

## Space weather prediction model improves NOAA's forecast skill

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NOAA is now using a sophisticated forecast model that substantially improves predictions of space weather impacts on Earth. Better forecasts offer additional protection for people and the technology-based infrastructure we use daily.

Explosions in the sun's <u>outer atmosphere</u> – tracked and forecast by NOAA scientists – can cause geomagnetic and solar radiation storms at Earth that can impede the operation of electrical power grids, interfere with the normal function of Global Positioning Systems and temporarily hamper radio and satellite telecommunications. Grid and satellite operators and airlines can take protective measures when stormy conditions are forecast.

"This advanced model has strengthened forecasters' understanding of what happens in the 93 million miles between Earth and the sun following a solar disturbance," said Tom Bogdan, director of NOAA's Space Weather Prediction Center in Boulder, Colo. "It will help power grid and communications technology managers know what to expect so they can protect infrastructure and the public."

Magnetic storms can occur on Earth 1??? days after a coronal mass ejection – a burst of charged particles and magnetic field that streams out from the <u>sun</u> at more than one million miles an hour. Before development of this model, forecasters could predict timing of such impacts within a 30-hour window, on average. The new model allows forecasters to narrow that window to 12 hours.



That improvement gives airline operators more reliable information about when to reroute flights to avoid communications blackouts from storms. Satellite operators can avoid changing orbit or orientation when space weather threatens. Oil drilling, mining and other operations that rely on global positioning systems – which can be made unreliable by space weather – can avoid conditions that might put operators at risk. Power companies can work to prevent problems.

"The shorter prediction timeframe will enable the electric industry to better prepare for potential issues," said Gerry Cauley, president and chief executive officer of the North American Electric Reliability Corporation. "The continued improvement of forecasting through innovation and modernization of the existing satellite <u>infrastructure</u> is vital to support the reliability of North America's bulk electric system."

The new model, WSA-Enlil, combines two advanced models, the Wang-Sheeley-Arge (WSA) and Enlil (named for the Sumerian god of wind). These linked numerical forecast models simulate physical conditions and phenomena from the base of the sun's corona out into interplanetary space, to Earth and beyond. Space weather scientists "inject" solar events into the WSA-Enlil model to understand how the space weather storm system is likely to unfold.

## Provided by NOAA

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