Response to Prof. Sukoriansky:

1) “The title of the paper is too general. I think it should directly reflect the main objective of the work, namely, the effect of IW on a free evolution of small-scale turbulence near a pycnocline. ”

Our original idea was to include the “pycnocline” in the title. However, some part of the paper is devoted to the turbulence dynamics in a stratified region *above* the pycnocline in the absence of IWs, both at some distance of it and in its vicinity. So we came to a more general title (in its present form) hoping that it would not confuse the reader since, as we think, the immediately-following abstract explains in more detail what is done in the paper.

2) “Throughout the paper the authors promote the idea that in the strongly stratified regions the turbulence becomes quasi-two dimensional. For example, on p.338, lines 20-23 and on p.339, lines 20-25, they argue that since the vertical velocity fluctuations become much smaller than their horizontal counterparts, the 3D turbulence collapses to quasi-2D. It is true that the vertical fluctuations often diminish due to strong stable stratification. However, a strong vertical variability of the other components remains and even increases. The flow becomes organized in thin layers, “pancakes”, weakly correlated with one another. Such a velocity field should be called “almost two-component”. The term “quasi two-dimensional”, on the other hand, only refers to a flow in which the variability of fluctuating quantities is severely restricted in one (vertical) direction; such a flow is rather organized in columnar structures, but vertical motion is not necessarily excluded.”

We used the term “quasi-two-dimensional turbulence” in a sense as it is widely adopted in the literature concerning the dynamics of stably-stratified turbulent flows. It denotes quasi-horizontal turbulent motions formed due to a collapse of initially three-dimensional turbulent motions under strong stratification. These quasi-2D motions are associated with the pancake eddies separated by vertically-sheared vortex sheets (cf. e.g. Praud et al. (2005) and references therein).

Since the text in the original paper indeed causes confusion, we changed the narrative questioned by the referee in the revised paper as follows:

(p. 338 lines 20-23):
“… in this, strongly-stratified, region turbulent motion becomes quasi-two-dimensional and there occurs a collapse of three-dimensional vortices and formation of pancake eddies (cf. Fig. 3e below)…”.

(p. 339 lines 20-25):
“…That means that in the region sufficiently close to the pycnocline there occurs a collapse of three-dimensional turbulence under the effect of stable stratification and fluid motion becomes quasi-two-dimensional.”

3) “The related issue is the strength of the horizontal and the vertical components of vorticity. The space distribution of y and z vorticity components (wy and wz) are shown in Fig. 3e and is discussed in terms of “3D – quasi-2D” transition in the last paragraph on p. 340. The formation of “pancake large-scale vortex structures” is shown. But are they quasi-two dimensional? It would be very informative if the horizontal rms of wy and wz as functions of the vertical coordinate z were shown. The argument of twodimensionalization” would only be valid if wz were the dominant component.”

In the discussion of Fig. 3e (p.340) in the original paper we write the following:

“… Let us consider now the instantaneous distribution of the flow vorticity presented in Fig. 3e. The figure shows *y*- and *z*- components of vorticity, ($\omega_y = \partial_z U_x - \partial_x U_z$ and $\omega_z = \partial_x U_y - \partial_y U_x$)

and density ($\rho + \rho_{ref}(z)$) obtained in DNS in the vertical and horizontal planes with no initially induced IW field at time t = 400. The figure shows that sufficiently far from the pycnocline (at z > 10), turbulence remains three-dimensional. However, in the vicinity of the pycnocline (in the region 8 < z < 10) the vorticity distribution in the vertical (x, z)-plane is characterized by a layered structure typical of stably stratified turbulence. The scale of vortices in the horizontal (x, y)-plane at z = 9 (where velocities U'_x and U'_y, and consequently the horizontal kinetic energy, have maximum) is larger as compared to the (x,y)-plane at z = 11, and turbulent eddies here acquire a pancake shape. This observation is in accord with results of previous laboratory studies where formation of pancake large-scale vortex structures in decaying, strongly-stratified homogeneous turbulence was observed (cf. Praud et al. (2005)). "

We agree with the remark of the referee that strong variability of the turbulence in the z-direction persists in the strongly stratified region in the vicinity of the pycnocline (8 < z < 10). Fig. 3e also shows that, in this region, y- and z- vorticity components are of the same order. However, there is no allusion to quasi-2D turbulence and/or the argument of twodimensionalization in the above discussion. The detailed analysis of the strongly-stratified turbulence was performed already by many authors (cf. e.g. Praud et al. (2005) and references therein). So in the present paper we try to minimize the discussion of the structure of strongly stratified turbulence (although there is a broad area for discussion there) and focus on the main objective of the present paper which is to investigate the effect of strong internal wave on the turbulence dynamics and TKE spectra. So we omitted the discussion of many features of the vorticity structure in strongly-stratified turbulence (most part of it is already well-known from the literature) to make the paper more consize.

We added the following comment on the strength of y and z vorticity components in Fig. 3e in the revised text:

"…The figure shows also that strong variability of turbulence in the z-direction persists in the strongly stratified region in the vicinity of the pycnocline (8 < z < 10) and, in this region, y- and z-vorticity components are generally of the same order."

Minor corrections:
1) Caption to Fig. 1: N_m was changed to N_0 .
2) "Page 341, lines 15-17: "In the
latter region (far from the pycnocline, z=11?), the decay rate of the turbulent kinetic energy is reduced as compared to the region in the vicinity of the pycnocline (z=9?)". I suppose that there is a typo because the rate of decay is higher at z=11."
The error was corrected: "reduced" changed to "enhanced".

We are grateful to the referee for all comments and suggestions.