

## ***Interactive comment on “Incidence and reflection of internal waves and wave-induced currents at a jump in buoyancy frequency” by J. P. McHugh***

### **Anonymous Referee #3**

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The author looks at upward propagating internal waves incident on an idealized tropopause and computes the reflected and transmitted waves and the wave induced mean flow. Eqs. (50), (53), (54) for I,R,T are solved numerically. The main point is that the wave induced mean flow is large and concentrated just below the tropopause.

Main comments:

1. The relation to Grimshaw and McHugh (2013) could be indicated more often. How do various equations compare: e.g. (42) here and (35) of GM13. At what stage does the derivation deviate from GM13? The "unknown functions" determined by GM13 – are they relevant here or consistent with the results?
2. pg. 284, l. 19. It is noted that epsilon can be scaled away, into the time and

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height coordinates. Is there a precedent for this, e.g., GM13 or other weakly nonlinear internal wave studies? it is stated that there are 5 waves in the wave packet, and this sets epsilon. What is the definition of epsilon in terms of the number of waves, and what is the value of epsilon used in the examples?

3. What is the sign convention for  $k$  and  $n$ , starting in (16) ?

4. (24)-(25) should be referenced to (16) in GM13.

5. In at least in one of the examples, it would be useful to give the associated dimensional values relevant to the atmosphere: i.e., the horizontal and vertical wavelengths, the vertical velocity amplitude, and the maximum wave induced mean flow. Can these values be compared with the experimental data of McHugh et al. (2008a,b)?

Other comments:

On the plots, some of the labels are way too small.

pg 270, l.4, abstract: "buoyance"

pg. 271, l. 8: The paragraph on over-reflection doesn't seem quite relevant enough to bring up, given that there is no over-reflection here.

pg. 273, l.4, punctuation missing before "however"?

pg 273 l. 8, "is is true"

pg. 274: Define  $D/Dt$  in (1)-(4).

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Interactive comment on Nonlin. Processes Geophys. Discuss., 1, 269, 2014.

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