

Earth's protective shield is weakening: Trio of Swarm satellites could reveal how fast the planet's magnetic field is fading

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SELECTION

- Swarm measures different magnetic signals from Earth's magnetosphere
- Scientists claim the magnetosphere - our protective shield - is weakening
- This can allow harmful solar radiation to penetrate planet's atmosphere
- The initial results from Swarm are due to be presented at a conference on 22 June to 2 July in Prague, Czech Republic

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Earth's protective shield is slowly weakening, allowing harmful solar winds to penetrate the planet's atmosphere.

Known as the magnetosphere, this shield extends thousands of miles into space and affects everything from global communication to weather patterns.

The European Space Agency's Swarm mission aims to map changes to magnetosphere – and, after a year in orbit, it's now provided a glimpse into its dynamics.

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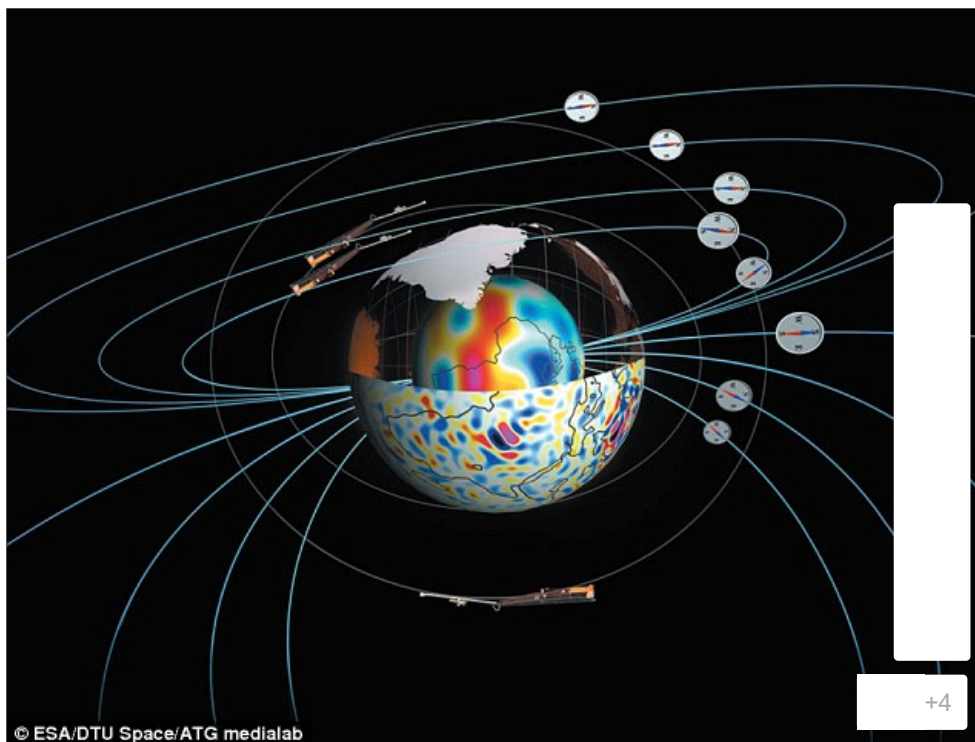


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The European Space Agency's Swarm mission aims to map changes to magnetosphere – and, after a year in orbit, it's now provided a glimpse into its dynamics. The image highlights the new crust (bottom) and core (centre) magnetic field models from Swarm. These preliminary results are based only on the first year of data

The initial results from Swarm are due to be presented at the General Assembly of the International Union of Geodesy and Geophysics on 22 June to 2 July in Prague, Czech Republic.

Rune Floberghagen, Swarm Mission Manager, said, 'These results show that all the meticulous effort that went into making Swarm the best-ever spaceborne magnetometry mission is certainly paying off.'

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Swarm is tasked with measuring and untangling the different magnetic signals that stem from Earth's core, mantle, crust, oceans, ionosphere and magnetosphere.

The four-year mission is hoping to eventually provide an insight into various natural processes, from those occurring deep inside the planet through to weather in space caused by solar activity.

The three satellites are identical, but to optimise sampling in space and time their orbits are different and change over the course of the mission's life.

