

R010-21

Zoom meeting C : 11/4 AM2 (10:45-12:30)

11:45~12:00

SuperDARN 北海道-陸別第一レーダーのイメージング化計画

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Plan of installing the imaging capability to the SuperDARN Hokkaido East radar for better spatial and temporal resolution

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The Super Dual Auroral Radar Network (SuperDARN) is a network of High-Frequency (HF) radars located at high- and mid-latitudes. It provides information on the global distribution of ionospheric convection and plasma density changes with a typical temporal resolution of 1 to 2 minutes, corresponding to the Nyquist frequency of 4 to 8 mHz. Sometimes this frequency range is insufficient to monitor ionospheric / upper atmospheric space weather phenomena with relatively short time scales (smaller than a few mins). The following are 2 examples:

1. SAPS wave structure. Sometimes SAPS contains temporal variations of the order of about 1 to a few tens of minutes. In order to consider their generation mechanisms, it is necessary to monitor the two-dimensional distribution of ionospheric convection with a temporal resolution of less than 1 min.

2. Coseismic ionospheric disturbances. Triggered by a big earthquake, the SuperDARN radar observed ionospheric plasma perturbations with a temporal scale of about 1 min or more and the propagation velocities up to several km/s. In order to discuss their generation and propagation mechanisms, it is necessary to operate the radar with a temporal resolution of less than 1 min.

Temporal resolution better than 1 min is difficult to achieve with the typical (traditional) SuperDARN operation modes covering the whole radar field of view. In order to overcome this difficulty, we are planning to install an imaging radar receiver system consisting mainly of USRP (Universal Software Radio Peripheral) receiver units, to the SuperDARN Hokkaido East radar. We succeeded in testing a 4-channel subset prototype receiver system in July 2020. Based on this achievement, we are planning to build a full-set 20-channel receiver system. The latest status and detailed scientific objectives of the imaging receiver system will be presented.