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# Aurorae of October-November 2001 and Mercury-Venus conjunction

ROBERT B SLOBINS

## Aurora of 28 October 2001

The images shown here are two out of thirteen of the aurora borealis as viewed from a site north of Fort Wayne, IN in DeKalb County. I began the photography at 08:50 UTC and finished at 11:05 UTC, when twilight was interfering with a diminishing display.

The aurora consisted of a background of wide red rays in front of thinner green-yellow rays. The green rays, when mixed with the red, became orange, gold and yellow. There was no motion within the aurora; the rays came and went in place. The aurora covered no more than 45 degrees altitude. As the sun rose on the aurora, some of the rays became whiter, as sunlight on red aurorae adds blue.

One can see in the wide-angle images the shadow of the earth; what is still in shadow is red and what is outside the shadow is blue or magenta, because of the blue. Yellow rays on the bottom become white on top.

Fig. 1: Aurora of 28 October 2001.



The aurora covered about 70 degrees of azimuth centered on north. It took about 45 minutes for a major feature within the aurora to cross from northwest to northeast.

Activity occurred from 08:50 to 09:45 UTC, with the peak at 09:02 UTC. Another surge lasted from 09:55 UTC to 10:25 UTC. After 10:45 UTC, the aurora faded.

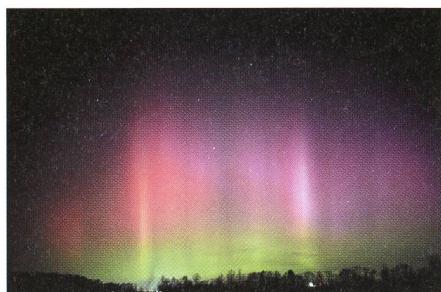


Fig. 2: Aurora of 28 October 2001.

## Aurora of 6 November 2001

The images shown on the following page are two out of eighteen of the aurora borealis as viewed from a site north of Fort Wayne, IN in DeKalb County. I began the photography at 03:00 UTC and finished at 07:20 UTC, when the display diminished because the interplanetary magnetic field started to point northward.

At 16:19 UTC on 4 November 2001, I observed a very large solar flare with my H-alpha filter setup in Active Region 9684. This X. 1 flare covered much of this region and persisted for over an hour and twenty minutes. Using web sites [www.spaceweather.com](http://www.spaceweather.com) and [www.spaceweather.com](http://www.spaceweather.com). I was able to follow the resulting coronal mass ejection (CME).

The material from this CME arrived at 01:50 UTC on 6 November. At 03:00, I walked out from my apartment in Fort Wayne, IN, to see a bright red ray across the zenith and two well-defined strong rayed arcs – curtains – centered on the north and up to 30 degrees altitude. These features were bright enough to be visible from the bright lights of the apartment complex. By the time my wife and I arrived at our site north of the DeKalb-Allen County Line, it was 03:20 UTC and 75% of the sky was covered with either auroral features or an auroral glow. The glow just about merged with the lights of Fort Wayne; it ended about 40 degrees above the southern horizon.

From 03:00-03:50, the main feature was a double-rayed arc, one with base at 10, other with base 25 degrees above the horizon. Most of the red color was visible at ends of the arc. The arcs extended 140-180 degrees azimuth. Peaks of activity occurred at 03:40 and 04:25 with



Fig. 3: Aurora of 6 November 2001.

coronal displays in Pegasus and at the zenith, respectively. This display subsided 04:55 to a rather bright homogenous arc with the base at 15, and the top at 40 degrees altitude until the aurora reacti-

vated at 06:35. At 06:40, the arc started producing bright red rays at 300-320 degrees azimuth to 70 degrees altitude. Some rays may have reached the zenith, but lunar interference prevented my being sure about that. This display concluded 07:25.

This aurora reminded me of the 9 November 1991 display in sky coverage. However, as for the displays, this was a brighter version of the 28 October 2001 display in that the forms were simpler than in 1991 and I detected no motion within rays or other features. However, I noticed that most ray systems or disturbances slowly moved eastward along the arc base to cover the 120-140 degrees of azimuth in about 45 minutes. Tonight, there were two groups of rays that moved westward from 060-020 azimuth between 03:40 and 04:20, taking about 10-15 minutes to cover that distance.

The moon was a nuisance. It reflected enough sunlight into the aurora to change the color; any blue color added to the scene is due to the sunlight hitting the high-level nitrogen red above 250 km from the earth's surface. During the

maximum show from 03:00-05:00, there was an auroral haze that obscured the fine features and made the gross features of the aurora rather indistinct. After a quieter period from 04:55-06:35, the features of the following substorm were easier to see.

*All images of the aurora were made with a Canon F-1 body and Fuji NPS film, ISO 160, processed normally. Exposures range from 8 to 25 seconds.*

Fig. 4: Aurora of 6 November 2001.

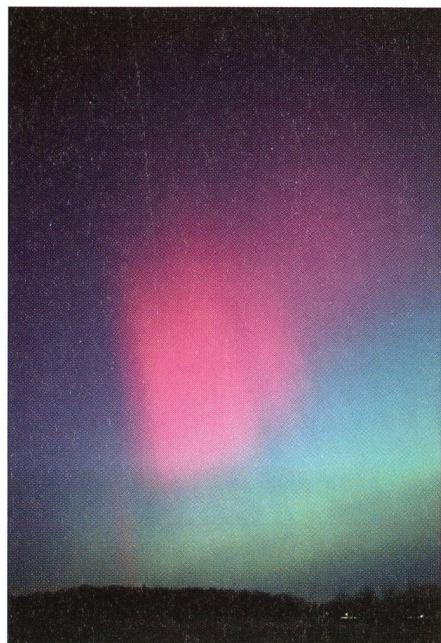


Fig. 5: Mercury and Venus in conjunction.



### Mercury-Venus Conjunction 7 November 2001

It is rare to see Mercury so bright and in a relatively dark sky. During the 28 October aurora, I was wondering what that bright object was next to Venus. I thought it was Spica at first, but the position and color of the object indicated that it was not that star, and I could account for the other naked-eye planets. Yes, it was Mercury – the first time I have photographed it since the total solar eclipse of 26 February 1998.

I used a Nikon F-2 body and a Nikon 105/2.5 lens at f/4.0. Exposures were about 4 seconds on Fuji NPS film, ISO 160.

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