

## interferometric detection of invisible VHF radio propagation possibly associated with earthquake

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Recently, earthquake-related electromagnetic phenomena have been reported in various frequency bands. In the VHF band, it is known that anomalous propagation (invisible propagation) precedes larger earthquakes. Temporal correlation between earthquake and anomalous propagation has gradually understood. However, spatial correlation hasn't been understood yet. Then, in this study, we develop a VHF band interferometer system and we have installed the system at Chiba and Numata to identify disturbed area related to earthquake. Accuracy of the develop system has an error of about a few degrees from direction of arrival, if received signal has enough intensity and there signal source locates within 40 degrees from the path.

In practical observation, FM Sendai [77.1MHz] has been selected as the target transmitter. The system is locked in direction of FM Sendai with the elevation of 15 degrees. Additionally, we tune the frequency which is not used for broadcast because of comparison with the natural emission.

We investigate propagation condition associated with (1) upper air profile and (2) earthquake. When a radioduct, which is an inversion layer of the refractive index of the atmosphere which arises by rapid changes of an atmospheric temperature or humidity, is generated, VHF wave is propagated to a distant place by ducted propagation. We found that intensity of a received signal increase and directional arrive of the VHF waves is tuned to be from Pacific coastline where the radioduct appear easily in summer.

As for the analysis on earthquakes, we found that the probability of direction of wave arrived from future focus seems to increase about the shallow earthquake (a maximum of M:5.7) which occurred near the Inawashiro Lake in September 29 and 30,2010.

The above results suggest that effectiveness of the usage two or more VHF interferometers to estimate the earthquake-related scattered source of the VHF wave.