

REJUVENATING IONOSPHERIC AND GEOMAGNETIC RESEARCH IN MALAYSIA

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Abstract:

The last known record of an ionogram in Malaysia, was that of Penang, under the Federation of Malaya, in 1948. Since then, concerted ionospheric research activities has not been carried out, at least until the early 90's, when investigations of TEC using the 15 Malaysian GPS receiver network began, by researchers at Universiti Kebangsaan Malaysia under a government initiative grant [1,2]. The program produced only two Masters thesis. It was only in 2001 when research into ionospheric and geomagnetic activities in Malaysia was carried out intently at the Tun Hussein Onn University College of Technology (10 51' N, 103o 5' E) near the town of Batu Pahat, through the university's Wireless and Radio Science (WARAS) Centre . The research activities involve the setting up of an ionospheric monitoring facility and a geomagnetic observatory station. The ionospheric facility is actively collecting data on a daily basis, while the geomagnetic observatory station will be commissioned in March 2005. The ionospheric station uses a four-receiver interferometric digital ionosonde to investigate the dynamic changes in the equatorial ionosphere. The digisonde is used to determine the critical frequency and virtual height, gyrofrequencies and to observe the plasma drift in the ionosphere layer. For example, in December 2004, the highest critical frequencies observed was 10 MHz and lowest 1.7 MHz. The tsunami catastrophe of 26 December 2004 showed the median frequency range due to seismic activities is between 4.4 MHz to 5.4 MHz. The importance of the geomagnetic observatory station is to relate the ionospheric phenomena with regards to the Earth's magnetic field variations. The Centre also operates two dual-frequency GPS receivers to study the TEC and scintillation events. In this paper, we present some typical observations from the digisonde, magnetometers, and GPS receivers. The development of both stations is a vital part of the University's research activities on radio science. It is expected that the facility will spur further study of the equatorial ionosphere and make up for lost time in radio science research in this region.

[1]Zain, A.F.M., and Abdullah, M., Initial Results of Total Electron Content Measurements over Arau, Malaysia, Proc. 4th IEEE Malaysia International Conference on Communications 1: 440-443, 1999.

[2]Zain, A.F.M., and Abdullah, M., Measurements of Total Electron Content Variability at Miri, Sarawak: Short Term Analysis, Proc. 2nd ICAST 2: 1967-1975, 2000.