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Aurora 29 October 2003

ROBERT B. SLOBINS

This aurora was the result of the first of the great X-class flares from solar Active Region 10486, which was the most active and largest sunspot of this current cycle. This particular one was of class X17.2, which ranked #2 since 1976 at the time. The coronal mass ejection (CME) took about twenty hours to reach Earth.

I was following the progress of the CME on the Internet using the SWIM program written by the Solar Terrestrial

Dispatch team headed by Cary Oler (www.spacew.com). With this setup, I was able to catch the arrival of the CME at the ACE spacecraft at 0600 UTC. This indicates that the CME would reach the earth an hour later.

Finally, as the diagrams indicated a rising auroral intensity, I decided to drive to my dark (relative to Fort Wayne, IN) northern sky site in LaOtto.

I was extremely lucky. Northern Indiana is a place to leave to see sky

shows, unless one is exclusively devoted to meteorology or loves clouds, especially at this time of the year. The interplanetary magnetic field (IMF) pointed south long enough and there was a clear band at the right time that afforded me a view of the entire event. At 0930, cloudiness was returning as the IMF pointed north and turned off the lights.

This was a very intensely bright aurora, with little internal activity. The first part, from 0802-0822 showed some very fast motion within the patches. The main show from 0832-0932 consisted of what was essentially a great disturbance or feature within this band moving at the same rate across the northern sky like a fast-moving line of thunderstorms. This disturbance passed north of my location with the closest approach of its southern edge over Lansing, MI.

A rough estimate shows that this disturbance or wave in the band was visible to me as it passed over Moose Jaw, Saskatchewan. This wave continued on a line over International Falls, MN, Mackinac, MI, and Toronto, ON before fading out over Ithaca, NY. I estimate that this feature moved at a speed of 2000-2400 km/hour. Locations within 300 km of this centre line should have seen the aurora cover the sky. For me, the aurora appeared like the entrance to a golden cathedral as the green rays and the red background combined to produce that colour.

The observations and photographs are documented below.

0749: Enroute to site, I noticed a green arc up to 10° altitude. Two minutes later, upon arrival, I confirmed this. The arc went from 345-045° azimuth.

0802: Arc brightened and increased to 15° altitude.

0810: A double rayed arc: rays to 25° altitude and patchy rays above that. The motions within the rays were quite fast and upward-waves.

0812-0822: The double rayed arc developed into a band the first at 8°, second at 20° altitude from 300-045° azimuth. These were patchy rays with fast upward wave-like pulsations that extended to 30° altitude.

0822-0832: Quiet time: arc 10° altitude.

0832: Arc intensified very quickly; very intense green, 5° thick from 7-12° altitude, 330-030° azimuth.



Fig. 1: 0906 UTC; Film: Fuji NPZ (ISO 800); Canon F1, Canon 24/1.4L @ f/1.4, 20 seconds.

Fig. 2: 0854 UTC; Film: Fuji NPZ (ISO 800); Nikon F-2, Tamron 17/3.5 @ f/3.5, 20-30 seconds.

0837: Arc started to illuminate the ground.

0842: Arc became a band as kinks appeared on the bottom. Rays developed from this arc, from 10-20° altitude and from 320-040° azimuth; some rapid wave motion upward within rays to 25-35°. To the west, red colour developed: red rays at 315° azimuth, 40° altitude and occasional brilliant yellow rays within the red started to show. This entire structure, which extended from 300-320° azimuth with a base of about 5° altitude was moving eastward.

0857: Rayed band (curtains? – I still don't perceive them as curtains!) at 360° azimuth; base at 15° altitude and rays extended to zenith. Rays were a combination of reds, greens and various mixtures. Width of band: 30°. Width of rays: between 1 and 5°. This entire structure was moving quite fast, indeed just about as fast as a squall line.

0912: Ray structure moved across Big Dipper and to 060° azimuth.

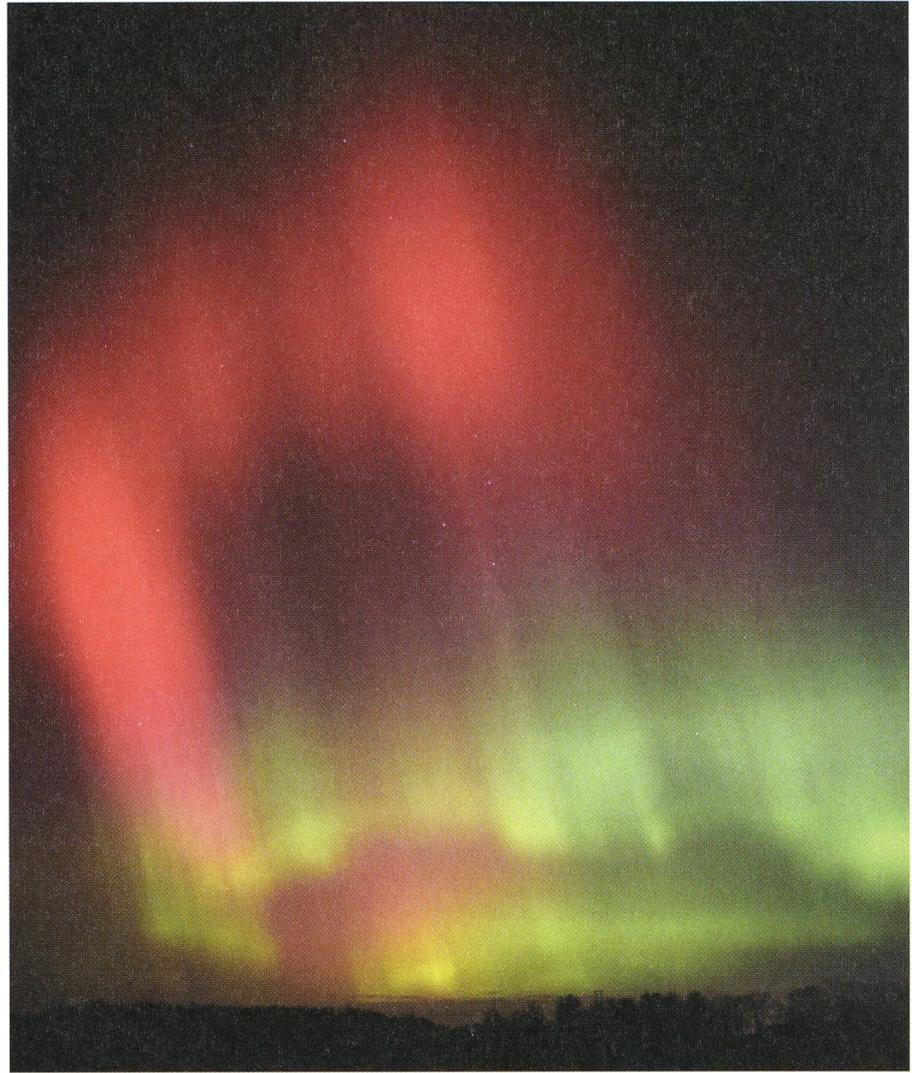
0922: Structure gone: it took 40 minutes to cross the sky from 300-070. Rayed band still persisted but was now greatly diminished.

0925: Altocumulus was arriving to cover the sky, but show is over.

0930: Rayed band was a dull arc growing very weak when sky became overcast.

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Phototak

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