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Humidity observations with the 1972 U.S. radiosonde instrument

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As noted in various publications (Morrissey and Brousaides, 1970) considerable difficulty has been experienced with humidity measurements from previous U.S. radiosonde instruments because of ventilation problems and radiation errors in sunlight. Artificial decreases of specific humidity were observed regularly from ascents after sunrise.

Accordingly, a new radiosonde was produced by the VIZ Instrument Company of Philadelphia, Pa., for the National Weather Service (Ostapoff *et al.*, 1970). At the beginning of our second observational radiosonde project in Venezuela (VIMHEX II) the characteristics of the humidity sensor of this instrument were tested. On five days radiosondes were launched about 0400, 0500, 0900, and 1000 local time in order to observe the change of specific humidity at different levels across sunrise in comparison with the hour-to-hour variations during nighttime or daytime. There was only little morning cloudiness on those days.

The mixing ratios for all of these 20 soundings from the surface to 700 mb are reproduced in Table 1. It is readily seen that there is no systematic change in specific humidity between day and night soundings and that the instrument design has overcome the previous defects successfully. No further tests were considered necessary.

It may be added that from the viewpoint of the tropical

TABLE 1. Mixing ratio (g kg^{-1}) from surface ($\approx$990 mb) to 700 mb for a series of rawinsonde ascents before or after sunrise at Carrizal, Venezuela, May 1972.

Date	Pressure	Mixing ratio (g kg^{-1}) at release time (local)			
26 May 1972	(mb)	0430	0530	0900	1000
	Surface	16.1	15.9	15.5	15.1
	950	15.3	14.3	14.6	13.7
	925	15.8	14.7	14.2	13.6
	900	16.1	14.6	13.1	13.8
	875	15.1	14.5	12.8	12.9
	850	13.0	13.7	12.7	11.9
	800	11.6	10.8	10.0	10.6
	750	8.7	5.3	6.2	5.7
	700	3.0	1.3	2.1	3.8

	Pressure	Mixing ratio (g kg^{-1}) at release time (local)			
28 May 1972	(mb)	0400	0500	0900	1000
	Surface	15.4	15.9	15.5	15.1
	950	13.6	14.8	15.1	15.4
	925	13.3	14.5	14.4	14.5
	900	12.9	13.9	13.7	13.8
	875	12.4	12.7	12.9	12.9
	850	11.8	12.1	12.2	12.8
	800	10.7	9.8	11.1	11.6
	750	10.3	8.4	6.9	7.3
	700	6.5	6.7	7.7	6.8
29 May 1972	Surface	15.4	15.8	15.0	14.9
	950	13.6	12.7	13.2	14.4
	925	12.9	12.2	12.3	14.4
	900	12.0	11.9	10.4	12.4
	875	11.7	11.1	9.5	9.5
	850	10.6	9.4	9.0	7.1
	800	6.7	8.8	4.9	1.9
	750	5.4	5.3	5.6	2.8
	700	3.9	3.1	2.7	1.3
30 May 1972	Surface	15.3	15.2	14.9	13.9
	950	13.1	13.3	13.2	13.5
	925	13.5	12.2	12.2	13.6
	900	11.9	11.4	11.8	12.9
	875	10.5	10.6	9.8	12.0
	850	9.8	9.7	8.2	11.0
	800	7.1	7.7	6.4	5.3
	750	5.4	7.4	6.7	5.2
	700	4.6	5.8	5.6	5.5
31 May 1972	Surface	14.4	14.7	15.9	15.3
	950	14.1	14.7	15.4	13.0
	925	12.9	14.9	14.2	13.9
	900	10.2	13.3	13.4	14.1
	875	13.6	12.1	12.9	12.0
	850	12.0	11.0	13.3	11.2
	800	10.6	10.3	9.9	9.9
	750	9.0	9.3	8.9	8.1
	700	7.6	8.1	5.4	6.9

meteorologist the new sonde also has the advantage that it permits a more detailed analysis of the low troposphere due to an increase of contact points. Further, the response of the instrument to decreases of humidity is very rapid since the ventilation of the hygristor has been improved. Even within 10 mb, sharp boundaries of dry layers can be seen very clearly.

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