

## **Study of longitudinal structure of plasma bubbles with the Equatorial Atmosphere Radar**

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Equatorial Atmosphere Radar (EAR) has continued experiment of plasma bubbles by observing intense echoes from field-aligned irregularities (FAIs) since 2001. As the EAR can steer its antenna beam in multiple directions, we have investigated spatial structure of the FAIs within the observation region. National Institute of Information and Communications Technology (NICT) installed the meridian chain of three FMCW ionosondes located at the EAR site, near the geomagnetic equator, and the magnetic-conjugate point to the EAR. Collaborative observations with the EAR and the ionosondes have shown that the FAI echoes are well associated with the prereversal enhancement near the sunset period. Based on the knowledge from our observations, in this study, we have investigated longitudinal structure of FAIs from the EAR data. Measurement of eastward drift speed of the FAI echoes above the EAR shows that the speed is the maximum right after the onset of echoes, and decreases with time. We assumed that the FAIs occur at the local F-region sunset time, and the FAIs propagate eastward. As the eastward speeds of the FAIs are observable with the EAR, we could estimate location of the FAI origin even when the origin is far west of the EAR observable region. We took into account the decrease of the eastward drift speed in the estimation. From the investigations, we found that the FAIs were originated within 2000 km west of the FAI. The origin regions have periodic structures with wavelengths of approximately 500 km. This indicates that the plasma bubbles are associated with prereversal enhancements that not-uniformly distribute along the longitude.

Keywords: low latitude ionosphere; plasma bubble; radar experiment; F-region; equatorial spread F; longitudinal structure