

Comments on a Reply by Lindzen and Hong

MARVIN A. GELLER¹

Laboratory for Atmospheric Research, University of Illinois, Urbana 61801

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In replying to a comment by Hollingsworth (1975), Lindzen and Hong (1975) have referred to some previous work of mine (Geller, 1970). I am afraid that some of their statements might be understood in a manner that, I am assured, was not intended by Lindzen and Hong. Therefore, I am writing this note to clarify two of their points.

In their reply Lindzen and Hong made the statement, "Incidentally, it should be noted that Geller's attempt to use local seasonal temperature profiles to calculate local changes in the lunar semidiurnal tide is inconsistent since the main lunar semidiurnal Hough mode is global in extent." In fact, the seasonal temperature profiles that are shown in Geller (1970) are hemispheric averages calculated according to the operator

$$\bar{(\quad)} = \frac{\int_0^{\pi/2} \left\{ \int_0^{2\pi} \frac{(\quad)d\lambda}{2\pi} \right\} \cos\varphi d\varphi}{\int_0^{\pi/2} \cos\varphi d\varphi},$$

where λ is longitude and φ is latitude. *They are not local seasonal profiles.* The point, I believe, that Lindzen and Hong were attempting to make was that a one-dimensional calculation such as that made by Geller (1970) or by Lindzen (1968) overestimates wave reflections compared with the two-dimensional calculations of Lindzen and Hong (1974). I have no argument

¹ On leave at the Division of Atmospheric Science, University of Miami, Coral Gables, Fla. 33124.

with this point and I refer the reader to the discussion in Lindzen and Hong (1974) in connection with their Fig. 42 for more information on this.

The second point of clarification that I wish to make is in connection with Lindzen and Hong's (1975) statement, "We are confident that the sensitivity we referred to is real, and that Geller's (1970) results do not show the full extent of this sensitivity." *I wish to assure the reader that the calculations shown in Geller (1970) are mathematically correct.* Lindzen and Hong (1975) have stated that "the integration scheme of Lindzen and Chapman has also been able to simulate Geller's (1970) results." The point, I believe, that Lindzen and Hong were attempting to make here was that *it is possible, by using temperature profiles other than those that I have calculated, to obtain more variability in the calculated lunar semidiurnal surface pressure variation than the results shown in Geller (1970).*

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Reply

R. S. LINDZEN

Center for Earth & Planetary Physics, Harvard University, Cambridge, Mass. 02138

S.-S. HONG

C.I.R.E.S., University of Colorado, Boulder 80302

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We are in agreement with Prof. Geller's second point. We would only wish to add that the temperature profiles used in Lindzen and Hong (1974) and elsewhere were as reasonable as those used by Geller, and, in fact, only slightly different.

As concerns the first point, we welcome Prof. Geller's clarification. However, our criticism was somewhat more general. It should be noted that one-dimensional calculations treat whatever temperature profile one

chooses as the temperature profile for every latitude. Now, the main lunar semidiurnal tidal mode is symmetric about the equator and global in extent. We therefore question whether one can reasonably expect to infer the seasonal behavior of such a mode by assuming it sees a single *hemispheric* seasonal mean temperature in *both* hemispheres. As we have already noted, our two-dimensional numerical calculations avoid such procedures.