Mind-Altering Television

Produced for PBS
by the WGBH
Science Unit

125 Western Avenue
Boston, MA 02134

617.300.2000

www.pbs.org/nova

Major Funding is provided by

PARK FOUNDATION

Sprint.

Microsoft

Additional funding is provided by the Corporation for Public Broadcasting and public television viewers.

IS EARTH'S PROTECTIVE MAGNETIC FIELD DISAPPEARING? OR IS NORTH JUST HEADING SOUTH?

NOVA PRESENTS *MAGNETIC STORM*
Tuesday, November 18, 2003, at 8PM ET on PBS
www.pbs.org/nova/magnetic

Like the plot of a sci-fi B movie, something weird is happening deep underground where the constant spin of Earth's liquid metallic core generates an invisible magnetic force field that shields our planet from harmful radiation in space. Gradually, the field is growing weaker. Could we be heading for a demagnetized doomsday that will leave us defenseless against the lethal effects of solar wind and cosmic rays? NOVA goes to the heart of what ails Earth, on *Magnetic Storm*, airing Tuesday, November 18, 2003, at 8PM ET on PBS (check local listings).

Scientists studying the problem are looking everywhere from Mars, which suffered a magnetic crisis four billion years ago and has been devoid of a magnetic field, an appreciable atmosphere, and possibly life ever since to a laboratory at the University of Maryland, where a team headed by physicist Dan Lathrop has re-created the molten iron dynamo at Earth's core by using 240 pounds of highly explosive molten sodium.

The most visible signs of Earth's magnetic field are auroras, which are caused by charged particles from space interacting with the atmosphere as they flow into the north and south magnetic poles.

But the warning signs of a declining field are subtler—though they are evident in every clay dish that was ever fired. During high-temperature baking, iron minerals in clay record the exact state of Earth's magnetic field at that precise moment. By examining pots from prehistory to modern times, geologist John Shaw of the University of Liverpool in England has discovered just how dramatically the field has changed.

"When we plot the results from the ceramics," he notes, "we see a rapid fall, as we come toward the present day. The rate of change is higher over the last three hundred years than it has been for any time in the past five thousand years. It's going from a strong field down to a weak field, and it's doing so very quickly."

At the present rate, Earth's magnetic field could be gone within a few centuries, exposing the planet to the relentless blast of charged particles from space with unpredictable consequences for the atmosphere and life.

An even older record of Earth's fluctuating field shows a more complicated picture. Ancient lava flows from the Hawaiian Islands reveal both the strength of the field when the lava cooled *and* its orientation—the direction of magnetic north and south.

"When we go back about seven hundred thousand years," says geologist Mike Fuller of the University of Hawaii, "we find an incredible phenomenon. Suddenly the rocks are magnetized backwards. Instead of them being magnetized to the north like today's field, they are magnetized to the south."

more

Such a reversal of polarity seems to happen every two hundred thousand years on average, making us long overdue for another swap between the north and south magnetic poles. Scientist Gary Glatzmaier of Los Alamos National Laboratory has actually observed such reversals, as they occur in computer simulations. These virtual events show striking similarities to the current behavior of Earth's magnetic field and suggest we are about to experience another reversal, though it will take centuries to unfold.

Some researchers believe we are already in the transition phase, with growing areas of magnetic anomaly—where field lines are moving the wrong way—signaling an ever weaker and chaotic state for our protective shield.

Geophysicist Rob Coe of the University of California at Santa Cruz may have even found a lava record in Oregon that charts the magnetic mayhem that ensues during a period of reversal. The picture that emerges may not be up to Hollywood disaster standards, but considering that human civilization has never had to cope with such a situation before, it could be an interesting and challenging time.

July 2003

Press contacts

Jonathan S. Renes
NOVA, WGBH Boston
617-300-4427
jonathan_renes@wgbh.org

Diane Buxton
NOVA, WGBH Boston
617-300-4274
diane_buxton@wgbh.org

Photography contact

Tom Stebbins
NOVA, WGBH Boston
617-300-5335
tom_stebbins@wgbh.org

Now in its thirtieth year of broadcasting, NOVA is produced for PBS by the WGBH Science Unit. The director of the WGBH Science Unit and executive producer of NOVA is Paula S. Apsell. NOVA is closed captioned for deaf and hard-of-hearing viewers, and described for people who are blind or visually impaired by the Media Access Group at WGBH. The descriptive narration is available on the SAP channel of stereo TVs and VCRs. Major funding for NOVA is provided by the Park Foundation, Sprint, and Microsoft. Additional funding is provided by the Corporation for Public Broadcasting and public television viewers.

WGBH Boston is America's preeminent public broadcasting producer, the source of one-third of PBS's primetime lineup and companion online content as well as many public radio favorites. WGBH is a pioneer in educational multimedia (including the Web, broadband, and interactive television) and in technologies and services that make media accessible for people with disabilities. WGBH has been recognized with hundreds of honors: Emmys, Peabodys, duPont-Columbia Awards . . . even two Oscars. In 2002 WGBH was honored with a special institutional Peabody Award for fifty years of excellence. For more information visit www.wgbh.org.