

A review of the performance of the Indian radiosonde consequent to change in the thermistor characteristics in February 1980

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सार — उष्ण प्रतिरोधकों में गुणता नियंत्रण मानकीकरण उपाय लागू करने के परिणाम स्वरूप भारत में रेडियोसोन्डे स्टेशनों पर ऊपरि वायु तापमानों की विश्वसनीयता पर उल्लेखनीय प्रभाव पड़ा है। उस प्रभाव की जांच करने के लिये प्रयास किया गया है। इसके द्वारा रेडियोसोन्डे के कार्य निष्पादन में कोई उल्लेखनीय परिवर्तन दिखाई नहीं दिया।

ABSTRACT. An attempt has been made to investigate the significant effect on the reliability of upper air temperatures over the radiosonde stations in India, consequent to the introduction of quality control standardisation measures in the thermistors. It is found that there has been no significant change in the performance of the radiosonde.

1. Introduction

Consequent upon the quality control standardisation of the thermistors, the manufacturer updated the slide rules for evaluating temperature vs ordinates in February 1980. Hence an investigation has been made here to determine whether this change of evaluators has caused any significant change in the reliability of temperature measurements.

2. Selection of data

Seshadri (1982) compared the performances of the different types of radiosondes used during Monex 1979 and found that the performance of the Indian radiosonde has showed high degree of compatibility in respect of data recorded by the other established radiosondes. In this study he has also referred to the intercomparison of Vaisala Omegasonde with Indian radiosonde at New Delhi during December 1980 and has stated that the results showed high compatibility of the two systems as already borne out by the studies relating to the period of Monex-79. A more detailed investigation was thought to be necessary to establish that change of evaluators has not affected compatibility and reliability of the data. The data for the study was chosen as given in Table 1.

Normally the day to day variations in upper air temperatures are larger in northern stations, than those in south. Standard levels 500, 400, 300, 200 and 100 mb only have been considered, to eliminate local disturbances of weather below these isobaric levels.

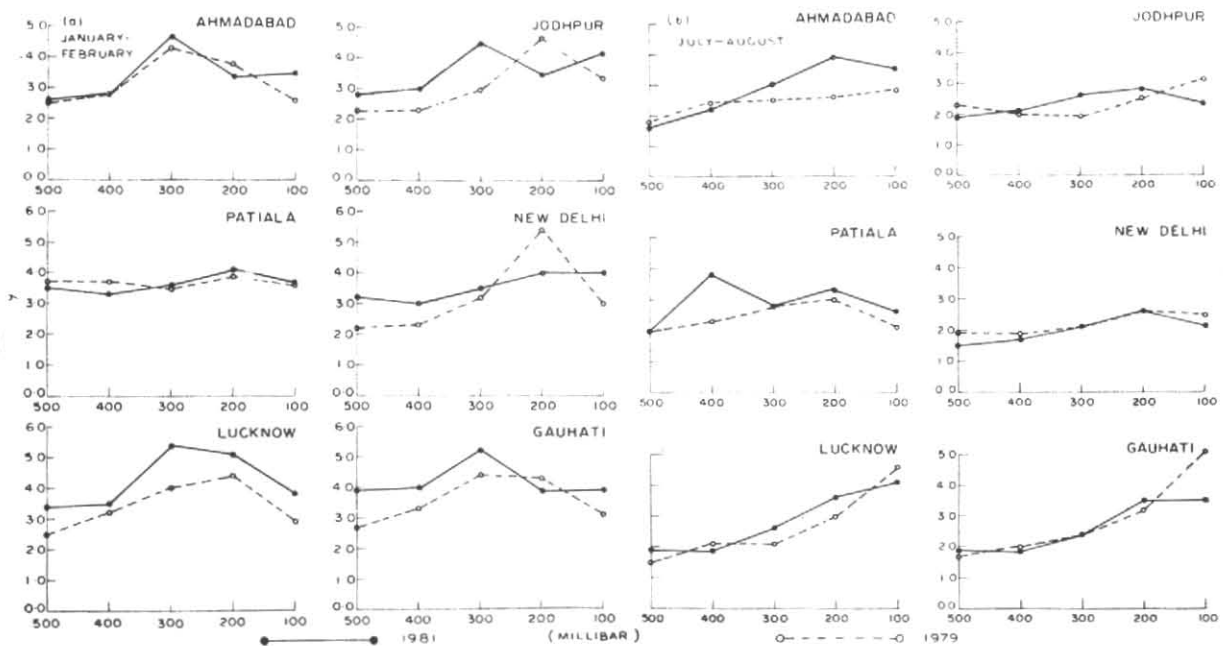
As the evaluators were changed in February 1980, some time was allowed for settling and the data of 1979 and 1981 were chosen for the analysis. The months chosen were January and February, representing the winter conditions and July & August, representing summer (monsoon). 00 GMT observations only have been considered to ensure uniformity of data.

3. Method of analysis

The number of observations, mean temperatures and their standard deviations for January and February, for 1979 and 1981, have been worked out and presented in Table 1.

Similarly July and August have been clubbed together and the values are given in Table 2.

The standard deviations for all the stations have been plotted against levels in Fig. 1(a) for January-February 1979 and 1981. Fig. 1(b) gives the standard deviations for July-August.



