Our Hazards: **Space Weather**

What is space weather?

Space weather is due to bursts of energy from the Sun. It usually does not affect us, but occasionally there are more extreme events, and these can impact Earth.

Space weather will not directly harm people on Earth, but may damage or disrupt technology across the globe (such as power and communication networks), with lasting impacts to communities.

Space weather impacts are more frequent during solar maximum. The current solar maximum commenced in October 2024, with heightened conditions expected until 2027.

What are the impacts?

Solar Flare

Impacts within
8 minutes*

Satellites
Aviation
Comms

Solar Radiation

Impacts within
10s of minutes*

Satellites
Aviation

Geomagnetic Storm

Impacts within
12-36 hours*

Supply Chain
Water
Banking
Gas/Fuel
Comms/ Internet
Aviation
Satellites
Electricity
Transport

these things can happen together or separately.

*from event onset at the sun.

National Emergency Management Agency
Te Rākau Whakamarumaru

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Keeping New Zealand Safe

What are we doing about space weather?

- NEMA monitors space weather notifications and information from international partners.
- If New Zealand will be affected, NEMA will alert the public and the emergency management system.
- NEMA will activate the National Space Weather Response Plan.

What can you do about space weather?

- In an extreme space weather event, electricity networks could be shut down to protect the grid from serious damage. Power could be out for 6 days.
- Make sure you have a backup plan if you are medically dependent on power.
- Get ready by having a "prep talk" with your family. What will you do when the power goes out?
- Get emergency supplies together and get to know your neighbours.

How does space weather affect us?

6 days without power

if action is not taken to protect our infrastructure, space weather could cause devastating impacts. Protective actions could cause short term negative impacts (like having no power for 6 days) to avoid more severe long-term impacts like having no power for days, weeks or months!

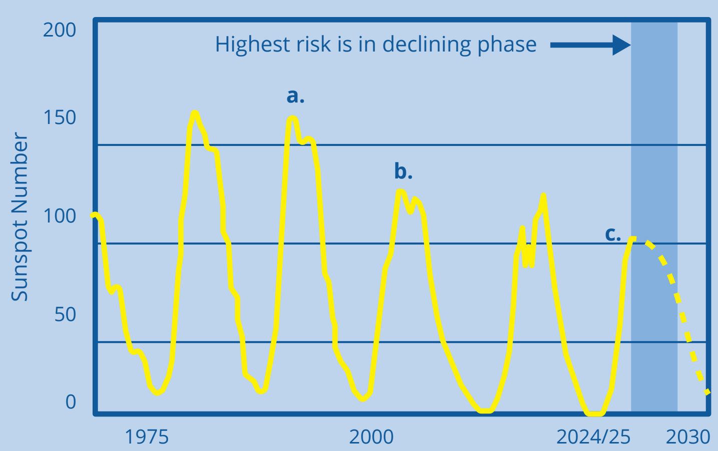
15,000

number of New Zealanders medically dependent on electricity.

$6.2 billion over 3 days

estimated cost of shutting down the electricity grid.

Solar Cycle



a. Canada in 1989:
- 9 million people without electricity for 9 hours

b. New Zealand in 2001:
- transformer loss costing $2.5 million

c. Multiple countries May 2024:
- International flights minutes from forced grounding.
- Largest mass migration of satellites in history and shortened lifespans of satellites.
- High economic loss from precision agriculture.

In 1859, astronomer Richard Carrington observed a large solar flare. The biggest geomagnetic storm in recorded history followed. Telegraph poles emitted sparks and operators suffered electric shocks. If a similar event happened today, the impacts could be catastrophic.

Event likelihood in the next 50 years

Event	Likelihood
Space weather event (May 2024) — equivalent	**Almost certain**
Whakaari / Ruapehu / Tongariro / Ngauruhoe ash producing eruption	Almost certain
Cyclone Gabrielle (2023) — equivalent	80%
Alpine fault — M8 earthquake	75%
Space weather event — extreme	**30%**
Taranaki eruption — small	30%
Hikurangi subduction zone earthquake and tsunami — M8+	25%
South American — M9+ earthquake and NZ tsunami	25%
Auckland volcanic eruption	10%
Wellington fault — M7.5 earthquake	5%
Taranaki eruption — large	1%
Hikurangi subduction zone earthquake and tsunami — M9.1	1%

Did you know?

Events that have a low likelihood can and do happen. Before the 2010-11 Canterbury earthquakes, an event like that had a less than 1% likelihood.

National Space Weather Response Plan

Find out more about the hazard at: **sws.bom.gov.au**

Find out more about the impacts of having no power at: **getready.govt.nz**

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