TERMINATION TIME ANOMALY IN NWC (19.8 KHZ) VLF TRANSMITTER SIGNALS DURING

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Abstract:

Employing AbsPAL receiver, amplitude and phase of VLF fixed frequency transmitter signals (19.8 kHz) propagating between NWC Australia and Agra, India through earth-ionosphere waveguide have been monitored since October 2001.Recently, we have analysed amplitude data for the period of 1 December 2004 to 6 January 2005, in order to examine the effect of tsunami earthquake that occurred on 26 December 2005 near Sumatra (Indonesia, Lat.3.4N, Long.95.7E) The data have been analysed to determine the morning and evening "termination times", which are characterised by deep minima during sunrise and sunset hours. For this purpose, we have considered daily sunrise and sunset times data which are determined from a software available in a website and also compared with those available in local news papers. The deep amplitude minima should normally coincide with sunrise and sunset times, However, we find that the variations of sunrise amplitude minima (Tm-morning termination time) are close to the sunrise times on almost all the days before 19 December 2004 but deviate considerably between 19 December 2004 and 1 January 2005 and then return to normal days variations. Another feature of morning termination time variations is that during normal days they occur a bit prior to sunrise times, whereas from 19 December 2004 to1 January they occurred much later than the sunrise times .The variation of evening termination times is similar to that of morning termination times except that here the termination times occurred after the sunrise times almost all the days. In both cases of morning and evening termination times the anomalous variation between 19 December 2004 and 1 January 2005 is very clear which may be attributed to tsunami earthquake. An interesting result that comes out from this study is that the anomaly appears about a week before the occurrence of earthquake. There are two possibilities which may be responsible for this anomaly. The first possibility is that, the radon gas emanated from the epicenter of the earthquake may interact with the neutral gases in overhead ionosphere and create additional ionization, which may influence the amplitude and phase of the VLF transmitter signals, and the second possibility is that the electric fields generated during earthquake process may penetrate the overhead ionosphere and bring down the lower boundary by a few kilometers, so that the propagating signals may be influenced in phase and amplitude.