

Ionosphere in low frequency Synthetic Aperture Radar images

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Space borne Synthetic Aperture Radar (SAR) images the Earth's surface through the ionosphere. The images in L-band SAR are known to be distorted by the ionospheric propagation effects associated with ionospheric irregularities both in high and low latitude. We present recent experiments to study ionosphere using space borne radar images, ground radars and GNSS measurements. In high latitude, during evenings of geomagnetic disturbances, the enhancement of ionospheric electron densities associated with auroral activity is detected by ground observations. The simultaneous acquisitions of SAR show distortions of the ground images where streak-like structures are present. In low latitudes, on the other hand, the post-sunset drifts of plasma instabilities monitored by ground radars are seen as stripe structures in SAR images. We develop methods to identify ionospheric parameters from SAR measurements and propose it as a new complementary method for ground radars.

Keywords: Ionosphere, SAR, GNSS