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Geomagnetic Storms May Kick Off the New Millennium

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As though there weren't enough uncertainty about what's going to happen with Y2K, yet another possible problem could occur on that historic transition in time - a geomagnetic storm.

While it is geomagnetic storms that give rise to the beautiful Northern lights, they can also pose a serious threat for commercial and military satellite operators, power companies, astronauts, and they can even shorten the life of oil pipelines in Alaska by increasing pipeline corrosion.

Geomagnetism is the study of the Earth's magnetic field. The field can undergo large and rapid fluctuations due to the interaction of charged particles ejected by the Sun that collide with the geomagnetic field. These disturbances are known as "geomagnetic storms," and can cause power blackouts, disruptions in communications, satellite failures, and other hazardous effects. These solar ejections, traveling at more than a million miles an hour, are associated with sunspots, whose number increase and decrease over an 11-year cycle. The number of geomagnetic storms therefore increases and decreases in concert with that cycle. The next peak in sunspot activity is expected to occur in early 2000 - perhaps just in time for the arrival of the New Year.

The last great magnetic storm occurred exactly 11 years ago this coming March 13 at 3 a.m. EST. That storm caused the collapse of the Hydro-Quebec power system in Canada, leaving about 6 million people without power. If the storm had struck a few hours later than it did, the blackout would likely have been much worse because of the heavier power consumption during daytime hours.

Magnetic storms are not rare, but great storms like this are.

"During the sunspot maximum we are going through now, smaller storms can occur rather frequently - even several times a week. Though it is unlikely that a really large storm will hit just as the New Year arrives, it could happen, and if it does, the results might complicate the situation with Y2K," said Don Herzog, a geophysicist with the U.S. Geological Survey (USGS).

If a magnetic storm does strike during the transition into the new millennium, the USGS is prepared to continue the supply of geomagnetic data to its customers.

The USGS operates a network of 13 magnetic observatories that continuously monitor the Earth's magnetic field. The USGS provides this valuable geomagnetic data to a wide variety of users and organizations that can be affected by a geomagnetic storm. The data are collected in near-real time via satellite to a downlink center located in Golden, Colo. They are then sent to the U.S. Air Force (USAF) Space Command Center for use in their operational models that characterize the near-space environment surrounding the Earth, and to NOAA's Space Environment Center for distribution to their extensive customer list.

The geomagnetic data are also shared with agencies comparable to the USGS in other countries including Canada, Japan, France, Brazil, the United Kingdom, and others as part of an international organization called INTERMAGNET. The data are made available to the worldwide community via the World Wide Web (http://geomag.usgs.gov) and by e-mail request.

In addition to providing data to its customers, the USGS also produces models of the Earth's magnetic field that are used in a host of applications, including GPS receivers, military and civilian navigational systems, and in research for studies of the effects of geomagnetic storms on the ionosphere, atmosphere, and near-space environment.

As the nation's largest water, earth and biological science and civilian mapping agency, the USGS works in cooperation with more than 2000 organizations across the country to provide reliable, impartial scientific information to resource managers, planners and other customers. This information is gathered in every state by USGS scientists to minimize the loss of life and property from natural disasters, to contribute to the conservation and the sound economic and physical development of the nation's natural resources, and to enhance the quality of life by monitoring water, biological, energy, and mineral resources.

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