

## Low-latitude ionospheric features obtained with GRBR and GPS in Southeast Asia

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To reveal the low-latitude ionospheric phenomena, the TEC from GNU radio beacon receiver (GRBR) and GPS were investigated. Naturally, the Earth's ionosphere is an irregular medium and unstable. It causes the passing through signals scatter and delay. Also, it degrades the satellite communications signal such as the GPS signal and causes the loss-of-lock. Currently, the GPS signal is widely used in daily life for positioning and air navigation system. Thailand tends to be the hub of air-transportation in Southeast Asia, which located at the EIA or "Equatorial Ionization Anomaly" zone. Understanding of ionosphere effects and its phenomena in Southeast Asia thus becomes important as it impacts on people safety issues. TEC can reveal the nature and the evolution of the ionospheric plasma. The technique to estimate the TEC was developed. As a result, the EIA and the plasma bubble (PBB) were captured. It was obvious that nocturnal EIA asymmetry mainly depends on the trans-equatorial wind. The PBB signatures, spatial TEC fluctuation and scintillation in time domain, were seen during the spread-F appearance. The pre-dawn depletion was clearly detected by GRBR, while it was shallow with GPS detection. It is due to the sparseness of the GPS network that should be improved to support the future plan of being the air-transportation hub in Southeast Asia.