

Processing of the prototype imaging data of the SuperDARN Hokkaido East radar.

*Shota Hayamizu¹, Nozomu Nishitani¹, Yoshiyuki Hamaguchi¹, Tomoaki Hori¹, Atsuki Shinbori¹

1. Institute for Space-Earth Environmental Research, Nagoya University

SuperDARN is an HF radar network operated mainly for ionospheric F-region observations. It observes Doppler velocities of ionospheric plasma in high and mid-latitude regions of both hemispheres.

Convection maps for a vast area of the ionosphere can be obtained by combining data from multiple radars. SuperDARN radars do not meet current performance and must be modernized because their important parameters are based on the radars' initial specifications. To that end, McWilliams et al. [2022] introduced Borealis as a new open-source software and hardware design for SuperDARN radar, and Bristow et al. [2019] used imaging technology.

We have also been implementing software radio technology to the Hokkaido East radar. We carried out a test operation from 30 June to 3 July 2020. Two USRP-N210s were used to receive the returned signal at four channels as digital radio equipment, and the received signal was imaged. However, a significant noise was observed at a specific time.

In this study, we implement a low-pass filter on the software and try to denoise the received signal. Such a frequency filter can cause some side effects in the time domain, such as spike noise spreading over the entire signal waveform. It is also necessary to ensure that the filter does not destroy or deform the observed data. For those purposes, we have improved our filter and confirmed that the noise is removed, and the imaged signal strength does not show any substantial deformation of the observed data. We proceed to verify the effects of the filter on Doppler velocity. In this presentation, we report the latest progress in our development and discuss how we attempt to resolve problems arising in the course of the development and the implementation of the radar system.