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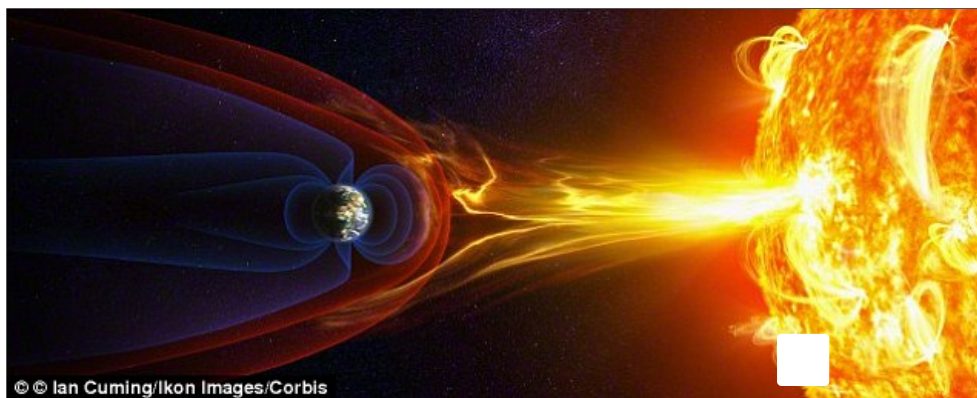
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Earth's protective shield is slowly weakening, allowing harmful solar winds to penetrate the atmosphere



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A weakened magnetosphere means that more aurora will be seen on Earth as solar winds hit the atmosphere

WHAT COULD HAPPEN IF OUR MAGNETOSPHERE CONTINUES TO WEAKEN?

The magnetosphere protects the Earth from solar radiation.

If it weakens dramatically, radiation at ground level would increase with some estimates suggesting that overall exposure to cosmic radiation would double causing more deaths from cancer.

The Electric grid collapse from severe solar storms is a major risk.

As the magnetic field continues to weaken, scientists are highlighting the importance off-the grid energy systems using renewable energy sources to protect the Earth against a black out.

'The very highly charged particles can have a deleterious effect on the satellites and astronauts,' added Dr Mona Kessel, a Magnetosphere discipline scientist at Nasa.

The Earth's climate could also change. A recent Danish study has found that the earth's weather has been significantly affected by the planet's magnetic field.

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Proud



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They claimed that fluctuations in the number of cosmic rays hitting the atmosphere directly alter the amount of cloud covering the planet.

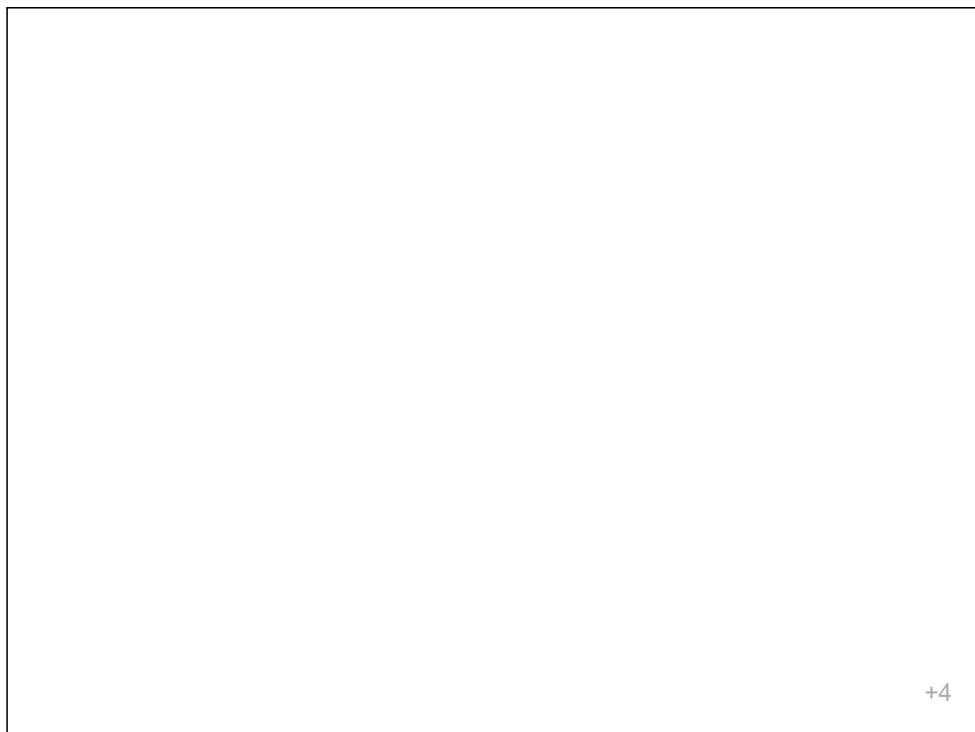
A weakened magnetosphere will also mean that more aurora will be seen on Earth as solar winds hit the atmosphere.

