IONOSPHERIC STREAKS APPEARED IN THE PALSAR IMAGES

M. Shimada[1)], Y. Muraki[2)], and Y. Otsuka[3)]

1 Earth Observation Research Center, Japan Aerospace Exploration Agency, Sengen 2-1-1, Tsukuba, Ibaraki, 305-8505, Japan

2 Department of Physics, Konan University, Kobe, 658-0073, Japan

3 Solar-Terrestrial Environment Laboratory, Nagoya University, Toyokawa

Keyword: ALOS, PALSAR, Scintillation, Streaking, Plasma Bubble, Geomagnetic line

Abstract

SAR image acquired in the nighttime (10:30 PM local time) at the magnetic equatorial regions, i.e., Amazon, Africa, and the south East Asian areas, are often interfered by the streaks since the ALOS launch of the Jan. 24, 2006. These streaks appear both in amplitude image and phase of the SAR data, which contain the interferometric fringe and polarimetric phase. JAXA/EORC is conducting the quick look processing of all the acquired SAR images to monitor the image quality, forest status, and sea ices status by utilization the fast SAR processor. In this regard, we are counting the streaks from the images. Although the streaks range from the weak ones to the highly contaminated strong ones, only manual counting shows the robust measure of these phenomena.

The first image that showed the streaks appeared in the initial mission check of the ALOS/PALSAR in April 2006 [1]. A cloud of streaks widely appeared in the ScanSAR image with the dimension of 200km in range (east-west direction) and 800km in azimuth (north-south direction) locating the geomagnetic equator of the Amazon Region (see Fig. 1 left). The streaks are almost aligned with the geomagnetic lines and the spatial wavelength ranges 400 m to 2000m. These streaks are seems to be caused by the scintillation of the SAR signal interfered with the distributed eddy of the plasma bubbles, which causes the non-uniformity of the refractive index.

In this study, we will show correlation of the number of the streaks associated with the SAR images for 2006-2008 and those for the number of the dark spots on the sun surface

(see Fig.1 right image).

We also try to theoretically analyze the scintillation in the SAR image.

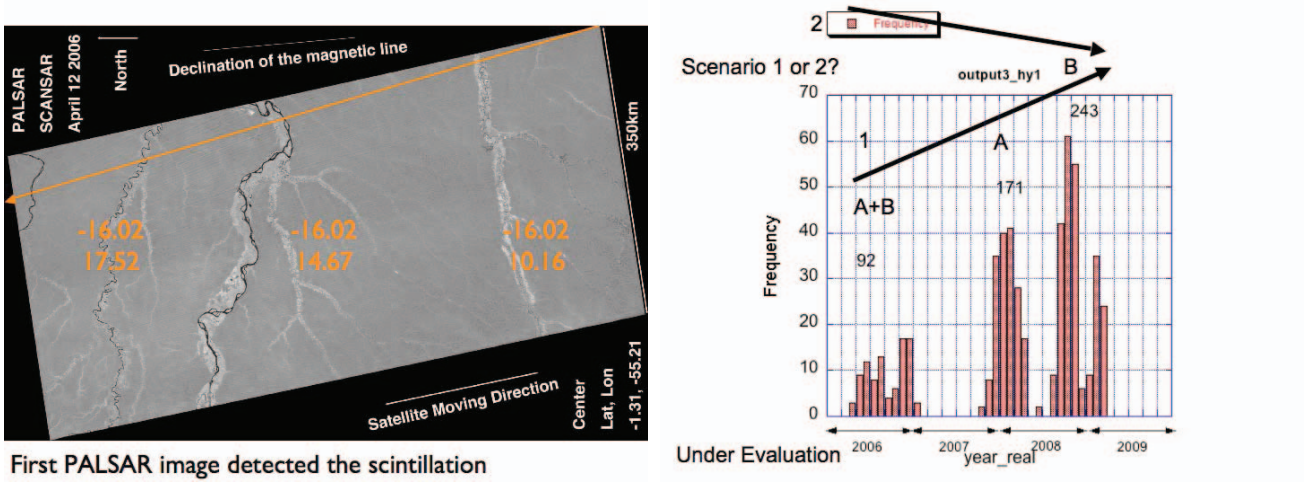

Figure 1. Left image is a sample of the SAR image interfered by the streaks, and right image is trend of the occurrence.

Conclusions

In this paper, we will show two recent results, 1) trend of the scintillation number after 2006 and its correlation with dark sun spot, 2) occurrence correlation between the SAR images and the Rocksat images, and 3) Theoretical expression on how the streaks occur in the SAR images.

References

M. Shimada, Y. Muraki, and Y. Otsuka, “DISCOVERY OF ANOUMOULOUS STRIPES OVER THE AMAZON BY THE PALSAR ONBOARD ALOS SATELLITE
,” Proc. of IGARSS2008, Boston.