

Traces of enormous solar storms in the ice of Greenland and Antarctica

28 October 2015



The NEEM research station in northern Greenland.
Credit: Raimund Muscheler

Solar storms and the particles they release result in spectacular phenomena such as auroras, but they can also pose a serious risk to our society. In extreme cases they have caused major power outages, and they could also lead to breakdowns of satellites and communication systems. According to a study published today in *Nature Communications*, solar storms could be much more powerful than previously assumed. Researchers at Lund University in Sweden have now confirmed that Earth was hit by two extreme solar storms more than 1000 years ago.

"If such enormous solar storms would hit Earth today, they could have devastating effects on our power supply, satellites and [communication systems](#)", says Raimund Muscheler at the Department of Geology, Lund University.

A team of researchers at Lund University, together with colleagues at Uppsala University in Sweden, as well as researchers in Switzerland, Denmark and the US, have been looking for traces of solar storms in ice cores from Greenland and Antarctica.

Everywhere on Earth you can find traces of cosmic rays from the Galaxy and the sun, such as low levels of [radioactive carbon](#).

A few years ago researchers found traces of a rapid increase of radioactive carbon in tree rings from the periods AD 774/775 and AD 993/994. The cause for these increases was, however, debated.

"In this study we have aimed to work systematically to find the cause for these events. We have now found corresponding increases for exactly the same periods in ice cores. With these new results it is possible to rule out all other suggested explanations, and thereby confirm extreme solar storms as the cause of these mysterious radiocarbon increases", says Raimund Muscheler.

The study also provides the first reliable assessment of the particle fluxes connected to these events. Raimund Muscheler points out that this is very important for the future planning of reliable electronic systems:

"These solar storms by far exceeded any known events observed by instrumental measurements on Earth. The findings should lead to a reassessment of the risks associated with [solar storms](#)", says Raimund Muscheler.

More information: Florian Mekhaldi et al. Multiradionuclide evidence for the solar origin of the cosmic-ray events of ?? 774/5 and 993/4, *Nature Communications* (2015). [DOI: 10.1038/ncomms9611](#)

Provided by Lund University

APA citation: Traces of enormous solar storms in the ice of Greenland and Antarctica (2015, October 28) retrieved 3 December 2020 from <https://phys.org/news/2015-10-enormous-solar-storms-ice-greenland.html>

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