light pollution also makes life hard for astronomers. Anyone with a laptop knows that their screens can be really hard to read when you’re sitting outside in the sun, but they can also be annoyingly bright if you’re trying to surf the web in bed next to someone trying to sleep.

Travis: Unless you are fussing with your laptops settings, the screen’s luminosity is the same when you are in bed and when you are outside. What has changed is the amount of background light the photons from your computer have to compete with.

Pamela: The luminosity of a candle in a dark, windowless room is easy to appreciate when it’s photons are the only things hitting your eye, but those same photons can seem meaningless when the candle sits next to a million candle bright spot light, and it’s photons suddenly make up only 1/1,000,000th of the light you see.

Travis: When astronomers are trying to figure out where to build new observatories they have to consider a lot of different factors, but two of the most important factors are typical cloud cover and amount of light pollution. Only from dark sites can they make out the photons from really faint objects.

Pamela: But when amateur astronomers, school kids, and the general public want to look at the sky, they don’t generally have the luxury of being able spend big bucks to be able to observe from dark, clear sites away from man and above or away from the clouds.

Travis: So, everyday schmucks like me step out into their driveways and look up when they hear there is a neat object in the sky like a visual magnitude comet...

Aaron: (From Background) Hey Travis, you hear about the naked-eye comet Pojmansky?

Travis: [Homer voice] Oooo, naked eye comet..... Be right back, gotta run to the driveway <foot steps away – foot steps return Wait a second... Pojmanski is a MORNING object. You just wanted my mic. Give that back.

<sounds of fight – maybe old batman movie?>

Travis: <slightly out of breath> So where were we?

Pamela: Um, well, we're still on page three, now about 4 inches down.

Travis: Got it. So, everyday schmucks like me have to step out into their driveways and look up when they hear there is a neat object in the sky like a visual magnitude comet or a particularly cool occultation, like will happen April 1 when the crescent moon passes through the Pleiades.

Pamela: And since most cities have really bad light pollution, most everyday schmucks like Travis really can't enjoy the night sky, and more sadly, their kids don't have the chance to look up and get addicted to studying the stars.

Travis: Instead of comets moving through the sky, kids see airplanes, grand opening spotlights, and raspberry colored clouds, which inspires them . . . well, if it inspires them... No, I just don't see how that can be inspiring.

Pamela: So, light pollution in addition to everything else it does, robs our kids from a chance to be captivated by one of the best free shows in town: The stars, planets and other neat stuff that Pokka dots the night sky.

Travis: But just how bad is light pollution when you move from big cities like Boston to little cities like Huron, South Dakota? Can those kids still see comets?

Pamela: I don't know, but a current study being done by kids around the United States may be able to answer that question.

Travis: Hmmm, so this editorial rant against light pollution actually has a news story buried in it doesn't it?

Pamela: Yes it does. During the first week of spring, March 22-29, students from more than 17,000 schools in 109 countries will look up and then write down what they can see.

Travis: Students are being asked to go out and look at Orion and compare what they see to an adjustable online image of Orion that allows them to vary the amount of computer simulated light pollution until their computer screen matches the sky.

Pamela: Once they have their observations, they can report them through an easy to use webform.

Travis: Got a kid? Well take them out, look up, and then get on the web. The URL is <http://www.globe.gov/GaN/>

Pamela: And while this project is geared at getting kids outside with their family looking at the stars, there is no reason those of you without kids can't play along from home as well.

Travis: So got out and look up for yourself. All you have to do is go to w w w dot globe dot

gov slash capital G lower case A capital N

Pamela: The data from this experiment is going to be used to map the human perspective of light pollution around the globe. We have the space perspective, thanks to NASA's satellite observations of the Earth...

Travis: Which you can see in our album art ...

Pamela: Now, we will also be able to have the Earth perspective, thanks to human observation of Space.

Travis: And while you're outside looking up also look around at the lights you can see. 30% of all outdoor lighting in the US is directed skyward where it really doesn't do a lot to help with safety, but it does do a lot to raise electricity bills. What do the lights in your area look like?

Pamela: If you are illuminating the sky -- instead of some area that needs illuminated for safety reasons -- you are wasting money. That 30% of skyward directed lights wastes at least \$1.5 billion dollars a year. Imagine if that money was available for education, road improvements, and health care?

Travis: Organizations like the International Dark-Sky Association provide lots of great information on how you can get involved in getting lights directed downward and shut off when they just aren't needed. Check out their website at www.darksky.org.

Pamela: Hey, Travis wanna go see how bad the light pollution is from the driveway?

Travis: Sure! Aaron, you coming?

Aaron: Nah, it's cold and I think I'm fighting a cold. Go ahead with out me.

<pause – sounds of leaving>

Aaron:

In 2001 scientists looked at high-resolution Mars Global Surveyor images and thought they saw familiar looking gullies and ravines on Mars. On Earth, running water from intense rainstorms can create similar looking ravines on desert hillsides or canyon walls.

So we have these things that look like Earth gullies on Mars. According to the 2001 press, perhaps that means liquid water flowed in the past and intense rain fell from the Martian sky. The story is something we all want to believe - scientists like it because it's a neat discovery that gets them promotions and grants, and justifies future missions. The press likes it because it makes great front page news – remember this story is from before 9-11 and before the world was going collectively mad. The public likes the story too, because the Universe looks a tad less lonely and barren than before.

But, all because a story makes us feel warm and fuzzy doesn't mean it's true. Last week the University of Arizona issued a press release challenging the linkage between the Martian gullies and past liquid surface water on Mars. Their evidence was simple. They looked at our Moon and found the exact-same-formations-there: Gullies, on the Moon. The moon is a place with lava seas, but clearly without liquid

water and rainstorms. According to the press release, micrometeorites hitting the walls of large craters can also explain the gullies. The impact creates a small avalanche that carves out the formation. This explanation works for both the moon and mars, because, guess what, gullies in Mars are found in, you guessed it, craters just like the Moon's.

So, now the world is a bit less warm and fuzzy, and we have two theories to explain gullies on mars.

According to Occam's Razor: when you have two competing theories with equal evidence, it's always best to go with the simpler theory.

Occam's Razor gets thrown about a lot these days, but people often leave out the fact that Occam's Razor is not meant to reveal the truth. - it simply helps determine the most likely truth – which in this case may mean gullies on Mars are made by micrometeors.

So has liquid water ever existed on the surface on Mars? We simply don't know, but we have some excellent new experiments heading to Mars, and the Mars Reconnaissance Orbiter is beginning to send back ultra-high resolution test images as I record. As bright shiny new results come out of these projects check them out with a sense of wonder and awe, but also remember these are all tiny steps in a very long journey. And sometimes, our analysis of results may make us step backwards or sideways as we do-se-do toward scientific truth.

<applause, whooting>

Travis: Is that great story why you wanted to steal the mic?

Pamela: Nicely done, Aaron, you should do micro monologues like this more often

Aaron: You liked it?

Pamela: Yeah, but that's not really what mattered. I wonder if the listeners would like it?

Travis: Well, it looks like it's all recorded, so let's put it in the show and see what sort of listener feed back we get. Hey you listeners, if you liked what you here, let us know.

Pamela: And if you didn't like it, well, I guess we want to know that too.

Aaron: But no matter how you felt, thanks for listening: This has been Slacker Astronomy, a three person collaboration for you, for fun, for the voices in our heads.