CORRESPONDENCE

Comments on "Power Spectrum Analysis of Climatological Data for Woodstock College, Maryland"

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In their article in the August 1959 issue of the *Monthly Weather Review*, Landsberg, Mitchell, and Crutcher [1] mention the predominant periodicity found in transosonde-derived winds (50-hour period) as supporting evidence for a 3-day Eulerian periodicity found from precipitation records at Woodstock College, Maryland. One must be careful in comparing Lagrangian and Eulerian periodicities since the time it takes for the transosonde at 300 mb. to pass through a long wave in the westerlies may have little correspondence to the time it takes this long wave to pass over a surface station. Therefore, some calculations are in order.

If these long waves move with a speed c of 18° longitude per day (34 knots at latitude 40°), as suggested by the authors, then, since the average zonal component of the wind speed $\bar{u}$ at latitude 40° along the transosonde trajectories is about 80 knots, the average trajectory wavelength L is 4,000 nautical miles, and since

$$L_s=(\bar{u}-c)L/\bar{u}, \tag{1}$$

where L_s is the streamline wavelength, we find from substitution of the above values

$$L_s=\frac{(80-34)}{80}\times 4000=2300 \text{ nautical miles.} \tag{2}$$

Interestingly enough, a long wave moving at a speed of 34 knots with the above streamline wavelength would pass over a surface station in 68 hours. Thus, if the long waves actually move with a speed of 34 knots in the average, the transosonde-derived wind fluctuations tend to support the 3-day periodicity in precipitation. However, if the average wave speed is assumed to be only two-thirds of 34 knots (which seems more reasonable to this writer), then the streamline wavelength deduced from the predominant transosonde periodicity is about 2,900 nautical miles and the wave would pass over the station in 128 hours. Thus, if the long waves move with a speed of about 22 knots in the average, the transosonde-derived wind fluctuations tend to support the 5- to 7-day periodicity found in precipitation records at Woodstock College. Obviously, the results are very sensitive to the value chosen for the long-wave speed and for this reason it would be desirable to evaluate as carefully as possible the average value for this long-wave speed before suggesting that the transosonde wind fluctuations are associated with one or the other of the precipitation periodicities.

REFERENCE

1. H. E. Landsberg, J. M. Mitchell, Jr., and H. L. Crutcher, "Power Spectrum Analysis of Climatological Data for Woodstock College, Maryland," *Monthly Weather Review*, vol. 87, No. 8, Aug. 1959, pp. 283–298.

Reply

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We are grateful to Dr. Angell for his very cogent comments on our paper. We are, of course, aware of the pitfalls of comparing Eulerian and Lagrangian periodicities.

We hope that it is obvious from our text as well as from the varying periodicities shown for different discrete time intervals on figures 1 and 2 that we were not too concerned with very specific values for the length of a given periodicity but rather with the fact that for certain intervals of time such periodicities in the 3- to 10-day range exist in the atmosphere. It was quite clear to us that use of local observations of precipitation is not the best approach to get at these fluctuations and that other more representative parameters of short periodic atmospheric fluctuations could and should be used for further investigations. The really important target of these investigations should be the determination of the causes for periodicities of this length and when and why changes occur from one preferred period to another.

This also gives us a welcome opportunity to correct some misprints which were overlooked in proofreading. On page 284, column 1, line 26, the word "infinitesimally" should read "infinitely" and on page 293, column 1, bottom line, "equation (3)" should read "equation (13)". On page 295, in table 2, harmonic 18, the inclusive period should read "4.9 to 5.2."