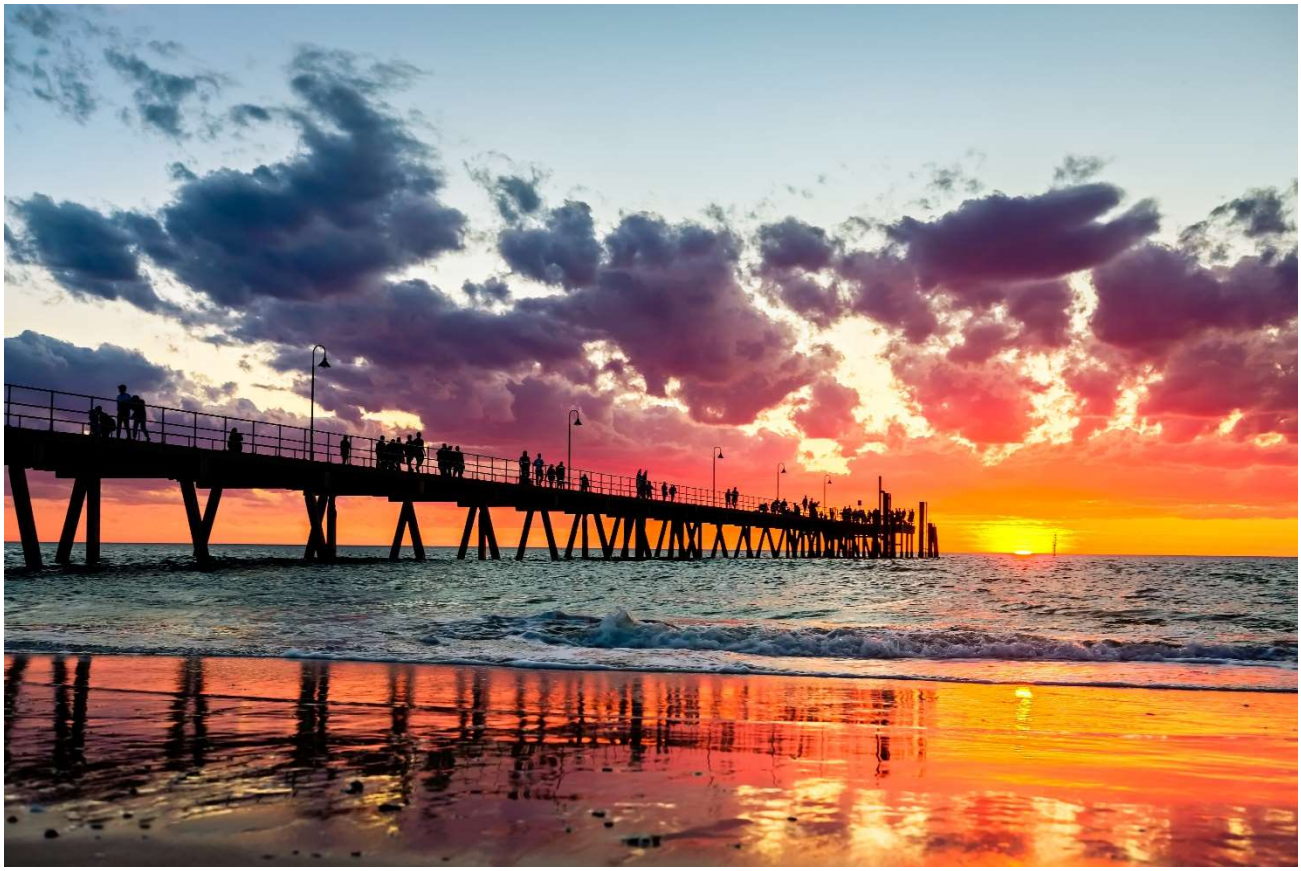
The Bureau of Meteorology

Bureau of Meteorology submission on the exposure draft of the Security of Critical Infrastructure (Critical infrastructure risk management program) Rules (LIN 22/018) 2022

November 2022



The Bureau of Meteorology (the Bureau) appreciates the opportunity to provide feedback on the Exposure Draft *Security of Critical Infrastructure (Critical infrastructure risk management program) Rules (LIN 22/018) 2022.*

Recommendation

The Bureau recommends that "space weather" be listed as a recognised natural hazard in the *Security of Critical Infrastructure (Critical infrastructure risk management program) Rules (LIN 22/018) 2022* (in *Part 1 Preliminary, Section 3 Definitions* (Exposure Draft, P.3)), that seek to strengthen the *Security of Critical Infrastructure Act 2018*.

