

Real-Time Real-Altitude Comprehensive Characterization of TID Activity Based on Dynasonde Data Analysis

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The approach to ionospheric radio sounding specific to Dynasonde technique allows one, among other things, to detect and to attribute to real altitudes wave activity in the ionosphere [1]. This is done by processing data obtained in a common, standard for Dynasondes ionogram mode of radar operation. Information about standard parameters of the ionospheric E, F regions (including the electron density profile), possibility to obtain vector velocities characterizing movement of plasma contours, and quantitative parameters of the km-scale irregularity spectrum are not lost and contribute into comprehensive description of dynamic activity in the thermosphere-ionosphere system.

We report the first results of real time application of this method at several Dynasonde locations. A few animations will be shown presenting typical TID (Traveling Ionospheric Disturbance) dynamics (Lomb-Scargle periodograms vs real altitude) at different geographical regions. We will explain how information of this kind facilitates understanding of both general properties of the TIDs and their specific behavior. Practically important properties of the TIDs include a) their almost constant presence, b) typically in the form of several wave packets simultaneously, and c) a possibility for wave packets to occupy a limited space both in horizontal and in vertical dimensions (see Figure 1). Statistical information about the TID parameters obtained by this method represents a valuable resource for validating models describing their origin and propagation.

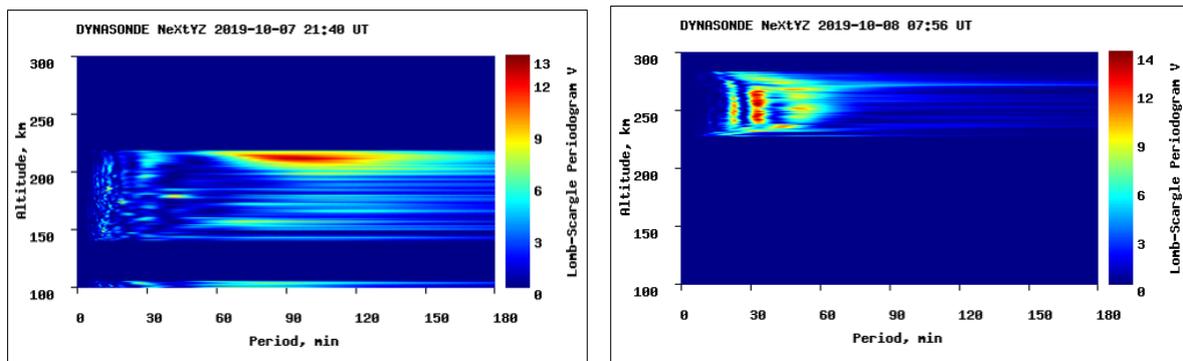


Figure 1. Selected frames from the animations showing multiple TID packets detected in a broad altitude range.

Reference

- [1] N. Zabotin, O. A. Godin, C. Negrea, T. Bullett, L. Zabolina, "Studies of wave activity in the thermosphere-ionosphere system using Dynasonde techniques," *XXXIInd General Assembly and Scientific Symposium of the International Union of Radio Science (URSI GASS)*, Montreal, QC, 2017, *IEEE Xplore*, pp. 1-4, doi:10.23919/URSIGASS.2017.8105216.