

Interactive comment on “Retrieving characteristics of IGW parameters with least uncertainties using hodograph method” by Gopa Dutta et al.

Referee #2, Vladimir Gubenko

This paper presents an attempt to overcome the inconsistency of hodograph method when retrieving the internal wave parameters from radisonde measurements. It seems to me that the description of scientific methods and theoretical expressions used for calculations of wave characteristics and their uncertainties **needs to be strongly improved**. For this reason, I would advice **MAJOR REVISION** as the Anonymous referee #1, also. The paper may become suitable for publication in ACP following implementation of the following points.

Major Comments:

1. Page 3, line 75. The values v' and u' , in your Eq. 1, **are not** the meridional and zonal wind fluctuations, respectively. The values u' and v' are the complex perturbations for parallel and perpendicular components of wave-induced horizontal wind speed to the wave propagation direction [see for details, for example, Gubenko et al. (2008, JGR, p. 2); Gubenko et al. (2011, AMT, p. 2155); Gubenko et al. (2012, Cosm. Res., p. 22)]. Hu et al. (2002, JRL, p. 1) designate u' as the in-phase wind along the wave propagation direction, and v' as quadrature-phase wind perpendicular to the wave propagation direction.

2. Page 3, line 77. Your Eq. 2 is wrong. The valid expression for the calculation of the inertial frequency f is following (Gubenko et al., 2008, JGR, p. 1). $f = 2\Omega \sin \phi$, where $\Omega = 7.292 \cdot 10^{-5}$ rad/s is the Earth's rotation rate, and ϕ is latitude.

3. Page 3, line 79. Your Eq. 3 is wrong. In the work of Gubenko et al. (2012, Cosm. Res., p. 23), the dispersion equation in the interval of intermediate intrinsic frequencies ($f^2 \ll \omega^2 \ll N^2$) is given: $|k| = \omega |m| / N$. If we use this expression to calculate the value $|k|$, then calculated values of horizontal wave number $|k|$ will be systematically overestimated by factor $(1 - f^2/\omega^2)^{1/2}$. This is connected with fact that the appropriate dispersion equation that is valid for internal waves with both low and intermediate intrinsic frequencies ($f^2 < \omega^2 \ll N^2$) has form (Gubenko et al. 2012, Cosm. Res., p. 23): $|k| = (1 - f^2/\omega^2)^{1/2} \cdot \omega |m| / N$. For this reason, the obtained results about horizontal wavelengths and wave numbers must be recalculated.

4. Page 3, lines 86–87. You state that the final direction of wave propagation was calculated by using hodographs $u' - v'$ and $u' - t'$ (Hu et al., 2002). I don't understand your method, because Hu et al. (2002, JRL, p. 1) use for that the hodographs of the zonal wind versus meridional wind, and the **in-phase wind** versus temperature.

Minor Comments:

1. Page 2, line 71. For zonal and meridional perturbations it is necessary to introduce another symbols, for example, u_{we}' and u_{sn}'