

## Imaging observation of Ionospheric Field Aligned Irregularities by the PANSY radar at Antarctic Syowa Station

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Program of the Antarctic Syowa MST/IS Radar (PANSY radar) is a large atmospheric and VHF-band radar located at the Antarctic Syowa Station. This radar has the capability of a MST radar which observes mesosphere, stratosphere, and troposphere, furthermore it is capable of observing plasma quantities in an altitudinal range from 100km to 500km using the ionospheric incoherent scatter (IS). In 2015, the PANSY radar performed the first ionospheric IS observation in the Antarctica. PANSY radar has a frequency of 47MHz, so it is capable of observing the echoes of field aligned irregularities (FAI) in E region. If FAI has a space scale of half wavelength of radio waves they are coherently backscattered, so PANSY radar observes the coherent echoes from 3-m-scale FAI. Signal processing using adaptive beamforming has been developed, because IS observation of PANSY radar is affected by the FAI echoes. PANSY radar has the FAI array of 24 antennas in addition to the main array of 1045 antennas. FAI array comprises of a pair of peripheral linear arrays of 12 antennas, and it can separate the signal from various angles using the directionally-constrained minimization of power (DCMP) algorithm. In fact, by this algorithm, we can observe not only electron density in the background but also FAI and its motion. In the presentation, we will show the temporal variation of FAI by the imaging observation using the PANSY radar, and figure out a physical process of FAI generation, development, and vanish, by comparing with the data of geomagnetic field or aurora at Antarctic Syowa Station.

Keywords: PANSY, Antarctic Syowa Station, Ionospheric Field Aligned Irregularities, adaptive signal processing