A review report on "A two-dimensional Stockwell Transform for gravity wave analysis of AIRS measurements" by N. P. Hindley, N. D. Smith C. J. Wright, and N. J. Mithell

Recommendation: Minor revision

General comments:

The paper presents usability of a 2D Stockwell transform (S-transform) for gravity wave analysis using nadir-view satellite measurements. Most previous studies use one-dimensional S-transform for cross-track rows and cross-spectra between adjacent cross-track rows to estimate two dimensional horizontal wavenumbers for observed waves. However, this method has a problem that the accuracy of along-track horizontal wavenumber estimates is generally low compared with that of cross-track ones. The 2D S-transform is a natural method to overcome this problem. The 2D S-transform is not now in a sense that it has been applied to other fields than atmospheric science. However, this paper carefully examine the usability of the 2D S-transform for a particular application of gravity wave parameter estimation from AIRS observations, such as limitation of the method or implication of the results obtained from the method for very long or very short horizontal wavelength waves. They even propose variations of window functions other than a standard Gaussian shape to estimate more accurate (or reasonable) amplitudes. This argument is quite interesting. The manuscript is well written and the points for discussion are clear. Thus I think that this paper has a value to be published in Atmos. Meas. Tech. However, the current manuscript contains several issues that need minor but important revision before being accepted for publication.

Comments

p.3 l.20: Momentum flux estimation from temperature fluctuations is not easy. Most methods such as shown in (15) use an assumption that the wave fields are monochromatic. Vertical wavelengths are hardly estimated from nadir view observations as discussed in this manuscript, too. There is also an observational window problem: AIRS cannot observe waves with short vertical wavelengths and/or very long horizontal wavelengths.

p.4, l.23: A reference or a short description of derivation for (5) should be useful (e.g. convolution theorem).

p.5 l.1: $H(t) \rightarrow h(t)$

p.14, l.1: For AIRS observation, the angle between along-track direction and across-trck direction is not necessarily 90°. Thus the formula for absolute horizontal wavelengths is not correct. This formula should be written using the angle between the directions.

p.14, l.15: Please specify underlying assumptions for (15). This formula is valide for monochromatic and hydrostatic gravity waves which are not influenced by the Coriolis effect.