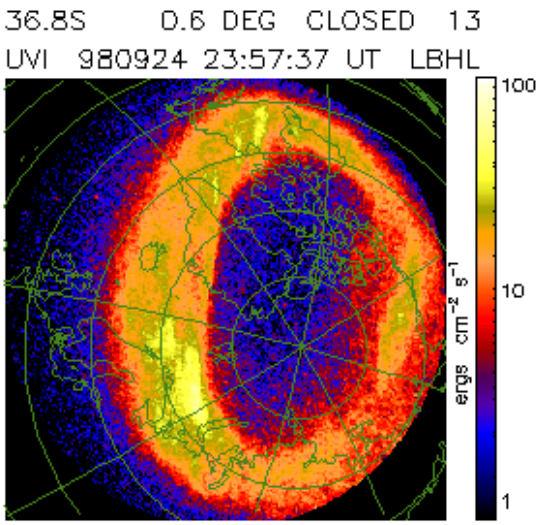
Where can one observe the auroras ?

By V. Pierrard

The polar light auroral activity appears in oval shaped regions, centred round the two geomagnetic poles; we call them the auroral ovals.



The illustration alongside shows an auroral oval observed by the UV1-instrument on board of the Polar-satellite (source NASA Marshall Space Flight Centre).

The magnetic field lines in a polar light oval, as well as at lower latitudes, are closed. Because of that, the auroras in the northern hemisphere (aurora borealis) and those in the southern hemisphere (aurora australis) are each other's mirror image (combined auroras). The thickness of a polar light oval is to be situated mostly in the order of 10 degrees of latitude.

In the northern hemisphere, the auroral oval is generally situated above Alaska, Canada and Scandinavia. In the southern hemisphere the polar light oval mostly lies above Antarctica.

Sometimes, during enormous magnetic storms, the auroral oval stretches out to lower degrees of latitude. During periods of strong solar activity, the tail of the magnetosphere can get disturbed and send out major streams in the upper layers of the atmosphere. In Northern Europe and North America intensive auroras are then observed. During magnetic storms this spectacle can be very impressive. Auroras at lower latitudes are rare, and form only during very strong magnetic perturbations.

Auroras are sometimes visible at Belgium's latitude. Unfortunately, light pollution from cities and our poor climate hinder observation of these phenomena. Among the auroras observed in Belgium, during maximal solar activity, we can name the following: (Roth, Ciel et Terre, 105, 31-37, 1989):

- 15th August 1947: beams, jets and bundles of white, blue and red light,
- 8th August 1948: lighting bands and triangular spots.
- 20th November 1948: reddish bows and bands,
- 21st January 1957: red, white, green and pink wisps and curtains,
- 29th September 1957: glittering pink red, white and blue wisps, arcs and beams
- 13th March 1989: red, whitish bands and spots.

Auroral phenomena called "aligned arcs" occur in polar areas at higher latitudes than the polar light ovals. They consist of lighting bands that cross the polar areas from the direction of noon to the direction of midnight.

The polar light that occurs during the day are caused by the solar wind. Auroras occurring at night are related to the dynamics in the tail of the magnetosphere.