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AGW manifestations in the Earth neutral atmosphere and ionosphere

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Acoustic gravity waves (AGW) manifestations spread from the lower atmosphere to the upper layers due to processes such as orography, weather fronts, deep convection atmosphere, and vice versa, can form in the upper atmosphere during geomagnetic activity, receiving energy from the magnetosphere. These wave processes can be considered as a dynamic process that transfers energy between different atmospheric and latitudinal regions, therefore it is important to understand their basic parameters and behavior.

In this work, to study wave disturbances, we used the Keo Sentinel optical system data, designed to record the spatial pattern of the 630 nm emission intensity (emission height 180-300 km). The system is located at the Geophysical Observatory (GPO) of the ISTP SB RAS, near the Tory, Buryatiya, Russia (52^0 N, 103^0 E, height 670 m). The interference filter transmission half-width is ~ 2 nm. Sight direction - zenith, field of view 145 degrees, exposure time 30-60 s (http://atmos.iszf.irk.ru/ru/data/keo).

For the analysis, we chose data obtained on clear, moonless nights from 2014 to March 2019. The total number of nights selected for analysis was 71 (~ 491 hours). An algorithm for the wave events and their characteristics automatic identification from the optic data was developed and tested. The approbation was carried out on a data set previously processed manually [Syrenova, Beletsky, 2019]. A comparison was made with traveling ionospheric disturbances (TID) characteristics obtained from the ISTP SB RAS radio-physical complex data [Medvedev et al., 2012].

The main directions of wave disturbances propagation obtained with automatic optical system data processing - southward (~ 175º) and eastward (~ 90º) - are similar to the TID directions. From the radiophysical complex data, the TID distribution from North to South prevails, the most probable azimuth is ~ 135º during the day, and ~ 205º at night. The most probable values of the wave disturbances propagation velocity obtained as a result of automatic processing are about 80 m/s. These values also accept well with the TID values.

The main characteristics obtained using the data of the optical and radiophysical complexes agree with each other. Differences in the preferred propagation direction of the recorded wave structures from the KEO Sentinel data from the directions obtained with photometers at the same observation point [Tashchilin, 2010, Podlesny, 2018], probably, associated with different

observation heights.

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