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Estimating the VLF modal interference distance using the South America VLF Network (SAVNET) (Article)

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Abstract

Pronounced amplitude minima are observed during the subionospheric propagation of VLF waves at times (Terminator Times) when the Terminator Line crosses given locations along the propagation path. The distance between such two successive minima is called the modal interference distance D , which is related to nighttime mode propagation in the Earth-ionosphere waveguide. Therefore, the temporal behavior of the distance D can bring information on the dynamics of the nighttime lower ionosphere and on the presence of external forcing agents, including those associated with seismic activity. In this paper we present a methodology to estimate D based on the measure and analysis of the pronounced VLF amplitude minima. We have used a long-term database of almost 5 years from three different VLF propagation paths from the South America VLF Network. We emphasize that the accuracy of the determination of the distance D achieved by our method is better than those obtained in earlier studies. The reason for that is the use of a long-term continuous database, from different parallel propagation paths mainly oriented along the west-to-east direction. We discuss typical properties of the obtained distance D , as the simultaneous occurrence of amplitude minima for parallel propagation paths, anomalous values of D at locations where the Terminator Line is close to the receiver, and the derivation of the undisturbed nighttime ionospheric height at $h_N \sim 88$ km. ©2014. American Geophysical Union. All Rights Reserved.

Author keywords

lower ionosphere Terminator Time VLF modal interference distance VLF waves

Indexed keywords

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