

An examination of passive radars as a new technique for the environmental observation

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We, National Institute of Information and Communications Technology (NICT) examine a new observational technique called passive radar. In general, radars retrieve some information by transmitting radio waves and by receiving their scattered echoes. On the other hand, passive radars never transmit radio waves. It retrieve some information by receiving radio waves which are transmitted by others for the other purposes. Passive radars do not need new radio wave frequencies, and just consist of rather simple and low cost receivers because they do not transmit radio waves. We are going to observe rain fall, wind velocity, water vapor, ocean current, and so on

by this passive radar technique.

The development of passive radar technique is equal to that of receiving technique because they do not transmit radio waves. In these years we develop bistatic radar systems for weather radars and ocean radars. The development of bistatic radar system is also equal to that of receivers. The difference between bistatic and passive radars is whether or not we know the transmitted radio waves. Transmitted radio waves in the bistatic radar system are well-known, exclusive, and suitable for radar signal processing. But in passive radar system, in general, we may not know the transmitted radio waves well because they are transmitted by the others for the other purposes. The basic techniques for both bistatic and passive radars are mainly common, so we are able to consider the bistatic radar system as a kind of passive radar in the broad sense. We develop the receiving systems for both bistatic and passive radars using software radio techniques.

In this presentation, we introduce a bistatic observation experiment for the ocean radar which is conducted in the last September in Yonaguni Island. In this experiments we succeeded retrieving ocean wave spectra using passive radar technique for the first time. Some other examinations for the passive radars are also introduced. Estimations of water vapor and rain fall might be possible using the radio waves for the terrestrial digital broadcasting by the passive radar technique.

Keywords: passive radar, bistatic, radar system