The Electric Storm of November 1882

Electricity and the use of electricity for power and communication was still a relatively new technology in the late nineteenth century, so when strange things started happening on November 17, 1882 no one knew quite what to make of it. A few number of scientists had noticed the growing sunspot during the previous month, but at the time it had not yet been established that sun spots and solar flares were connected to magnetic disturbances on Earth and thus to the strange behavior of the newly-installed electric power and communication lines.

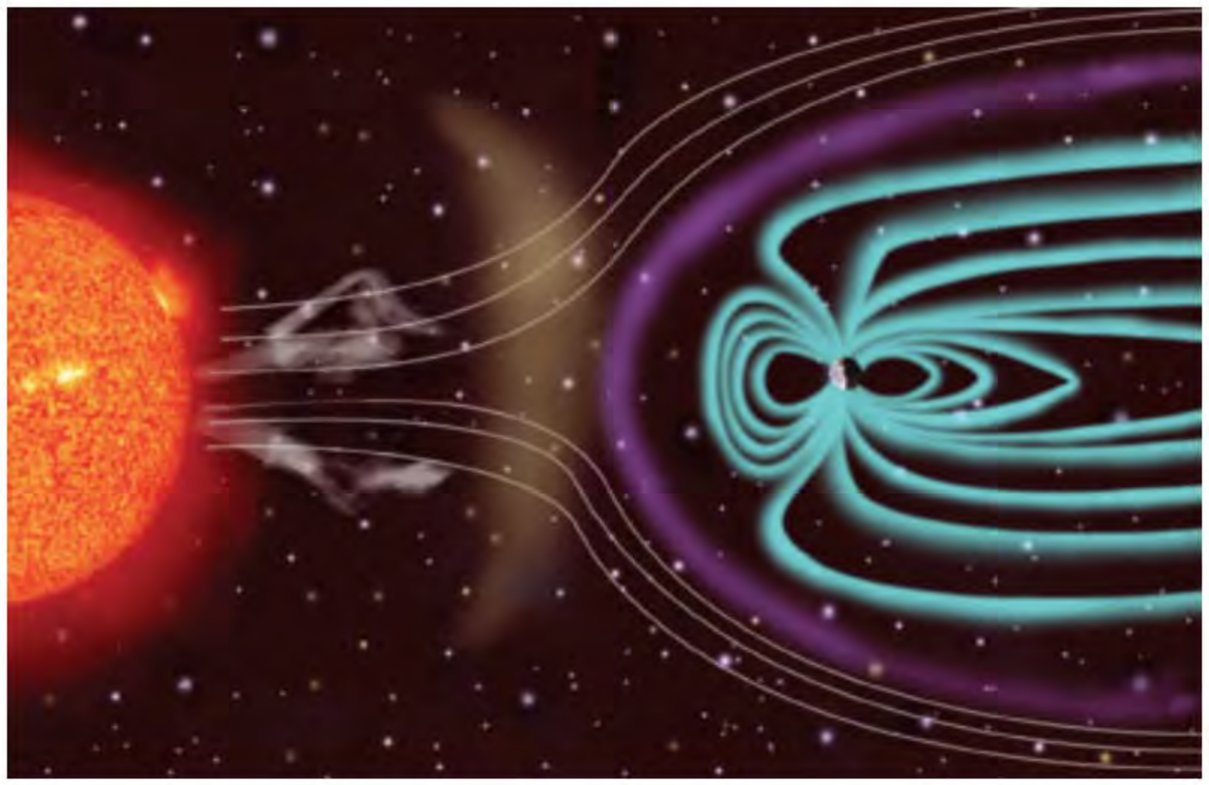
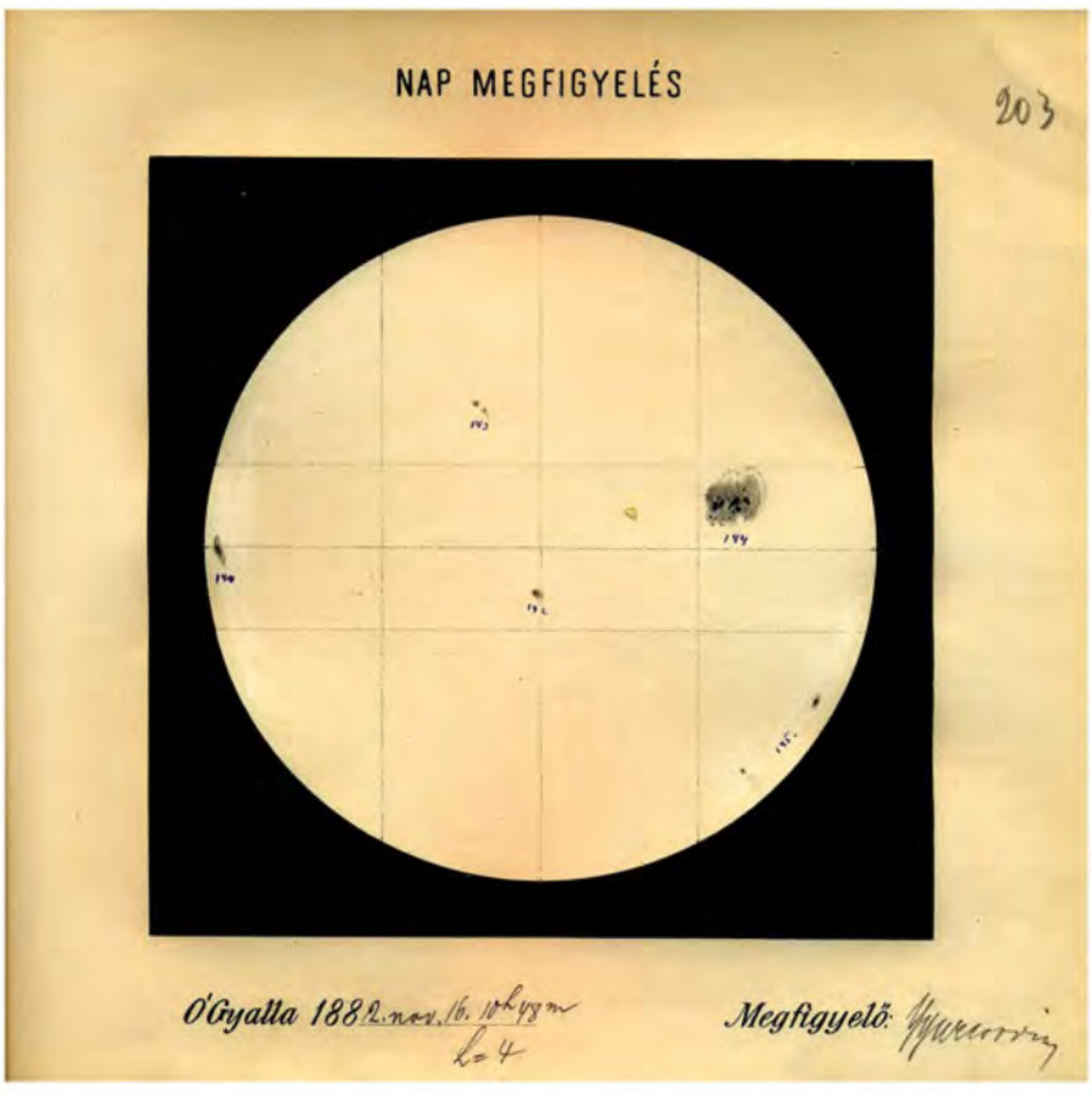


