



Aotearoa New Zealand Space Weather Science Advisory Panel

Terms of Reference

August 2025

1. Introduction

- 1.1 The purpose of the Aotearoa New Zealand Space Weather Science Advisory Panel (SWxSAP) is to ensure the provision of authoritative and efficient space weather science advice across the 4Rs to the Director of Civil Defence Emergency Management (CDEM) and the National Crisis Management Centre (NCCMC).
- 1.2 It has been established in the context of Aotearoa New Zealand having a very limited pool of domestic space weather expertise and limited, if any, supporting operational infrastructure, such as monitoring systems and a lead science agency.
- 1.3 The SWxSAP is structured in two parts:
 - Science Advisory Panel (the Panel): The broader **Panel** is focused on the stewardship and development of space weather science capability and capacity in Aotearoa New Zealand.
 - Response Science Advisory Subgroup (the Subgroup): The **Subgroup's** core function is to provide specialist and timely advice to support the electricity industry and the emergency management system during extreme space weather events.

2. Scope

- 2.1 The **Panel** and **Subgroup** are in an establishment phase and will predominantly focus on short-term readiness and response – which meets critical system need.
- 2.2 The **Panel** and **Subgroup** will operate on a **best-endeavours basis** to formalise and support existing capabilities.
- 2.3 The **Subgroup** will focus on the highest impact consequences only (the electricity industry) to enable a faster stand up.
- 2.4 As such, the provision of science advice from the **Subgroup** for other critical infrastructure (e.g. aviation¹, telecommunications) is currently out of scope. The scope may broaden as the **Subgroup** matures.
- 2.5 While the primary mandate of the **Panel** is to provide space weather science advice, it also incorporates 'planetary defence'² expertise to assist the National Emergency Management Agency (NEMA) in addressing other space-related natural hazards (note this does not apply to the **Subgroup**).

¹ Serviced by the International Civil Aviation Organisation

² Assesses the threats to the Earth from the atmospheric explosion or ground impact of small Solar System bodies

3. Objectives

3.1 The **Panel** will:

- a) act as the national focal point to identify, advocate for, and coordinate additional monitoring, science investigations, and data collection that will support both short- and long-term research.
- b) support timely, well-communicated, and consistent science advice in the post-impact³ stages of a space weather response to inform response and recovery needs.
- c) develop and maintain effective, collegial relationships between domestic scientists, with expertise in space weather science and engineering.
- d) monitor and advocate for the development of capability and capacity of space weather science expertise across New Zealand.
- e) assist with establishing national priorities for space weather risk management.
- f) develop and maintain mechanisms to act as the national focal point for international science liaisons for space weather activity.
- g) provide a mechanism for coordination of post-event research.

The **Subgroup** will, under best endeavours approach:

- h) lead the provision of timely, well-communicated, and consistent science advice in a space weather response, and particularly the pre-impact phase⁴ of an event, to inform critical operational decision making, and later response and recovery needs.
- i) develop and maintain mechanisms to act as the national focal point for international science liaisons, for use in coordination of response to space weather activity.

4. Membership of the Panel

4.1 The **Panel** is designed to be a broad group consisting of various agencies and scientists with expertise and leadership roles in emergency management, hazard and risk science, and infrastructure.

4.2 The **Panel** will be chaired and administrated by NEMA.

4.3 Membership of the **Panel** includes representation from:

- NEMA (including Chair, Executive Officer)
- Key national space weather experts from the science system (currently University of Otago)

³ In this context, 'post-impact' refers to all phases beyond the 'immediate response' phase of the National Space Weather Response Plan, defined as the immediate actions taken after the first damaging coronal mass ejection arrives at Earth.

⁴ In this context, 'pre-impact' refers to the 'elevated threat' and 'credible threat' phases of the National Space Weather Response Plan, defined as the period between the initial notification of potentially extreme space weather through to the confirmation of the size and characteristics of the one or more coronal mass ejections arriving on Earth. The likely arrival time is between 12 and 36 hours after the initial notification.

