Comments on a Reply by Lindzen and Hong

MARVIN A. GELLER

Laboratory for Atmospheric Research, University of Illinois, Urbana 61801
6 October 1975

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 a main lunar semidiurnal 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

\[ \frac{1}{\cos \varphi} \left\{ \int_0^{2\pi} \cos \lambda d \lambda \right\} \frac{\cos \varphi d \varphi}{2\pi} \]

where \( \lambda \) is longitude and \( \varphi \) 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 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 would like 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).

REFERENCES


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

10 November 1975

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.