Reason

Space weather is recognised internationally as a low-frequency high-impact natural hazard. Historical and recent experience demonstrates that many critical infrastructure assets in space and on the ground are vulnerable to the effects of space weather, with potential implications for government and emergency management services, industry, and the community, due to the potential effects on the supply of critical services and subsequent economic impacts.

The exposure draft of the *Security of Critical Infrastructure (Critical infrastructure risk management program) Rules (LIN 22/018) 2022,* in *Part 1 Preliminary, Section 3 Definitions,* (Exposure Draft, P.3) defines the range of natural hazards as;

> *"a bushfire, flood, cyclone, storm, heatwave, earthquake, tsunami or health hazard (such as a pandemic)".*

The insertion of space weather as an identified natural hazard under the Act will strengthen it by allowing critical infrastructure operators to develop risk management programs (RMP) where space weather has been identified as a threat to that critical infrastructure asset and its operation.

It is recommended that space weather be inserted into the Act as an identified natural hazard to ensure relevant critical infrastructure asset owners and operators identify space weather as a threat and minimise and/or mitigate the effects of this natural hazard to critical infrastructure assets and operations.

Background

Space weather events are natural variations in the Sun, solar wind, magnetosphere, ionosphere, and thermosphere which can influence the performance and reliability of a variety of space-based (e.g., satellites) and ground-based (e.g., energy distribution grids) technological systems and can also endanger human health and safety. The four main types of space weather of major concern are coronal mass ejections; solar flares; radio blackout events, and coronal holes. Each have significant but different impacts across a range of critical infrastructure assets.

Just like terrestrial weather, space weather is pervasive, and compensating for its impact is technically challenging. Space weather can affect our technology and the near-Earth space environment by varying the Earth's magnetic field; enhancing electrical fields and currents in the atmosphere and the ground; increasing the amount of radiation entering the upper atmosphere, varying the density and stability of the upper atmosphere. Space weather events can:

- degrade or disable electricity transmission networks
- damage satellites
- disrupt high frequency and satellite communications services
- disrupt global navigation satellite systems (GNSS) or position navigation and timing (PNT) services
- damage satellite and cable internet infrastructure
- affect aviation and air passenger safety due to high levels of radiation and disruption to GNSS and PNT services

Once space weather impacts Earth the event can very rapidly unfold, with impacts on critical infrastructure and associated flow on effects. Our ability to forecast such events is constrained by our scientific understanding of space weather and the tools to observe and measure actual events.

Critical infrastructure networks are increasingly interconnected, technologically complex, and thus vulnerable to a range of space weather events. Impacts across these sectors are likely to have cascading impacts on government emergency management services, defence and national security capacities, critical infrastructure asset operators and the economy more broadly. Substantial portions of the economy depend on the electrical grid, satellite communications, and GNSS / PNT services. Loss or degradation of any of these systems from a rapid onset space weather event without the appropriate planning and mitigation efforts will have far-ranging impacts.

If an extreme space weather event occurred which led to a widespread and persistent blackout, the direct economic impact would be a loss of power for industry, businesses, and consumers within the storm footprint. Economic modelling for Australia is not available as a point of comparison, however, the direct economic cost of a power outage across all users lasting 16 days – 2 years of a 1-in-150 years geomagnetic storm is estimated at $0.6-$2.6 trillion in the United States alone. Indirect economic effects will arise outside of the storm footprint, as disruption to supply chain linkages will prevent normal economic activities taking place.

References

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