

Upper Atmosphere phenomena in Geomagnetic Anomaly Region in association with Magnetosphere Disturbances

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Since 1999, we continuously study/observe upper atmosphere phenomena in Geomagnetic Anomaly Region (South Atlantic Anomaly: SAA) by using several equipments and obtained several interesting results. We show several remarkable phenomena in SAA on the basis of imaging riometer data and CCD imager data obtained at Southern Space Observatory (SSO; 29.4S, 307E) in Brazil and other stations.

(1) Particle precipitation in SAA seems to be related with polar disturbances. From imaging riometer data, enhancement of Cosmic Noise Absorption (CNA) occurs simultaneously with magnetic disturbances in polar region. On the other hand, CNA at Kakioka imaging riometer can be also seen during polar disturbance (not so frequently observed). It may suggest that particle precipitations are occurred in association with substorm at Kakioka as well as SAA.

(2) In sometimes, strong CNA is observed in association with sharply decreasing of electron flux (GOES satellite data) after moderate polar disturbance period. It may indicate that injection and drifting of electrons after polar disturbances precipitate in SAA during this period.

(3) It is well known that VLF waves trigger precipitation of radiation belt particles.

Although the longitudinal difference is 94 degrees (6 hours local times) between Syowa Station, Antarctica and SSO, CNA at SSO is nearly simultaneously observed with VLF emissions at Syowa Station. It may suggest that particles are more easily precipitating and observed in SAA through the wave particle interactions in radiation belt.

(4) Static multiple bands are singularly observed at SSO. The characteristics of static multiple bands are different from atmospheric gravity waves. They are fixed at the ground and rotate with earth rotation. This phenomena is very seldom and looks like occurs in winter season. The luminosity of these phenomena are not clear but less than 150R like airglow level..

We almost finished to construct South America Riometer Network (SARINET; 7 stations) and hope to collect data continuously during one solar cycle.

Keywords: South Atlantic Geomagnetic Anomaly, Cosmic noise absorption, Imaging riometer, Radiation belt, Airglow



South America Riometer Net work (SARINET)