

Capabilities of the ionospheric observation by the PANSY radar in the incoherent and coherent modes

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Capabilities of the ionospheric observation by the PANSY radar will be discussed with the results from the incoherent and the coherent modes of the MU radar. PANSY is a planned VHF radar at the Syowa Antarctic station. It will have a capability to observe the incoherent scatter (IS) echo from the electrons in the ionosphere. The ionospheric electron density, velocity of the ion drift, and plasma temperatures can be measured from the IS observation mode. Because the radio wave frequency is low as incoherent scatter radar, the signal noise ratio is relatively low, and it requires long integration time. This low temporal resolution will limit the temporal scale of the target ionospheric phenomena. The MU radar is using the similar frequency to the PANSY radar, and has same low signal noise ratio for its IS mode observation. The data quality and temporal resolution of the MU radar's IS observation can be a benchmark of the PANSY IS observation. The PANSY radar will also have the capability of the coherent mode observation. It can detect the coherent echo from the plasma turbulences, such as field-aligned irregularities. The MU radar observed various types of coherent echo from the ionospheric E-region and F-region. The high-power observation of the MU radar's coherent mode has clarified several new findings in this field. While at mid-latitude, the MU radar observes the coherent scattering only from the field-aligned irregularities, the PANSY radar is expected to observe the other types of coherent echoes. Capabilities of the PANSY radar will be discussed and compared with that of the MU radar for the incoherent scatter and the coherent scatter modes.