Induction Responses from Magnetotelluric Transfer Functions in Southland, New Zealand

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SUMMARY

The impact of geomagnetically induced currents (GIC) on the New Zealand power grid has previously been studied using a thin-sheet model of electrical conductance variations across the country. Due to its relative proximity to the auroral zone observed GIC are greatest in the south of the South Island in the Otago/Southland region. Recent acquisition of 62 long period magnetotelluric (MT) sites in this region provides the opportunity to better understand how GIC are related to the conductivity structure and tectonics. MT 1Hz impedance data in the period range between 10 and 10000 seconds have been combined with 1s resolution magnetic data to calculate the induced electric fields during the 2015 St. Patrick's Day Storm. Direct current measurements from sensors installed along the transmission network are compared with the induced electric fields to analyze the GIC and phases of the storm in detail.