

# AGU: Geophysical Research Letters

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## Keywords

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induced currents  
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## Index Terms

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Ionosphere: Instruments  
and techniques  
Ionosphere: Current  
systems  
Magnetospheric Physics:  
Magnetic storms and  
substorms

## Abstract

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### High-latitude geomagnetically induced current events observed on very low frequency radio wave receiver systems

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Noise burst events observed at Sodankylä, Finland, in the frequency range 20–25 kHz during January–April 2005 last up to 4 s, occur more often at midnight, are associated with high geomagnetic activity, and exhibit a quasi-constant amplitude perturbation ~15 dB above the background noise levels. We considered the possibility that the events could be caused by lightning noise breakthrough. The association of the noise burst events with local midnight and high geomagnetic activity argues against a lightning link, as well as the lack of close thunderstorm location relative to Sodankylä during noise periods. While energetic electron precipitation is also associated with high geomagnetic activity, we showed that they occur at different times and exhibit significantly different amplitude characteristics. Finally, we compared in detail the geomagnetic induced current (GIC) in the Scottish power system in southern Scotland, during a storm event that occurred on 15 May 2005, with the noise burst event rate at Sodankylä. We found that the onset time and variability of the Scottish GIC activity was well matched by the variability in the noise burst event rate, particularly the high-frequency component of the GIC fluctuations. The technique used in our study of observing at a narrow band of frequencies allows GIC measurements to be made in built-up areas where mains interference is a problem for other experiments, such as magnetometers.

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[frequency radio wave receiver systems](#)

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