

Interactive comment on “Lidar observations of atmospheric internal waves in the boundary layer of atmosphere on the coast of Lake Baikal” by Viktor A. Banakh and Igor N. Smalikho

Anonymous Referee #1

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The paper shows the ability of the Doppler lidar to visualize the spatiotemporal structure of the wind field in the atmospheric boundary layer, and reveal the presence of low-level jet streams and atmospheric internal waves. Six atmospheric internal wave (AIW) occurrences were observed using Halo Photonics Doppler wind lidar measurements. Results of the wind flow analysis along with an explanation of the approach to determine wave frequency, phase and amplitude, were described in the paper. Because of the importance of the AGWs for understanding atmospheric vertical energy and momentum transfer and improvement of model parameterization, information presented in the paper deserves attention in scientific literature.

The manuscript falls into the scope of AMT and provides scientifically sufficient results.

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Discussion paper



Therefore my recommendation is to accept this manuscript for publication in AMTD after revisions.

Major revisions The paper requires some clarification in the description and the order of cases shown. For example, Figs 3-7 describe an observed case during Aug. 23, then Fig 8 shows the case observed on Aug. 19. Figs 9-10 show another case on Aug. 23. Not clear of the logic behind this jumping from one day to another and coming back to the first day again. It would be easier to read the paper if the results are organized by either the date or time of the observed events, or at least by the period of oscillations of waves. Results presented in Figs 5 and 6 are confusing. Figure 5 showed detailed analysis and temporal profiles at “a height of 636.5 m of wind taken from data in Fig. 3”. The following sentence states that: “They [wave oscillations] are especially marked in the period from 13:30 to 15:30.” However, Fig. 6 shows results when models 1 and 2 were “applied in the analysis of data ...for a height of 766.4 m and 47-min time interval starting from 14:20.” Why do not apply models first to data as in Fig. 5 and then repeat the analysis of data at the other (766.4 m) height and “47-min time interval”? The authors may provide the range of the lidar measurement uncertainty since the values of some wave parameters are very low. They also may reference more similar studies using Doppler lidars such as Yansen Wang et al, 2013, JARS, v.7, “Investigation of nocturnal low-level jet-generated gravity waves over Oklahoma City during morning boundary layer transition period using Doppler wind lidar data” In addition, description of an agreement between presented results with previous studies would only strengthen the paper.

Minor revisions

Abstract Line 9 “jet streams at heights of ...700 m.” Are these heights above ground level (AGL) at the lidar location or above the surface (ASL) of the lake? Better to state at the beginning what heights (AGL or ASL) were used throughout the paper.

Introduction Line 17 Indent the sentence “Atmospheric. . . Line 25 “[Baumgarten et al.,

2015]”. Consider mentioning the paper of Newsom et al, 2003. They also used the Doppler lidar measurements over a flat terrain to characterize the wave field, its interaction with the mean flow, and its role in turbulence generation.

Page 2 Line 15 “340 m from Baikal “. From what point on the lake coast was the distance counted? Indicate this distance on Figure 2. Lines 23-24 “The wind in the atmospheric surface layer during the measurements was mostly directed from the north through the mountainous terrain toward Lake Baikal”. The sentence arises the following questions: What is your definition of the atmospheric surface layer here? How far the second mountain hill was from the lidar location (Fig.2)? May it influence the measurements of the northerly winds? Line 28 “250 and 750 m “. You may add AGL Line 31 “They are especially marked in the period from 13:30 to 15:30”. Suggest to use the word “evident” instead of “marked”

Page 3 Line 11 “Model (1), (2) was applied.” Rewrite as “Models (1) and (2) were applied...”

Summary Page 5, Line 2 “day tame”, change to “day time” Suggest to rewrite the next sentence “The low level jet streams were observed by day and night while none of the AIWs events was in the night time,” as follows: “The low level jet streams were observed during day and night times while none of the AIWs events were observed in the night time”

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