

All sky imaging of airglow emissions at Mt. Lulin, Taiwan

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Abstract

This paper describes the preliminary results the all sky imaging experiment conducted from Mt. Lulin (23.47° N, 120.87° E; 13.45° N Geomagnetic), Taiwan. The temporal variation of the nighttime airglow intensity at different wavelengths and the possible geophysical implications are discussed. We also report the traveling ionospheric disturbance (TID) structures observed in the 630.0 nm images.

Introduction

The night time ionosphere is characterized by a variety of phenomena such as equatorial spread-F (ESF), and traveling ionospheric disturbances (TIDs), which often results in large scale modulation of the plasma density. In order to investigate these ionospheric structures, an all sky imager is developed at the Institute of Space Science, National Central University, Taiwan, and routine observations are carried out during new moon period. These are the first measurements of the nightglow intensity variations over Taiwan.

Observation

The imaging system is operated from Mt. Lulin, during the new moon periods since August 2006. The 557.7, 630.0, and 777.4 nm airglow lines are used, and images are taken at every 15 minute interval. The recorded images are processed to

remove background and system noise. A series of the 630.0 nm images taken in the night of 22 December 2002 are displayed in Figure 1. Dark bands of depleted airglow intensity are seen in these images, which appear pronounced at 0302 and 0317 LT respectively

Discussion and Conclusion

. The depletion in Figure 1 has a width of about 65 km, and appears to drift at about 60 m/s in the south-westward direction. Such westward drifting TID structures have been reported by Garcia et al., (2000). Ionograms showed weak spread-F at the time of appearance of the airglow depletions. There was no significant geomagnetic activity during the observation period in this month, allowing speculating on their lower atmospheric origin. Shiokawa et al. (2002) noted there is an apparent propagation limit at 18° Magnetic Latitude for the mid latitude TIDs, but in Figure 1 they seem to extend further southward.

References

- Garcia, F. J., M. C. Kelley, and J. J. Makela, 2000: Airglow observations of mesoscale low-velocity travelling ionospheric disturbances at midlatitudes, *J. Geophys. Res.*, **105**, 18,407-18,415.
- Shiokawa, K., Y. Otsuka, M. K. Ejin, Y. Sahai, T. Kadota, C. Ihara, T. Ogawa, K. Igarashi, S. Miyazaki, and A Saito, 2002: Imaging observations of the equatorward limit of midlatitude travelling ionospheric disturbances, *Earth Planets Space*, **54**, 57-62.

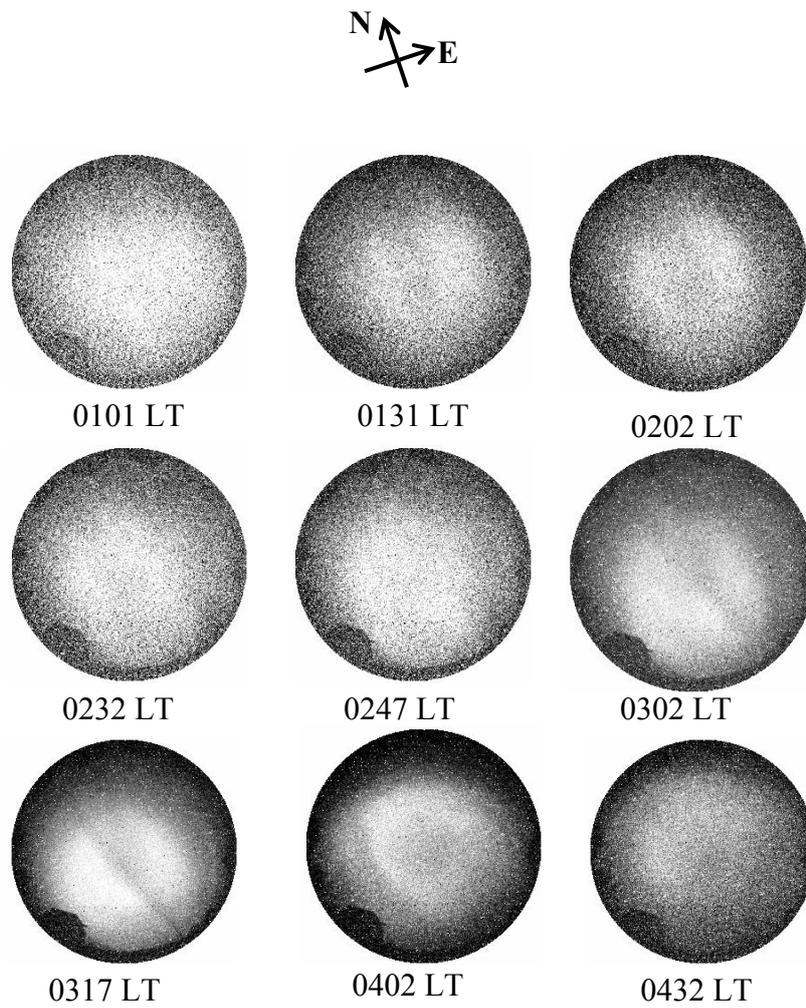


Figure 1. A series of 630.0 nm images taken in the night of 22 December 2006. Dark bands of reduced airglow intensity are visible in the images at 0302 and 0317 LT. The north and east directions are indicated by the arrows.