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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Response of OH airglow emissions to the mesospheric gravity waves and its comparisons with full wave model simulation at a low latitude Indian station" *by* R. N. Ghodpage et al.

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Interactive comment on "Response of OH airglow emissions to the mesospheric gravity waves and its comparisons with full wave model simulation at a low latitude Indian station" by R. N. Ghodpage et al. Response to the comments/suggestions made by Referee#2

Received and published: 11 January 2016 General Comments The paper presents an analysis of the experimental data obtained by the photometer in Kolhapur, (16.8 âŮęN,

74.2 âŮę E), India, in order to detect variations in the characteristics of the hydroxyl radiation (intensity, temperature, time lag between them) at propagation of internal gravity waves (IGW) through the emission layer. It is not clear by what criteria, as the parameters characterizing the disturbance of characteristics of the observed emission of hydroxyl, the authors used Krassovsky's numbers η and Æ§. In the main conclusions of the article the authors present differences or coincidence of the obtained values of Krassovsky's numbers with the data of the numerical modelling executed for conditions of observation, and with the data, obtained in a number of others published works. Neither the analysis, nor discussion of the causes of revealed differences (coincidences) in this article is not presented. The article has no clear purpose and a problem on which solving the authors made efforts. The paper requires considerable revision before it can be published.

Response: We thank reviewer for the help rendered to us in improving the content of our manuscript. We have worked on the comments & suggestions made by the reviewer in the revised manuscript. Following are our point-by-point responses (bold fonts) to his/her comments (black fonts).Corrections made in the manuscript are reflected as bold letters.

Specific comments 1. There is no description of the organization of the hydroxyl emission monitoring - was the radiation observed at one point of the sky or at several points? To register IGWs using any emission (in this case - the hydroxyl emission) is required to satisfy the condition of observation necessary to identify them - simultaneous observations of variations in the intensity and temperature in the layer not less than in three sites of the sky.

Response: We have observed at one point of the sky over Kolhapur. Unless we need to get the vertical profile and propagation direction of observed gravity waves, observations at 3 sites are not a require criteria. Kindly note that observations of gravity waves from a single locations with photometry are well documented and to get the kind of parameters we intend have been performed in the past as well (e.g., Takahashi et al.,

2002; Reisin and Scheer, 2004; Lopez-Gonzalez et al. 2005).

2. There is no description of the methodology for determining the absolute values of the intensity of emission of hydroxyl, its variations, and accuracy. 3. There is no description of a technique of definition of the rotational temperature ofthe hydroxyl emission and accuracy of its definition. 4. There is no description of the analysis of statistical data providing satellite measurements, which are used together with ground-based measurements.

Response: In modified manuscript we have added description related to OH emission (in introduction section). As suggested we have now included the technique descriptions and statistical errors and significance at suitable places.

5. What criteria did the authors use, attributing observed variations in characteristics hydroxyl emissions as associated with IGW impact?

Response: In order to study the wave features present in the MLT region, we consider only those clear sky days having more than 5 hours of continuous data. After assuring that data is not contaminated by the passage of clouds, we have normalized data (mean intensity deviation / mean) for finding the wave feature in data. The long period wave estimates may be biased when the data length is comparable to that of the wave period and therefore in our study we have considered only those waves whose periods are substantially less than the length of the available data. Equation (2) is valid for the zenith observation and for plane waves and not valid for the evanescent waves. In this study, we have deduced the Krassovsky parameters and vertical wavelengths for the mesospheric OH band.

6. In Figures examples of variations of observed intensity and temperature in absolute values should be presented.

Response: In the absence of standard calibration source, we have used relative intensities in arbitrary units. Thus the derived temperatures are absolute while the intensity

data is in relative units. In the Krassovsky analysis, we need the percentage amplitude variations instead the absolute values of intensity and temperature. Therefore, we have normalized data (mean intensity deviation / mean) for finding the wave amplitudes in data.

Interactive comment on Atmos. Chem. Phys. Discuss., 15, 35881, 2015.