



Written by [James Heiser](#) on November 8, 2010

## NASA's "Solar Shield" Will Warn of Solar Weather

According to an old quote often attributed to Mark Twain, everyone complains about the weather, but no one does anything about it. Most of the time the weather which most immediately captures our interest is that in our immediate surroundings, but it turns out that the Sun's weather is quite capable of having an immediate impact on human life.

The threat posed by "solar storms" may sound like the premise for a bad science fiction movie, but NASA is taking the danger quite seriously, and planning is underway to do something about the potential impact of the sun's weather on planet Earth by creating a "Solar Shield" to protect power grids from the disruptions caused by solar flares.



Not all solar flares are a cause for concern; [according to Spaceweather.com](#):

A solar flare is an explosion on the Sun that happens when energy stored in twisted magnetic fields (usually above sunspots) is suddenly released. Flares produce a burst of radiation across the electromagnetic spectrum, from radio waves to x-rays and gamma-rays.

Scientists classify solar flares according to their x-ray brightness in the wavelength range 1 to 8 Angstroms. There are 3 categories: **X-class flares** are big; they are major events that can trigger planet-wide radio blackouts and long-lasting radiation storms. **M-class flares** are medium-sized; they can cause brief radio blackouts that affect Earth's polar regions. Minor radiation storms sometimes follow an M-class flare. Compared to X- and M-class events, **C-class flares** are small with few noticeable consequences here on Earth.

The concern behind NASA's "Solar Shield" is the damage caused by X-class flares. When the coronal mass ejection (CME) from such a solar flare strikes the Earth's atmosphere, it poses a threat to the power grids around the world because the flare essentially causes an power overload in the affected area. [According to Clay Dillow, writing for Popsci.com](#):

The threat to power grids during bad solar weather is known as GIC, or geomagnetically induced current. When the sun ejects a huge coronal mass in our direction, the impact with our atmosphere shakes up Earth's magnetic field. That generates electric currents from the upper atmosphere all the way down to the ground. These can cripple power grids, overloading circuits and in some cases melting heavy-duty transformers.

Those transformers are very necessary to keep the power flowing. They're also expensive, irreparable in the field, and can take a year to replace. Meaning that a massive coronal ejection could knock down entire power grids for long stretches of time, grinding economies to a halt and making life more than a little inconvenient.



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NASA's answer to the problem — a Solar Shield — is somewhat of a misnomer, in that it will not actually shield the Earth from all of the effects of a solar flare. Instead, it is a bit more like a weather radio alert of an approaching storm, except that instead of citizens unplugging televisions to protect them from lightning, Solar Shield will warn the power companies to “unplug” those portions of the grid most likely to be damaged, thus hopefully avoiding a catastrophic failure.

NASA satellites would identify and track CMEs, which can take as long as two days to reach Earth after a solar flare. Approximately 30 minutes before the storm reaches Earth, NASA would be able to provide specific information regarding which areas of the globe would feel the brunt of the impact; power companies could then cause a temporary, regional blackout, and restore service after the CME had passed.

GIC is not the only threat posed by solar flares; with the current solar flare cycle [expected to peak in May 2013](#), and with commercial airliners cruising at higher elevations than ever before, there is an increased risk of health effects from radiation exposure. [The Telegraph reports](#) that a new study is warning of an increased risk of cancer:

Scientists found aircrew were “the major occupation group” most exposed to the Sun’s radiation with passengers also at risk from the phenomenon.

Because the sun’s radiation levels had been reasonably low for the past century, its strengthening power in the coming few years would create new health problems.

“Space radiation is a hazard not only to the operation of modern aircraft but also to the health of aircrew and passengers,” said the study, titled “Space weather and its impact on Earth - implications for business”.

“Radiation from space can reach the Earth’s atmosphere and create extra radiation exposure for people travelling on aircraft at typical cruise altitudes (40,000 feet).

“The radiation risk to passengers is usually much less than that for aircrew since most passengers spend less time in the air [and] the radiation doses accumulate with time in flight, especially at cruise altitudes.”

The study, published by Lloyds of London, the insurance market, added: “However, frequent fliers whose time in the air approaches that of aircrew are equally at risk. There is, as yet, no legal framework for handling such risks.”

What remains to be seen is whether a program such as “Solar Shield” may be developed for commercial air travel, grounding flights when particularly large solar flares are deemed to pose a significant risk of radiation exposure.



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