

# Development of a detection method for Pc1-range ionospheric MHD waves using SuperDARN

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We have been developing a possible measurement technique for Pc1-range oscillations of ionospheric electric field with Super Dual Auroral Radar Network (SuperDARN) radars. The goal of the present study is to study spatial and temporal evolution of the ionospheric electric field oscillations caused by fast mode waves excited by incident electromagnetic ion cyclotron waves from the magnetosphere. Past ground magnetic field observations showed that Pc1 geomagnetic pulsations are often found in the sub-auroral to auroral latitude region. Due to the spatial integration effect, however, the ground magnetic field observations can hardly resolve the spatial structure of the ionospheric electric field oscillations of scales of ~ a few hundred km or smaller. SuperDARN radars are capable of resolving such scales, although its nominal beam integration time of ~3 s is nowhere near capturing the Pc1 frequency range variations. We seek to develop a data analysis procedure for raw IQ data from the radars to obtain a Doppler velocity value every single or several pulse sequences, possibly providing a sub-second resolution. We try to apply a technique similar to that developed by Yukimatu and Tsutsumi [2002] to mid-range ionospheric echoes to discriminate those with and without the cross-range interference. In the presentation, we will show some actual results from the newly developed method and further compare them with induction magnetometer observations obtained simultaneously.