Precalibration of VIZ-NWS Radiosonde [1]

Alan K. Betts, *Department of Atmospheric Science, Colorado State University, Fort Collins, Colo. 80521*

One problem in studying atmospheric structure around convective clouds using a conventional radiosonde is that even cumulonimbus rarely last more than a few hours. Some increase in sampling frequency can be achieved by using precalibrated radiosonde instruments. During last summer's second Venezuelan International Meteorological and Hydrological experiment (VIMHEX II), soundings were launched continuously every 70–75 min during periods of precipitating convection by one rawinsonde team using precalibrated instruments. The ascents reached about 130 mb in 55 min, before termination. Correspondence on the improved humidity measurements by this radiosonde (the new VIZ–National Weather Service sonde) has been published previously (Friedman, 1972; Riehl and Betts, 1972).

Instruments were calibrated in batches, and then sealed in polythene bags for storage. Some instruments were recalibrated before launch to test whether the calibration had drifted with time. The results of these tests, shown in Table 1, indicate no significant change of calibration in a week. The temperature calibration comparison is limited by the accuracy to which the GMD-1 chart recorder can be read. The chart recorder can be read to ±0.1 divisions corresponding to ±0.25C. The table shows the temperature difference corresponding to the two calibrations. A positive value denotes that the same chart value corresponds to a higher temperature on the second calibration. Only one value is larger than the probable error in the difference (±0.4C). The humidity calibration accuracy is limited by the measurement of temperature and wet-bulb temperature within the calibration box. An 0.2C error in both temperature measurements can lead to a 2% error in relative humidity. The table shows the difference in relative humidity corresponding to the two calibrations. A positive value denotes that the same chart value corresponds to a higher relative humidity on the second calibration. Again only one value is larger than the probable error (±3%). The range of calibration temperatures was 27–33C and of relative humidity 51–71%.

TABLE 1. Temperature, relative humidity, and time difference between two comparison calibrations of fourteen VIZ-NWS radiosondes.

Time Difference (days)	Temperature Difference (°C)	Relative humidity Difference (%)
1	+0.1	−2
1	−0.3	0
1	+0.8	−2
1	−0.1	+2
2	−0.3	−1
2	+0.2	0
3	+0.4	−2
6	−0.2	+3
7	−0.3	+8
7	+0.2	−1
7	−0.1	−1
8	−0.3	0
10	+0.2	+3
14	+0.4	−1
	Probable erroc ±0.4	±3

During VIMHEX II, sondes were not used more than six days after precalibration, although the table indicates longer storage times may be practicable.

[1] The VIMHEX II experiment was supported by the Office of Naval Research under Contract N00014-68A-0493-002, the Atmospheric Sciences Section, National Science Foundation under Grant GA-33182, and the Facilities Laboratory of the National Center for Atmospheric Research.

References

Friedman, M., 1972: A new radiosonde case: the problem and the solution. *Bull. Amer. Meteor. Soc.*, **53**, 884–887.

Riehl, H., and A. K. Betts: Humidity observations with the 1972 U.S. radiosonde instrument. *Bull. Amer. Meteor. Soc.*, **53**, 887–888.

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