WINDOWS TO THE UNIVERSE

SUN - EARTH DAY

FLIP BOOK SERIES

"Spectacular Auroral Oval"

Image Credit: The Far Ultraviolet Imaging (FUV) system on the IMAGE spacecraft, courtesy of S. Mende and H. Frey, Space Sciences Lab, Univ of CA, Berkeley; Randy Gladstone, Southwest Research Institute

Flip Book

14 July 2000

What Are the Auroral Ovals?

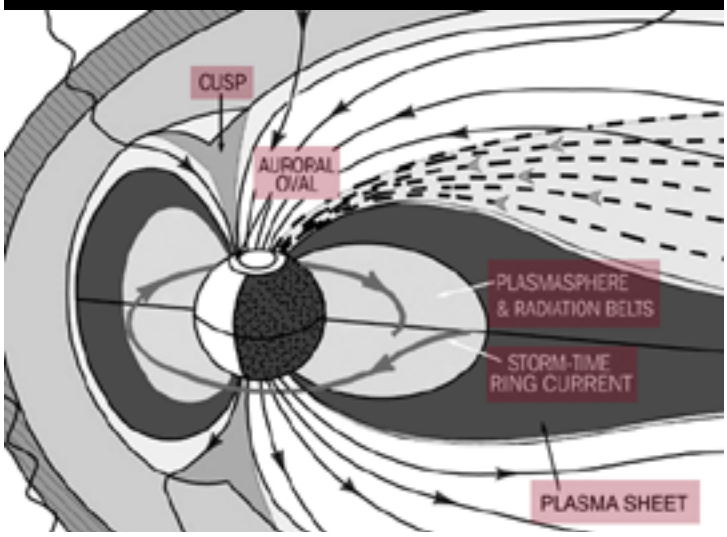


Figure courtesy of the IMAGE satellite team.

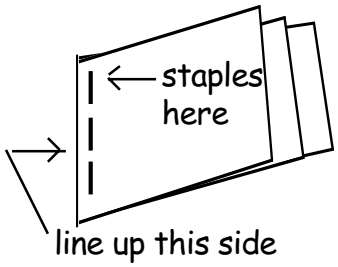
Above is a schematic of the Earth surrounded by its magnetosphere.. The lines depict magnetic field lines. The dark gray region depicts the Earth's plasma sheet, a reservoir of relatively dense plasma cutting through the center of the magnetic tail. The magnetic field lines of the plasma sheet map down onto the atmosphere in two ovals encircling the magnetic poles. In active times, electrons from the plasma sheet strike the atmosphere producing auroral lights in an oval pattern in much the same manner as images are formed on a TV screen. This oval of light can clearly be seen in the flip book. When the electrons smash into the atmosphere, they slow down, exciting the atmospheric particles and causing them to glow. When viewed from a spacecraft orbiting around the Earth, the whole auroral oval is visible. Currents in these ovals can reach a million amperes. Dissipated electric power can reach 10 times the annual US electrical power consumption .

14 July 2000 Auroral Storm

The images that make up this flip book were taken by the FUV instrument on the IMAGE spacecraft as it circled the Earth during a recent space weather superstorm on 15-16 July 2000. They show the auroral oval brighten and expand to lower latitudes, then slowly dissipate. This auroral display occurred during a G5 magnetic storm -- the most severe on the rating scale. During the storm, the aurora engulfed most of the continental United States. Unfortunately, this happened before nightfall so the aurora were not visible to US observors. By dusk, the aurora had receeded to far northern latitudes. Satellites in near-Earth space were engulfed in a cloud of high energy protons, corrupting satelliteimages of the sun, scientific measure-ments, and GOES 8/10 and 11 meteorological satellite images. The auroral currents induced significant ground currents which produced voltage swings in transformers on electric power grids in New York, Maine, Wisconsin and Virginia.

Assembly Instructions

Print the following 3 pages. It works best if you can use stiff paper but standard printer paper is fine. Cut out each of the pages for the flip book along the solid line. All of the pages will be slightly different lengths. This makes it easier to flip through the book when it is finished. Arrange them in order according to the number printed in the upper left corner of each image. Line up all the pages by the edge that has a broken line marking the staples. Staple the left edge along the boken line. Your flip book is ready.



Auroral Oval Flip Book

Spectacular Northern Lights of 14 July 2000

Image Credit: The Far Ultraviolet Imaging (FUV) system on the IMAGE spacecraft, courtesy of S. Mende and H. Frey, Univ of CA, Berkeley; Randy Gladstone, Southwest Research Institute

Developed in partnership with: WINDOWS TO THE UNIVERSE

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Flip Book Facts

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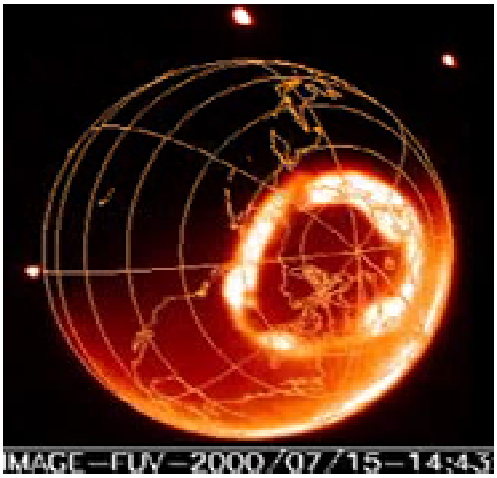

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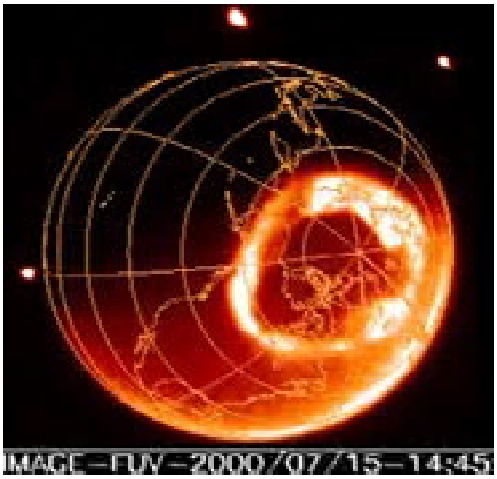

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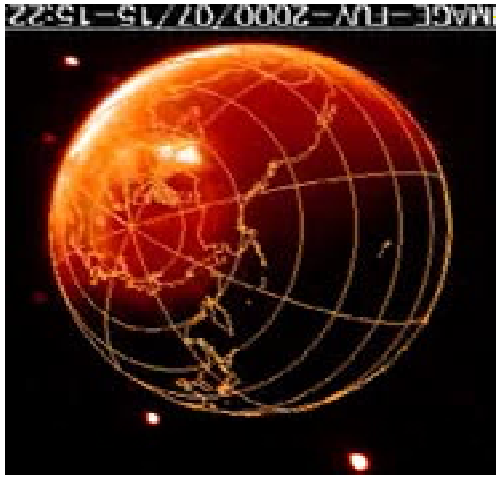

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