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Poster

New Zealand’s space physics experts have been collaborating with New Zealand’s High Voltage power grid owner and operator Transpower for the last 9 years to assess the risks geomagnetic storms pose to the grid. Since 2001 Transpower has recorded and archived the Geomagnetically Induced Currents (GIC) observations from several dozen transformers. This has allowed us to validate our GIC models against a large dataset of real-world observations to reliably model GICs during geomagnetic storms. This suggests that many New Zealand transformers are at risk of damage when an extreme geomagnetic storm occurs in the future.

In 2022, acknowledging the importance of protecting the grid, Transpower and the University of Otago collaborated to develop an "All of New Zealand" GIC mitigation plan. This grid reconfiguration plan strategically disconnects specific lines and transformers with the objective of reducing the magnitude and duration of GICs flowing in the system and the most vulnerable transformers, while ensuring an uninterrupted power supply across the country. After control room staff were trained, the plan became operational in mid-2023.

During the May 2024 “Gannon” storm, Transpower's control room staff activated the mitigation plan according to the established procedure. We saw a considerable reduction in GIC flows, with no disruption to New Zealand's power supply. We will compare GIC observations with modelling to demonstrate the expected outcomes with and without the mitigation plan being implemented. Further mitigation efforts in the form of capacitor blockers are being explored.

This research is part of the New Zealand Solar Tsunamis programme.

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