

Carrington Event

The strongest known geomagnetic storm made the rudimentary electrical systems of the 1850s go haywire. A similar storm today could cause continent-wide blackouts.



SOUTHERNMOST
AURORA SIGHTING
Hawaii and Panama

1958 A hundred planes flying between the U.S. and Europe lose radio contact with the ground.

1989 A Quebec power grid is knocked out, causing hundreds of millions of dollars in damage.

2003 Flights are rerouted as GPS systems fail. A blackout hits Sweden.

2000 ASCA, a research satellite, loses control and tumbles in space.

1972 A British Columbia transformer explodes.

MAJOR SOLAR STORMS

Possible effects on Earth

Extreme Storms

Voltage surges over much of the Earth may cause grid collapse. GPS and navigation systems could fail. Spacecraft may lose communications and struggle to maintain orientation in orbit.



SOUTHERNMOST
AURORA SIGHTING
Florida and southern Texas

Moderate Storms

Long-lasting solar storms may damage high-latitude power grids. Drag from particles will cause spacecraft to lose altitude. Some radio communication will be impeded.



SOUTHERNMOST
AURORA SIGHTING
New York and Idaho

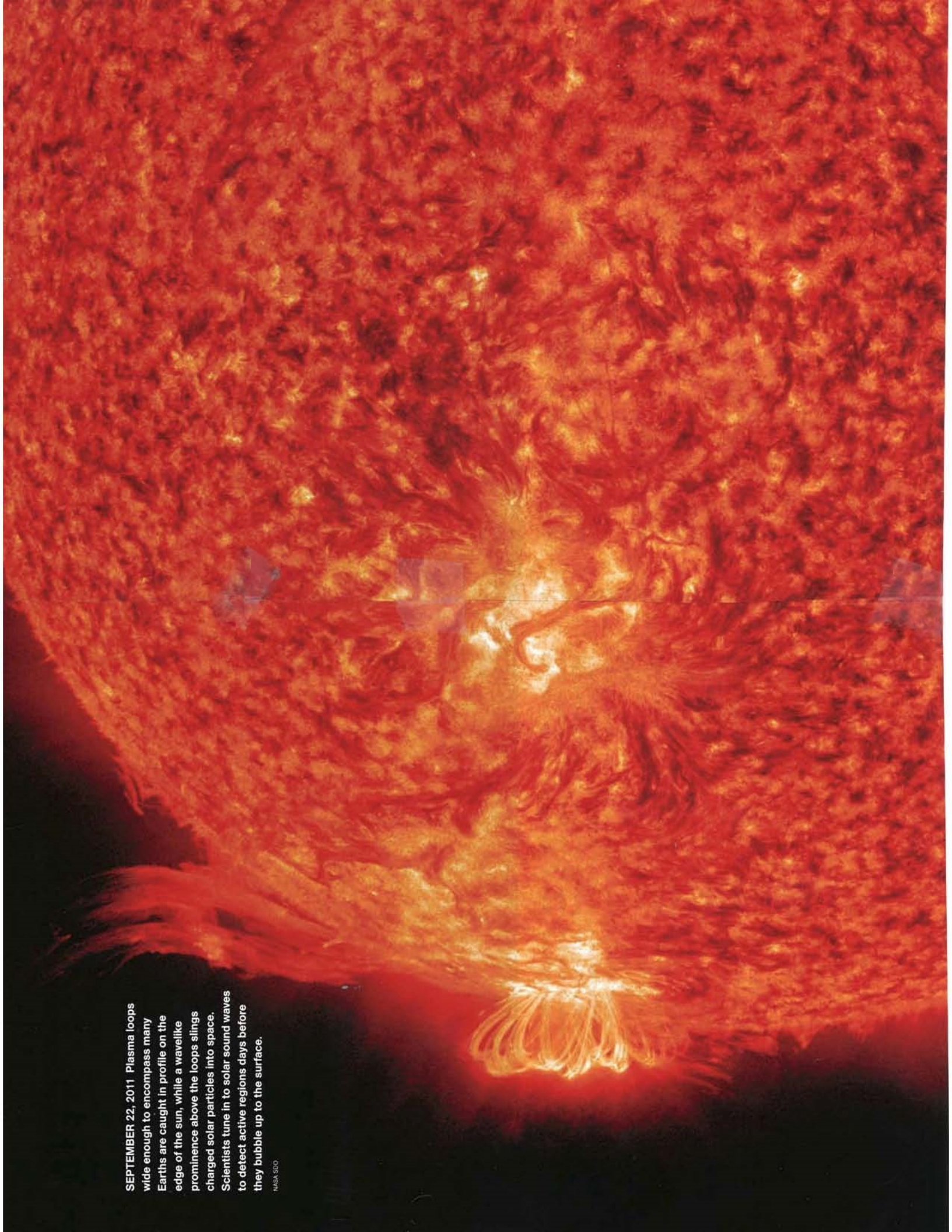
★ Event associated with solar storm

Annual average impact of storms on Earth*

1859 1960 1970 1980 1990 2000 2010

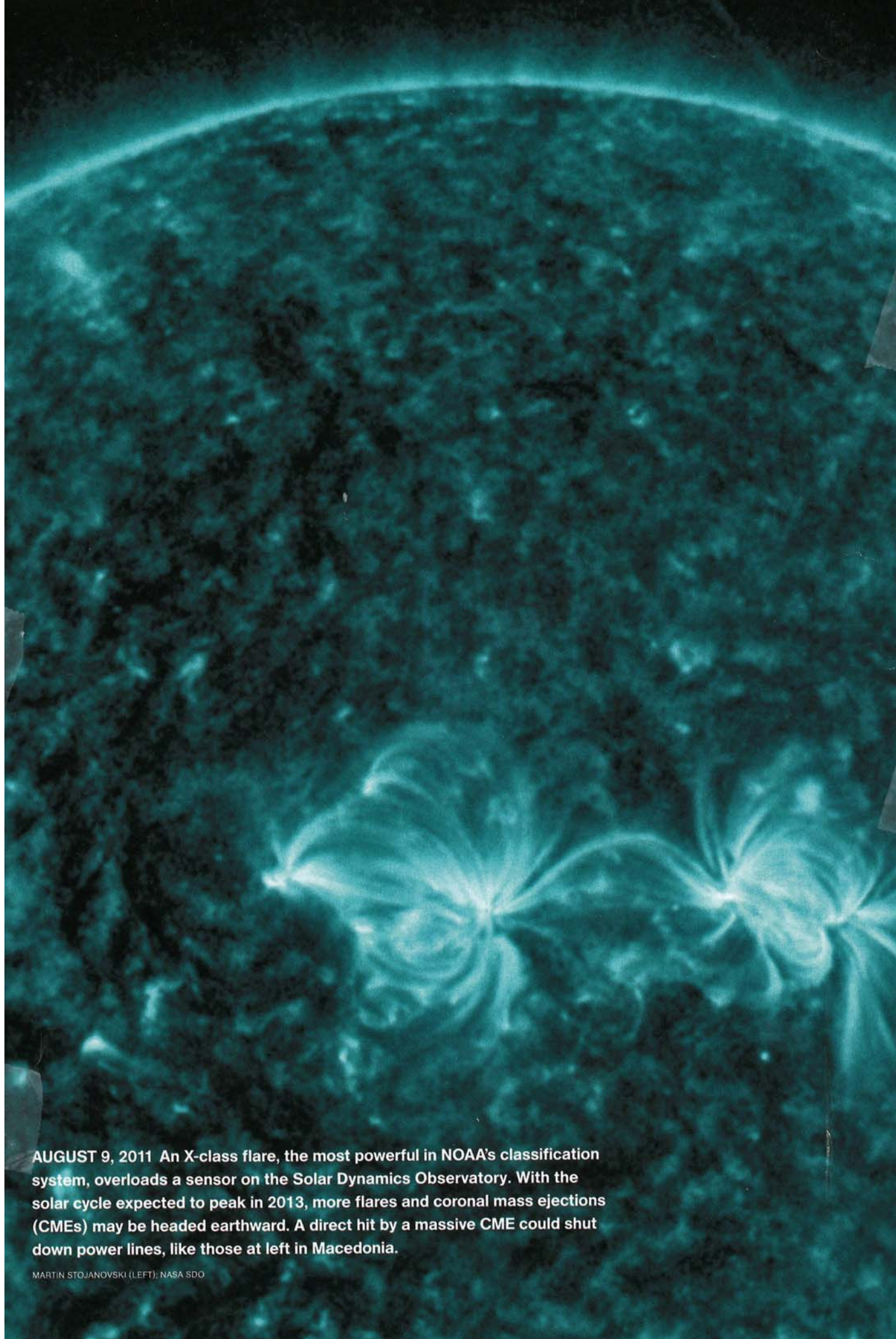
*Storm-size classifications based on Dst (nT) index, which measures disturbance of Earth's magnetic field. Carrington event = -850 nT; extreme storm = -300 nT; moderate storm = -150 nT





SEPTEMBER 22, 2011 Plasma loops wide enough to encompass many Earths are caught in profile on the edge of the sun, while a wavelike prominence above the loops slings charged solar particles into space. Scientists tune in to solar sound waves to detect active regions days before they bubble up to the surface.

NASA SDO



AUGUST 9, 2011 An X-class flare, the most powerful in NOAA's classification system, overloads a sensor on the Solar Dynamics Observatory. With the solar cycle expected to peak in 2013, more flares and coronal mass ejections (CMEs) may be headed earthward. A direct hit by a massive CME could shut down power lines, like those at left in Macedonia.

MARTIN STOJANOVSKI (LEFT); NASA SDO