- Transpower
 - Ministry of Business Innovation & Employment
 - Land Information New Zealand
 - Earth Sciences New Zealand (GNS Science and NIWA).
 - MetService⁵
 - Key national planetary defence experts from the science system (currently University of Canterbury)
- 4.4 The Membership is expected to change as the **Panel** develops, with a greater focus on subject matter expertise.

5. Membership of the Subgroup

- 5.1 The **Subgroup** is a specialist group of subject matter experts with expertise in space weather science and sound working knowledge of New Zealand's national electricity grid.
- 5.2 Members of the **Subgroup** are also members of the **Panel**.
- 5.3 The **Subgroup** will be chaired and administrated by NEMA.
- 5.4 Membership of the **Subgroup** includes representation from:
- NEMA (including Chair, Executive Officer)
 - Key national experts (currently University of Otago)
 - Transpower
- 5.5 A key early priority is establishment of communication mechanisms and protocols for rapid provision of science advice to the NEMA National Controller, NCMC, and Transpower Control Desk (to be developed).
- 5.6 NEMA and Transpower will advise the emergency management and electricity industry when the **Subgroup** is formally activated as an operational capability. Until that time, this **Subgroup** is to be considered in development.

6. Responsibilities of Members

- 6.1 A separate Statement of Expectations outlines the responsibilities and qualities of the members of the SWxSAP.

7. Meetings

- 7.1 The Chair will encourage free and open discussions. Decisions are by consensus, if possible, and by a majority vote if consensus cannot be reached. The Chair has a casting vote.

⁵ MetService will be acquired by the NZ Earth Science Institute as a wholly owned subsidiary for at least 3 years, after which consideration may be given to full merger. This means MetService continues to exist as a separate entity until the full merger is completed.

- 7.2 Regular Panel meetings will be held at such frequency as agreed among the Members. It should meet at least annually.
- 7.3 The Chair shall poll members for suitable dates and decide the (physical and/or virtual) location of meetings.
- 7.4 Members should aim to be present at all meetings. If attendance is not possible, Members should propose a delegate to the Chair for their consideration ahead of the meeting.
- 7.5 Additional science capability or organisation representatives can be called upon for discussions, as proposed by Panel Members, in agreement with the Chair.

8. Response to space weather activity

- 8.1 The primary mechanism for responding to space weather activity is through the **Subgroup**. The broader **Panel** may be called upon to support as required.
- 8.2 The decision to convene the **Subgroup** in response to space weather activity, and the way in which it operates, will follow the **Subgroup's** Standard Operating Procedure (SOP, to be developed).
- 8.3 The **Subgroup** may be asked to provide science advice (including advice on forecasts, nowcasts and confirmation of event end) to an emerging event at short notice, but NEMA acknowledges that this will be based on a best-endeavours principle.
- 8.4 There may also be a requirement to provide science advice to the media directly or advise a media spokesperson (such as the Director of Civil Defence Emergency Management). The Chair and Executive Officer will support this process.

9. Administration

- 9.1 NEMA will keep a contact list of the Members. The Executive Officer will ensure this remains up to date. Contact details will be checked for accuracy at least annually by the Executive Officer.
- 9.2 NEMA will keep a database with contacts of scientists (including their skillsets) who would be willing to be involved in a response.
- 9.3 The Chair will provide and maintain access to the online shared workspace within the Emergency Management NZ Instance (EMI) within Microsoft Teams. This will be used as the primary location for sharing information amongst Panel Members.
- 9.4 The **Panel** and **Subgroup** will also use 'Signal' App to provide a rapid messaging capability. This will be administered by the Chair and Executive Officer.
- 9.5 The Chair is responsible for distributing meeting minutes to Members.
- 9.6 Any Member may seek clarity and review of the Panel purpose, objectives, roles, and responsibilities. An amendment to the Terms of Reference is to be agreed by all Panel Members.
- 9.7 The Terms of Reference and Panel membership will be published on the NEMA website and will be kept up to date by the NEMA.