Figs. 1 (a & b). Standard deviation of temperatures : (a) January-February and (b) July-August

TABLE 1
Mean temperature and standard deviation

Station	500 mb			400 mb			300 mb			200 mb			100 mb		
	<i>n</i>	<i>x</i>	σ	<i>n</i>	<i>x</i>	σ	<i>n</i>	<i>x</i>	σ	<i>n</i>	<i>x</i>	σ	<i>n</i>	<i>x</i>	σ
(a) 00 GMT Jan, Feb '79															
Ahmadabad	49	11.0	2.5	40	21.8	2.8	39	35.9	4.3	31	55.1	3.8	24	74.5	2.6
Jodhpur	45	17.3	2.3	43	29.3	2.3	40	43.9	3.0	33	59.0	4.7	23	73.4	3.4
Patiala	53	18.2	3.7	52	30.6	3.7	50	45.3	3.5	44	58.1	3.9	28	66.0	3.6
New Delhi	56	17.4	2.2	56	29.8	2.3	53	44.3	3.2	48	58.5	5.4	29	70.3	3.0
Lucknow	53	16.6	2.5	52	29.1	3.2	51	43.4	4.0	49	59.4	4.4	43	74.5	2.9
Gauhati	55	15.6	2.7	53	27.9	3.3	53	42.1	4.4	53	58.5	4.3	40	75.2	3.1
(b) 00 GMT Jan, Feb '81															
Ahmadabad	46	12.2	2.6	44	23.5	2.8	37	36.6	4.7	29	52.9	3.4	23	72.9	3.5
Jodhpur	43	15.7	2.8	43	27.8	3.0	40	42.0	4.5	37	55.2	3.5	19	72.3	4.2
Patiala	55	18.5	3.5	54	29.6	3.3	51	44.3	3.6	48	54.8	4.1	29	63.4	3.7
New Delhi	58	18.4	3.2	58	30.3	3.0	58	44.4	3.5	58	56.0	4.0	47	69.8	4.0
Lucknow	51	17.1	3.4	52	29.3	3.5	48	42.7	5.4	45	57.2	5.1	39	74.5	3.8
Gauhati	54	15.3	3.9	51	27.3	4.0	50	40.7	5.2	50	56.3	3.9	36	74.6	3.9

n—Number of observations, *x*—Mean temperature (negative), σ —Standard deviation.

TABLE 2
Mean temperature and standard deviation

Station	500 mb			400 mb			300 mb			200 mb			100 mb		
	<i>n</i>	<i>x</i>	σ	<i>n</i>	<i>x</i>	σ	<i>n</i>	<i>x</i>	σ	<i>n</i>	<i>x</i>	σ	<i>n</i>	<i>x</i>	σ
(a) 00 GMT July, Aug '79															
Ahmadabad	56	2.5	1.8	54	11.3	2.4	50	25.6	2.5	45	48.2	2.6	30	79.1	2.8
Jodhpur	52	4.3	2.3	50	14.1	2.0	48	29.9	1.9	43	52.8	2.5	30	80.8	3.1
Patiala	53	3.7	2.0	50	13.4	2.3	47	27.3	2.8	42	47.8	3.0	10	75.8	2.1
New Delhi	61	3.9	1.9	59	14.1	1.9	59	29.2	2.1	58	51.5	2.6	46	80.7	2.5
Lucknow	57	4.2	1.5	55	14.2	2.1	53	29.6	2.1	52	52.7	3.0	40	78.1	4.6
Gauhati	61	4.9	1.7	60	14.9	2.0	61	29.4	2.4	61	53.3	3.2	52	76.1	5.1
(b) 00 GMT July, Aug '81															
Ahmadabad	49	2.7	1.6	49	12.2	2.2	49	26.2	3.0	47	48.5	3.9	40	75.3	3.5
Jodhpur	37	3.1	1.9	36	12.4	2.1	35	28.3	2.6	32	51.0	2.8	20	79.6	2.3
Patiala	58	2.7	2.0	55	12.1	3.8	45	24.1	2.8	49	45.3	3.3	26	70.6	2.6
New Delhi	62	3.0	1.5	62	12.5	1.7	62	26.5	2.1	60	49.0	2.6	41	76.6	2.1
Lucknow	56	3.8	1.9	55	14.1	1.9	55	29.7	2.6	54	53.1	3.6	37	78.4	4.1
Gauhati	60	4.0	1.9	59	13.8	1.9	57	28.1	2.4	54	51.6	3.5	45	78.0	3.5

n—Number of observations, *x*—Mean temperature (negative), σ —Standard deviation.

The curves comparing the standard deviations for both the years and both the seasons (Figs. 1a and 1b) follow more or less the same trend. Ahmadabad and Patiala in Fig. 1(a) and most stations in Fig. 1(b) at all levels show good agreement of standard deviations the years 1979 and 1981.

4. Conclusion

From these results it can be concluded that the change of evaluators in February 1980 has not affected the accuracy of upper air temperature measurements. No inaccuracy will be introduced in working out the

normals etc using the data collected before the evaluation for the years 1979 and 1981.

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Reference

- Seshadri, N., 1982, 'A study of performance of different types of radiosondes used over Indian sea areas during Monex-79,' *Mausam*, 33, 3, pp. 317-324.