

## Comments on "Venezuelan Rain Systems and the General Circulation of the Summer Tropics I: Rain Systems"

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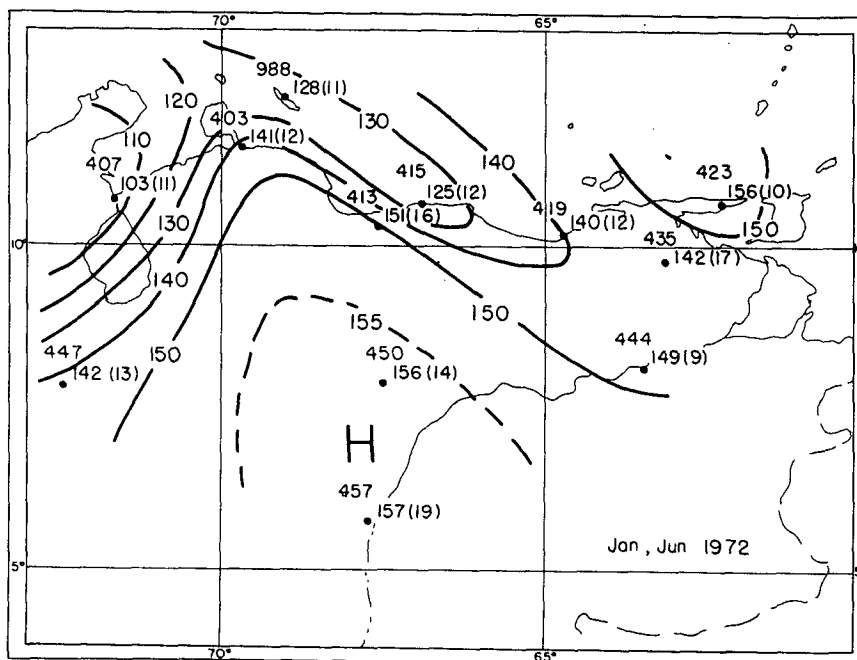
A reading of Riehl's (1977a) recent interesting paper on Venezuelan rain systems prompts three questions on which further comment by the author would be welcome.

1) In Riehl's Fig. 11 a westerly wind is shown at Puerto Ayacucho, suggesting orographic descent on the eastern cordillera of the Andes between 5–6°N; yet the satellite reveals an extensive cloud mass there. In admittedly limited experience with South American upper wind data I have seen examples in which the relatively inexperienced observer has evidently miscalculated the wind direction by 180°. If this error had been made in the Puerto Ayacucho observation, the corrected data would fit well with the rest and would be more consistent with the cloud structure. Can the westerly observation be confirmed by credible spatial or temporal continuity?

2) It is surprising that the author on p. 1415 considers the 200 mb trough unrelated to the rain system, especially since in an adjacent paper (1977b) he points out the importance of upper tropospheric troughs in the tropical circulation pattern. In this instance, the struc-

ture shown in Riehl's Figs. 20 and 21, with perturbations on a basic westerly vertical wind shear, would suggest from quasigeostrophic reasoning a large-scale ascent downshear from the upper trough, over the rain system. This suggestion is reinforced by the 200 mb divergence indicated by wind observations at the vertices of the Bogota-Curacao-Barbados triangle encompassing the rain area. Why then is the trough considered of no consequence?

3) I found the recent disappearance of the "Venezuelan high" a relief rather than a vexation. Fig. 1a, obtained by averaging reported pressures in the 1972 Northern Hemisphere Data Tabulations over five days in January and five in June, shows the feature as it appeared for many years. It invited scepticism because it implied a 17 m s<sup>-1</sup> westerly mean geostrophic flow between 8–12°N and 65–70°W where apparently low-level easterly components are observed, and because it implied large longitudinal variations of pressure in the deep tropics which tend not to be observed elsewhere and which would be difficult to explain physically. [I was not able to obtain Grosske's (1964) paper



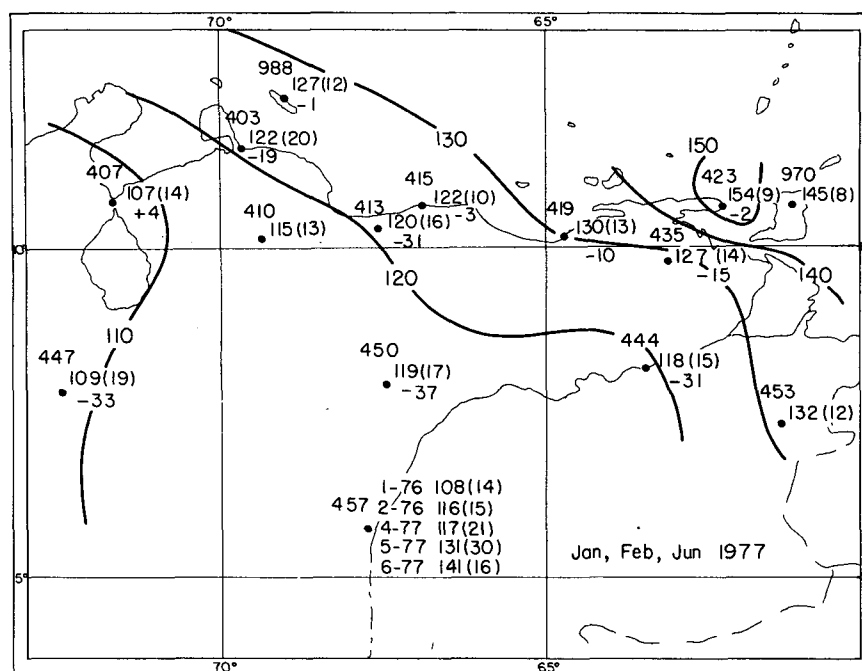


FIG. 1. Mean sea-level pressures in Venezuela for 1972 (a) and 1977 (b). The pressure excess over 1000 mb is plotted above and to the right of the station circle, followed by the sample standard deviation in parentheses. The station number appears above the station circle. In (b) the change from 1972 to 1977 appears to the right of the circle. All pressures are in tenths of mb.

cited by Riehl.] In contrast, Fig. 1b shows the pattern obtained by average observations over four January days, six February days, and 15 June days in 1977. The high now appears as a mesoscale feature centered near station 423. Elsewhere we see a "Venezuelan trough," the mean geostrophic zonal flow being now easterly at about  $11 \text{ m s}^{-1}$ . When we examine the pressure changes from Fig. 1a to 1b, it is remarkable that at stations 403, 413, 419, 435, 444, 450 and 457 the mean pressure has dropped between 1 and 4 mb, while at the others the changes have been fractions of a millibar. Cursory examination of the *Data Tabulations* shows an abrupt drop in characteristic values some time in the year following June 1972 at stations 413, 419, 444, 447, 450 and 457, and since January 1975 at stations 403, 435 and 453. At 457, as shown in Fig. 1b,

the lowered pressure apparently climbed back up in May and June 1977, but standard deviations were suspiciously large during the period of transition. Is it reasonable to conclude that the synoptic-scale "Venezuelan high" was a figment of erroneous pressure observations and that the mesoscale remnant at station 423 will vanish when the observation is corrected at this location?

#### REFERENCES

- Riehl, H., 1977a: Venezuelan rain systems and the general circulation of the summer tropics I: Rain systems. *Mon. Wea. Rev.*, **105**, 1402-1420.
- , 1977b: Venezuelan rain systems and the general circulation of the summer tropics II: Relations between low and high latitudes. *Mon. Wea. Rev.*, **105**, 1421-1433.