

## CORRESPONDENCE

**Long-period circulation anomalies and tropical storms**

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In a recent paper, Ballenzweig<sup>1</sup> accounts for both the development frequency and movement of Atlantic tropical cyclones in terms of mean monthly or mean seasonal anomalies in the distribution of pressure-heights at 700 mb. To the unsophisticated reader, simple explanations of the low-latitude anomaly patterns suggest themselves. Since storms usually move only slowly out of a development area, one should not be surprised to note that pressure-height anomalies are negative in a region of high development frequency and positive in the adjacent 700-mb ridge, overlain by air expelled from the storm cores. In fig. 7a, which illustrates conditions said to favor frequent storm formation in the Caribbean, a negative pressure-height anomaly extends from Yucatan to Newfoundland. Mr. Ballenzweig says "the composite anomaly pattern shows that a good southerly steering current generally accompanies storm development in the Caribbean, and these cyclones often move in a direction between north and northeast." Surely it is hard to envision a negative anomaly axis *not* coinciding with the zone of development and movement.

Simple interpretations depend on the fact that, in low latitudes, day-to-day variations in the height of the 700-mb surface are slight, except when tropical storms or hurricanes are present. Thus, only a few storm days each month can contribute excessively to departures of the mean pressure-height field from normal. Mr. Ballenzweig, aware of this viewpoint, bases his justification of the "composite approach" on the 1947 hurricane season, during which five tropical storms entered the Florida area. The pressure-height anomalies for the whole season (fig. 15a) resemble those for other periods of frequent Florida hurricanes (figs. 12a and 13) when "a broad band of easterly anomalous flow prevails at lower latitudes which tends to steer storms toward this area." Mr. Ballenzweig claims that 700-mb pressure-height anomalies for the 1947 season *excluding* tropical storm days in the Florida region (fig. 15b) differ insignificantly from the anomalies for the whole season. This is a debatable conclusion for, in fig. 15b, the important "broad band

of easterly anomalous flow" can no longer be found over or near Florida!

Mr. Ballenzweig reports only the one attempt to eliminate tropical-storm influence from the anomaly patterns and, until he does this for all other cases and with much more convincing results, one must conclude that his anomaly charts reveal the *effects* of tropical-storm development and movement while largely concealing the causes.

<sup>1</sup> E. M. Ballenzweig, 1959: Relation of long-period circulation anomalies to tropical storm formation and motion. *J. Meteor.*, **16**, 121-139.