

Comparative Studies Between Ionospheric Doppler Data Using FM-CW Radar and CPMN Magnetic Field Data

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In order to understand the generation and propagation mechanisms of electromagnetic disturbances from polar to middle and low latitude ionosphere, the CPMN (Circum-pan Pacific Magnetometer Network) group is planning to build up a FM-CW (Frequency-Modulated Continuous Wave) Radar array along the 210 magnetic meridian. This project also focuses on contribution to the Space Weather study especially around the earth's space environment.

Now, FM-CW Radar is available in Cebu, Philippines by CRL, and Sasaguri, Fukuoka, Japan by Kyushu University. Further, a negotiation is now going on for installing this new system in Australia.

FM-CW Radar has 2 operation modes. One is 'Ionosonde Mode', and the other is 'Doppler Mode (Fixed Frequency Mode)'. In Ionosonde Mode, a HF radio wave whose frequency is swepted in MHz band is radiated vertically, and echo from the ionosphere is reproduced by Ionograms. As the usual Ionosonde Observation, it takes a few minutes in 1 sweep.

In contrast, a radio wave which has narrow band (order of kHz) swepted frequency is radiated many times in Doppler Mode. It takes less than 1 second in 1 sweep. So, by focussing on the change of the phase of echo wave, it is possible to obtain the Doppler Frequency and Doppler Velocity. Now a time, this Doppler Mode operation is available in only Sasaguri station.

In this presentation, the brief introduction of the FM-CW Radar theory and the latest data in Sasaguri will be shown. And then, the comparative studies between Doppler Data and Magnetic Field Data in CPMN will be given.