

# Observational study of the equatorial thermosphere and ionosphere over Indonesia: CPEA results

# Tadahiko Ogawa[1]; Kazuo Shiokawa[2]; Yuichi Otsuka[2]

[1] STE Lab., Nagoya Univ; [2] STE Lab., Nagoya Univ.

As part of the CPEA (Coupling Processes in the Equatorial Atmosphere) program, we have been conducting radio and optical observations of the equatorial ionosphere and thermosphere at the Equatorial Atmosphere Radar (EAR) site in West Sumatra, Indonesia since October 2002. The following instruments are now in operation: 1) GPS receiver for total electron content measurement, 2) three closely-spaced 1.58-GHz GPS scintillation receivers (GPS-SRs) for irregularity-drift measurement, 3) all-sky CCD imager (ASI) at four wavelengths, 4) airglow temperature photometer at two wavelengths, and 5) magnetometer. In addition to these, a 30.8-MHz radar to detect coherent echoes from the E- and F-region will begin its operation in June 2005. One of the hot topics is plasma bubbles observed with ASI, GPS-SRs, and EAR. Bubbles imaged by ASI are well coincident with those simultaneously detected by both EAR and GPS-SRs, suggesting that the small-scale electron density irregularities causing EAR echoes (3.2 m) and GPS scintillations (about 250 m) are embedded within bubbles. A plasma bubble drift can be estimated from a cross-correlation analysis of scintillation signals from the three GPS-SRs. Temporal variations of the drifts thus determined are very consistent with those from previous observations, indicating that multiple GPS-SRs are useful for the monitoring of bubble movements, i.e., of F-region electric fields. The two-year monitoring of the GPS scintillations tells that the scintillations appear during postsunset - midnight (2000 - 0100 LT) in equinoctial months (March - April and September - October), consistent with the well-known feature of plasma bubble occurrence. We also show an initial result from the ASI observations of medium-scale atmospheric waves in the equatorial anomaly.