

Mapping the regional ionosphere over Malaysia using Spherical Cap Harmonic Analysis during high solar activity

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This paper utilized the spherical cap harmonic analysis (SCHA) to map the regional TEC over Malaysia for the most recent solar maximum, 2014 and analyzed the distributions and variations of the TEC at different temporal and spatial scales. High-density GPS receivers known as the Malaysia Real Time Kinematic Network (MyRTKnet), which are owned by the Department of Mapping and Surveying Mapping (JUPEM) Malaysia were used in this study. The results showed that MyRTKnet are sufficient for mapping the TEC over Malaysia using SCHA under high solar activity. The result from the SCHA model were compared with the global ionosphere mapping (GIM) model from CODE and other regional models. Result show that the SCHA model has a better solution in mapping the TEC based on GPS observations and better performance in temporal and spatial domains for the Malaysia region. By taking advantage of high-density GPS receivers over Malaysia, SCHA parameters can be used to model ionospheric dynamics over Malaysia as well as to investigate TEC variations under quiet and disturbed ionospheric conditions.

Keywords: ionosphere, TEC, spherical cap harmonic analysis