PROPAGATION OF TWEEK ATMOSPHERICS IN EARTH IONOSPHERE OBSERVE IN MALAYSIA

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ABSTRACT

Lightning discharges produce ELF/VLF pulse signals propagate in Earth-Ionosphere waveguide over long distance with frequency dispersion characteristic known as tweeks atmospherics. This paper presents the observation of propagation of tweek atmospheric in Earth-ionosphere received at Selangor station (2.92°N, 101.77°E). A total of 714 tweeks were recorded during 25 May 2010 and 19 June 2010. Observation on 25th May 2010 found that the electron density at reflection height of 84-93 km varies from 21 to 24 el/cm^3 whereas on 19th June 2010 electron density at reflection height of 87-93 km varies from 21 to 23 el/cm^3. Using LIS data from GHCC, Two tweeks were found to originate from Nepal and Philippines Island. The reflection height and the estimated electron density for tweek from Nepal and Philippines were found between 87.21 km and 23.46 el/cm^3 and 81.65 km and 25.06 el/cm^3 respectively. It shows that tweek originated from Nepal has higher reflection height compared to the tweek from Philippines.

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INTRODUCTION

1.1 BACKGROUND STUDY

Lightning strike is a power electromagnetic signals from few Hertz to tens of MHz but the maximum radiated energy is in the extremely low frequency (ELF: 3- 3000Hz) and very low frequency (VLF: 3-30 kHz) band[1]. Electromagnetic impulse signals launched by individual lightning discharges with certain frequency dispersion characteristics at lower end are known as tweek. The tweek waveform in the ELF/VLF range propagates by reflecting in multiple reflections from boundaries of natural waveguide formed by the Earth's surface and the lower ionosphere layer[2].

Tweeks have been used by researcher to estimate the ionospheric reflection height (h), equivalent electron densities (n_e) at reflection heights, propagation distance (d) and the geographical locations of the source discharge.