

# Study of low-latitude field-aligned irregularities based on the Equatorial Atmosphere Radar Multi-beam observation

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In the geomagnetic equatorial region, a local decrease of the electron density produced in the lower ionosphere often spreads to the topside ionosphere quickly. This phenomenon is called plasma bubbles. Plasma bubbles are extended along the geomagnetic field, and are accompanied by meter-scale field-aligned irregularities (FAIs). We can observe FAI echoes as tracers of plasma bubbles with the VHF-band radars. In order to investigate the generation mechanism of FAIs associated with plasma bubbles, we have observed them with the Equatorial Atmosphere Radar (EAR) in West Sumatra, Indonesia. Since the EAR is located in the geomagnetic Southern Hemisphere (geomagnetic latitude: 10.6 degrees S), it is possible to clarify the difference from FAIs in the geomagnetic Northern Hemisphere. It is expected to reveal the generation mechanism of FAIs and plasma bubbles with the EAR.

From the previous observations, we revealed the spatial structure and the temporal variation of FAIs associated with plasma bubbles. It was also found that the FAI echoes usually appeared below the F peak, which satisfied the condition of the Rayleigh-Taylor instability. In 2003, we conducted more observations from March 25 to April 8 and from September 15 to September 30. We found that plasma bubbles were much less frequent in 2003 than in 2002, but found several cases that appeared just before the local sunrise of the F region. FAI in the morning propagated westward, which was opposite to the propagation of the nighttime FAIs. We investigated the FAIs around the sunrise and compared them with those in the nighttime. We will also present observations from CPEA (Coupling Processes in the Equatorial Atmosphere) International observation campaign planned in March 2004, and discuss characteristics of the low-latitude FAIs.