NATURE | NEWS

Sunny outlook for space weather forecasters

Companies seek to sell tailor-made predictions of geomagnetic storms to airlines and electricity suppliers.

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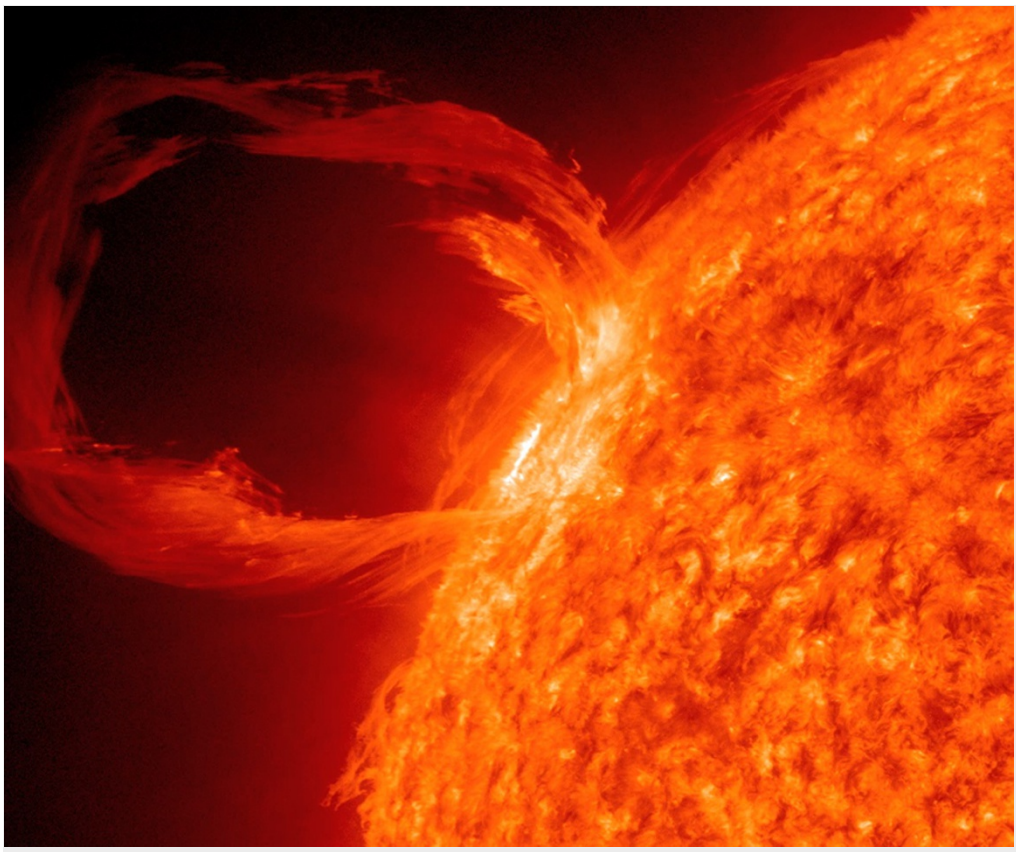
27 April 2012

BOULDER, COLORADO



SDO/NASA

Solar eruptions can play havoc with electrical equipment on Earth.

For decades, companies have tailored public weather data for private customers from farmers to airlines. On Wednesday, a group of businesses said that they are on the cusp of developing a new market: fine-tuned space weather products for customers as varied as electrical utilities and satellite operators.

Space weather is caused by magnetic storms in the Sun's atmosphere, which release streams of particles into space that boost the energy of Earth's magnetic field. These geomagnetic storms can push satellites out of position in orbit and ramp up the current in electricity grids, sometimes causing sudden blackouts of communications and power.

The push to develop a commercial forecasting enterprise for space weather came at workshop hosted by the Space Weather Prediction Center (SWPC) of the National Oceanic and Atmospheric Administration (NOAA) in Boulder, Colorado.

“Ten years ago it was nascent,” says Kent Tobiska, president of Space Environment Technologies in Los Angeles, California, referring to the developing market. His company is developing space weather products for clients such as the US Air Force. Now, he says, the enterprise is approaching “its teenage years”.

As the Sun heads towards a peak of disruptive activity that is expected in 2013, known as a solar maximum, it is little surprise that more companies are paying attention to space weather. Many firms are starting to realize the effect that geomagnetic storms and other solar events could have on their operations, with the number of worldwide subscribers to the SWPC’s space weather alerts rising from about

5,000 in 2007 to 20,000 in 2011.

These public alerts are based on observations of the Sun from both ground-based telescopes and satellites, and they offer probabilistic forecasts of a variety of potentially damaging solar events.

Gap in the market

But Terry Onsager, a physicist at the SWPC, says that private forecasting firms are starting to realize that they can add value to these predictions. For example, he says, the susceptibility of an electrical utility to a particular geomagnetic storm depends on the orientation of its power lines, the temperature on the day the storm strikes and the existing demands on the grid. These extra data points could all be factored into a tailor-made prediction by a third-party forecaster.

Another customer could be airline companies, which want custom predictions of solar particle events — instances when highly energetic particles, mostly protons, come crashing into Earth's atmosphere. For aircraft flying through polar regions, where Earth's magnetic field is generally strongest, this can cause communication blackouts as well as hazardous radiation exposures for passengers.

If private space weather forecasters do end up flourishing, they would be following in the footsteps of companies such as AccuWeather, which in 1962 started to make for-profit predictions using public data from the US National Weather Service. Former NOAA administrator Conrad Lautenbacher says that there is a natural division between public data provided for the public good, and private products for private entities. "You can't have the SWPC calling every electrical utility in the country every time there is a space weather event."

But SWPC physicist Doug Biesecker says that before customers are willing to pay for such private forecasts, the bedrock predictions provided by NOAA need to improve. Sometimes, the SWPC offers warnings for solar events three days in advance, but these are very uncertain. Further research into the processes of magnetic field reconnection within the Sun — the mechanism responsible for solar flares and coronal mass ejections, the two main drivers of solar activity — could help to improve forecasting models.

"We're in a grey area," says Onsager. "The quality of the information is right on the edge of being actionable."

Nature | doi:10.1038/nature.2012.10538