

## **Packerland Chapter of the American Meteorological Society**

Approximately sixty members and guests were welcomed to the University of Wisconsin-Green Bay by Dr. Steve Meyer, Chapter President and UW-GB Earth Science Professor. Peg Zenko, Chapter Treasurer, who has known our speaker for several years, had the honor of introducing Duane Clausen, our speaker for the evening.

### **Featured Speaker – Duane Clausen, Award Winning Nature Photographer**

Duane Clausen is an award winning nature photographer who has gained international recognition with his photographs. He is especially known for stunning Northern Lights (Aurora Borealis) and other night time phenomena. The majority of Mr. Clausen's work has been captured in and around his hometown of Menominee, Michigan and nearby counties in Northeast Wisconsin.

Mr. Clausen's photos and articles have been featured in notable media outlets such as *The New York Times*, *Astronomy Magazine*, *Photographers Edge*, *Traveler Magazine*, *Earth Science Picture of the Day* (<http://epod.usra.edu/>), *science.NASA.com*, *SpaceWeather.com*, *Astronomy Picture of the Day* (<http://antwrp.gsfc.nasa.gov/apod/>) and *The Weather Channel's "Photo of the Week"*. He has been a repeat guest on Wisconsin Public Radio and won many awards.

### **Northern Lights**

Delightful and inspiring, Northern Lights are also an interesting scientific phenomena. What causes these beautiful displays? What about the different colors, shapes and movement? As he moved us through breathtaking displays of green, red, and pale yellow lights, Mr. Clausen provided entertaining, and effective explanations of the science behind the beauty.

### ***What Causes of Northern Lights?***

Northern Lights are caused by charged particles from the sun which energize oxygen and nitrogen particles in our upper atmosphere. But how does it happen?

We're all quite familiar with the weather here on earth, since we experience it every day. And just as the earth has an atmosphere and a magnetic field surrounding it, so does the sun. So it should come as no surprise then, that the sun also has its own changing weather.

Solar winds, traveling at millions of miles per hour, constantly bombard the earth. These winds are made up of magnetic energy and hot, electrically charged gases, called plasma. Fortunately, the earth's magnetic field acts as an umbrella, deflecting much of this energy and keeping us safe.

Storms in the sun's atmosphere (solar flares) and weak spots in the sun's magnetic field (coronal tears) send huge bursts of solar winds at us. These burst of solar winds energize particles in our atmosphere and release light, which we know as “northern lights” or aurora borealis.

By the way, the same solar winds cause “southern lights” or aurora australis; from now on, we'll refer to them as “aurora”. Interestingly, Jupiter, Saturn, Ganymede (one of Jupiter's moons) also have magnetic fields and aurora of their own.

## ***Why the Different Colors?***

As energized particles collide with oxygen and nitrogen in Earth's atmosphere, some of the energy is released as light. Nitrogen atoms release red, blue or violet light. Oxygen atoms produce either yellow-green or red light.

Most northern lights displays are dominated by green or yellow for two reasons: our eyes are not as good at detecting blue, and red lights require a longer period of stimulation without being bombarded by another ion before it returns to its previous state. In upper layers of the atmosphere, there are fewer oxygen atoms, but they require a longer burst of solar wind to produce the more rare red colors. There is much discussion, but little consensus about sound in.

## ***Viewing and Photography Tips***

The sun has an 11 year cycle of minimum to maximum activity. Solar maximum is when the most sunspots and solar flares occur, while minimum is the least. Aurora watchers like solar maximum, but it can cause problems for communication satellites and astronauts. The Kp index is used to measure the relative strength of the magnetic solar winds received on earth. Some of the more impressive storms can exceed a Kp of 9.

The closer you are to either *magnetic* pole, the more likely you are to see aurora. This is similar to a bar magnet placed under a piece of glass with iron filings on top. More filings are drawn toward the top of the bar, where the magnetic pull is stronger.

Because of the long distance from the sun to earth, we can detect solar activity before it reaches earth and be ready for times when northern lights are more common. In fact you can sign up for e-mail notices that conditions are good at Duane's website, <http://www.northernexposures.net/>.

The two most common problems with observing or photographing aurora are clouds and light pollution. Once you know the Kp index for your latitude is promising, check the sky for clouds, then head to the outside of town, where the light pollution is not between you and the aurora.

To help present an idea of the scale of the display, try to include a tree or building in the foreground. Experiment with different exposure times. Remember, our eyes aren't always accurate in our perception of color. On a very dark night, the camera may pick up colors we don't see. In some of his photos, Duane used lights on the ground to give a more "natural to the eye" look.

All during this explanation, Duane showed one amazing photo after another. To really appreciate this presentation, you need to go to his website, <http://www.northernexposures.net/>, or do an Internet search. Of course, you still won't have learned how cows relate to aurora, but to get that, you'll have to attend one of Duane's lectures in person. Duane ended with a thank you to his employer, UP Special Delivery who has been flexible in allowing him time for his hobby (as in coming to Green Bay for this meeting).

Next Meeting: **February 15, 2007 - 7:00 pm -- "Nuclear Power"**

Becky Deuel, Senior Training Instructor, Point Beach Nuclear Plant

Location: **UW-Green Bay** - Univ. Union, Phoenix Room A

Join us for dinner at 5:30 before the talk at Luigi's Italian Bistro, 2733 Manitowoc Rd

Respectfully submitted,

Brian Hulse, Secretary, Packerland Chapter of the American Meteorological Society