Image showing solar wind interfering with Earth's magnetic field.

The following day, newspapers reported people hearing a "buzzing, ringing noise" in the telephone lines, telegraph lines not working, a Western Union office that "ignited half a dozen times", and even "melted" telegraph equipment. Spectacular aurora were visible over many night-times skies. Even without Twitter or Instagram, stories about the odd events of the day quickly spread around the globe.



Drawing of the Sun for 16 November 1882 from the Ógyalla Observatory in Hungary (Baranyi et al., 2016)

Some scientists believed that aurora and magnetic storms were somehow connected, but no one knew exactly what the connection was. We now know that they are caused by the interaction of the Earth with the sun. The Earth's magnetic field is generated deep down in the Earth's metallic core. This field imparts a force to the magnetized needles of compasses. The sun also has a magnetic field, one generated in its chaotic interior. The magnetic influence of the sun comes to the earth by way of an electrically conducting solar wind.

Normally, this wind is something of a light breeze, but sunspots and solar flares can cause strong gusts of solar wind. These bursts of energy interact with the earth's magnetic field and can cause magnetic storms that interfere with electrical systems on the Earth, including power-lines and telephone and telegraph systems. Magnetic storms can also disturb simple compasses. We know about the November 1882 storm from historical accounts, and also from data recorded at a magnetic observatory that had just been installed in Los Angeles.

Disturbances such as the November 1882 magnetic storm have occasionally occurred since then. Today, the U.S. Geological Survey monitors the Earth's magnetic field using a network of 14 magnetic observatories that are situated across the United States and Territories. Data from these observatories enable scientists to understand magnetic storms and the hazard they represent for the operation of modern technological systems. Intense magnetic storms can disrupt radio signals, GPS systems used for navigation (think planes and boats), and power grids, sometimes causing wide-spread power outages. Monitoring the sun and the earth's geomagnetic signals allows us to prepare for potential disruptions and prevent potential disasters in the future.

- written by Lisa Wald

A photograph of the Kew-pattern magnetograph system in place in the Los Angeles observatory. Note that the lid on the recording box has been removed, showing the recording cylinder inside. (Courtesy of NOAA archive)

For More Information

- Introduction to Geomagnetism
- Love, J. J. (2018). The electric storm of November 1882. Space Weather, 16, 37–46.

The Scientist Behind the Science

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