Swarm is the first mission to take advantage of something known as 'magnetic gradiometry', which is achieved by two of the satellites orbiting side-by-side at a distance of about 60 miles (100km).

This is used to unravel the details of the magnetic field produced by magnetised rocks in Earth's crust.

Nils Olsen from DTU Space in Denmark said: 'We are extremely satisfied with these preliminary results.

'Not only do they validate the gradiometry concept, but they also confirm the remarkable accuracy of the satellites' absolute magnetic measurements.'



The layers of Earth's upper atmosphere, the ionosphere, and magnetosphere, form a closely-paired, interacting system. Swarm is contributing to a better understanding of near-Earth electric current systems and processes as shown in this graphic

The Swarm constellation also makes it much easier to monitor the changes that occur in the main field produced in the Earth's core, which protects us from harmful charged cosmic particles.

'Our magnetic field is largely generated by Earth's outer core,' said Gauthier Hulot, one of the lead proposers of the Swarm mission.

'The constellation provides detail on the way the field is changing and thereby weakening our protective shield.'

'This is what will ultimately make it possible to predict the way this field will evolve over the next decades.'

The Swarm satellites will be in orbit for another three years at least.

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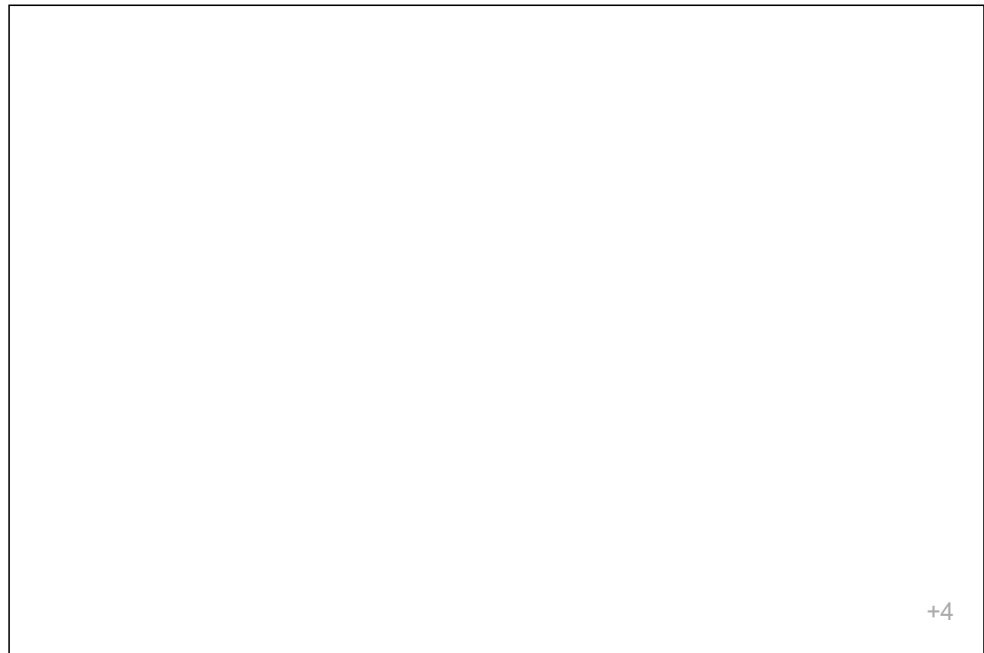
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Kelly has posted a no make-up selfie

Dennis Quaid, 64, heads to dinner at Catch with girlfriend Santa Auzina, 32, in West Hollywood

These results will be presented at the 26th General Assembly of the International Union of Geodesy and Geophysics on 22 June to 2 July in Prague, Czech Republic.



The Earth's protective shield extends thousands of miles into space and affects everything from global communication to weather patterns

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