



## **Study the gradient characteristics of the ionosphere at equatorial latitude during the latest cycle of solar activity**

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The sun has its own seasons with an average duration of about 11 years. In this time, the sun enters a period of increased activity called the solar maximum and a period of decreased activity called the solar minimum. Cycles span from one minimum to the next. The current solar cycle is 24, which began on January 4, 2008 and is expected to be ended in 2019. During this period, the ionosphere changes its thickness and its characteristics as well. The change is most complicated and unpredictable at the equatorial latitudes in a band around 150 northward and 150 southward from the equator. Thailand is located in these regions is known as one of the countries most affected by the ionosphere change. Ionospheric information such as the vertical total electron content (VTEC) and scintillation indices can be extracted from the measurements of GNSS dual-frequency receivers. In this study, a Matlab tool is programmed to calculate some ionosphere parameters from the normal RINEX observation file including VTEC value, amplitude scintillation S4 index and others. The value of VTEC at one IGS station in Thailand (13.740N, 100.530E) is computed for almost one full solar cycle, that is 8 years, from 2009 to 2016. From these results, we are able to derive the rules of TEC variation over time and its dependence on solar activity in the equatorial regions. The change of VTEC is estimated in diurnal, seasonal and annual variation for the latest solar cycle. The solar cycle can be represented in several ways, in this paper we use the sunspot number and the F10.7 cm radio flux to describe the solar activity. The correlation coefficients between these solar indices and the monthly maximum of VTEC value are around 0.87, this indicates a high dependence of the ionosphere on solar activity. Besides, a scintillation map derived from GNSS data is displayed to indicate the intensity of scintillation activity.