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HUMAN COMFORT OVER SRIHARIKOTA ISLAND

Attempts have been made by research workers especially by the biometeorologists to assess the effect of meteorological parameters on human body in the day to day environments. Landsberg (1972) gives a review of some early attempts. The usual practice is to use the concept of comfort index to parameterise the comfortability felt by a normal man in an environ-

ment. The comfort index is normally a function of some of the basic meteorological parameters which will affect the man. Thoms (1959) discomfort index was the one used by many in this direction. This index is a function of the dry bulb and wet bulb temperatures. Sivaramakrishniah (1966), Venkiteswaran and Swaminathan (1967), Philip and Jeevananda Reddy (1974), Prasad and Pawar (1982), Chowdhury and Ganesan (1983) and Lakshmanan (1984) have studied the thermal comfort over India at some selected cities and at some selected locations mainly using the above index.

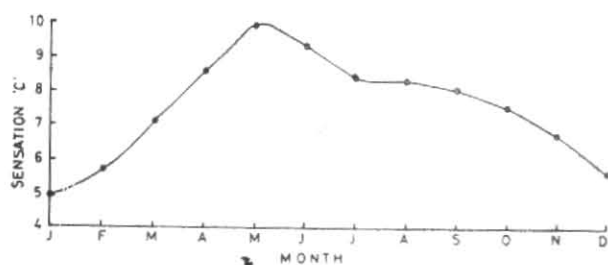


Fig. 1. Mean monthly Webb's comfort index.

The airflow as parameterised in wind speed is also an important parameter which affects the human body. This factor has not been considered in the Thoms index. Webb (1960), proposed a comfort index which takes into account the effect of wind speed also. The Webb's comfort index defines the sensation (factor C) as follows :

$$C = 0.464t + 0.164p + 0.762 \sqrt{v} - 12.93$$

where, t — Temperature in °C,

p — Vapour pressure in mb and

v — Prevailing wind speed in kmph.

The sensations of the comfort index (C) can be as follows :

- | | |
|---------|-------------------------|
| 1, 2, 3 | — Bitterly cold |
| 4 | — Cold |
| 5 | — Comfortably cool |
| 6 | — Neither cool nor warm |
| 7 | — Comfortably warm |
| 8 | — Warm |
| 9 | — Hot |
| 10 | — Very hot |
| > 10 | — Severely hot |

Sriharikota is the main launching centre of Indian Space Research Organisation and the residential colony for most of the range personnel is also in the Sriharikota island. An attempt to study the human comfort from the sensation using Webb's thermal comfort index has been made and the results are presented.

Sriharikota observatory contains the weather records since 1975. Ten-year monthly mean values of temperature, humidity and wind for the period ending 1987 were considered and Webb's comfort index (C) valid for 0300, 0600, 0900, 1200, 1500, 1800, 2100, 2400 IST for each month have been computed.

The sensation (C) can be further described as follows :

- | | |
|-----------|-------------------------|
| ≤ 4 | — Uncomfort due to cold |
| 5, 6, 7 | — Comfortable |
| 8 | — Warm |
| 9 | — Hot |
| ≥ 10 | — Uncomfort due to heat |

The results are discussed in the above terms. Summer thunderstorms and the tropical cyclones are the two

major weather events over this place. Some case analysis and studies of the change in this comfort index associated with these events have also been made.

The comfort indices at three hourly interval valid for each month are presented in Table 1. The lowest value for C is seen around 06 hours in all the months while the maximum value occurs any time in the afternoon. The comfort index is not same at all the hours and thus there is a diurnal variation of comfortability. The range of variation is high in the winter months of February and March. The range is steady (3.5 ± 0.3) during the southwest monsoon months of June to September. The variation is least in the month of November. Fig. 1 gives the monthly mean value C in any year. Except during the month of May when the C value goes to the uncomfortable zone, the mean value trend shows that the place is either comfortable or warm. The mean value for June can be taken as 'Hot' because June is typically a summer month. However, southwest monsoon airmass arrives within this month and thereby makes C not to reach the uncomfortable zone.

Late night and early morning during the months of January and February are uncomfortably cold as seen from the 0300 and 0600 IST values. In March except the noon and afternoon when it is a little warm it is very comfortable both during day and night. May is the month when the whole day time is uncomfortably hot while in April again afternoon becomes uncomfortable often due to heat. The afternoon heating continues till September while remaining parts of the day are comfortable. The reason for the above seen diurnal tendency may perhaps be due to the fact that the temperature term is the dominant contributor for the value of C . In fact the human body is highly sensitive to heat than any other natural phenomenon.

November is the month when copious rainfall occurs over this island. On a typical day of incessant rains throughout, the C value was computed at two hourly intervals between 6 a.m. to 6 p.m. and the results are presented in Table 2. It can be seen that the large variation in C is suppressed due to rains. This may, perhaps, be the reason for the least diurnal variation in the Webb's comfort index during November as seen in Table 1.

Whenever a station is in the storm field, people are normally uncomfortable psychologically because of the likely damage and threat to life and property. However, biologically is there any discomfort due to the prevailing environmental temperature, pressure and humidity? This was analysed by computing the thermal comfort index on 2 November 1987 when the station was in a cyclone field. It was found that the human comfort was not affected drastically and the C value was between 6 and 9 at any time.

During summer months of May, June and subsequently up to September thunderstorms occur over this island. With the passage of a thunderstorm a moist cold airmass spreads. In practice this phenomenon is found to bring a welcome comfort in the hot summer. In order to get a quantitative estimate of this comfort six thunderstorm occasions monitored closely during the year 1988 between June to September were analysed.

TABLE 1
Monthly mean comfort index

Month	Time (IST)								Diurnal range
	03	06	09	12	15	18	21	24	
Jan	3.3	2.7	5.1	6.2	6.5	5.9	5.3	4.3	3.8
Feb	3.5	2.7	5.8	7.2	8.3	7.2	5.8	5.2	5.6
Mar	4.9	4.2	7.4	9.5	9.0	8.3	7.2	6.2	5.3
Apr	6.3	5.9	9.2	10.6	10.7	9.9	8.3	7.6	4.8
May	8.6	8.3	10.0	11.5	11.5	10.4	9.9	9.1	3.2
Jun	8.2	7.4	9.4	10.7	11.0	9.9	9.4	8.7	3.6
Jul	6.7	6.5	8.5	9.7	10.1	9.3	8.5	7.8	3.6
Aug	6.9	6.3	8.3	9.6	9.8	10.1	7.7	7.3	3.8
Sep	6.4	6.0	8.2	9.6	9.8	8.9	7.8	7.2	3.8
Oct	5.9	5.5	7.9	8.8	9.0	8.3	7.7	7.0	3.5
Nov	5.9	5.5	6.9	7.8	7.7	7.2	6.2	6.4	2.3
Dec	4.4	3.7	6.1	7.1	6.9	6.5	5.4	5.0	3.4

TABLE 2
Variation of comfort index

Fac- tor	06	Time (IST)												
		08	10	12	13	14	15	16	17	18	19	20	21	22
Rainy day (11 November 1987)														
C	6.1	6.2	6.4	6.7	5.4	5.9	6.1							
Cyclone day (2 November 1987)														
C		6.5	6.6	6.9	6.3	6.6	6.6	6.8	7.1	7.9	8.6	8.9		

The results showed that the thunderstorm of smaller duration brought about a quick change in C factor where as a prolonged thunder activity brought about a change steadily.

Hence except during May and June the thermal comfort over Sriharikota is either comfortable or warm. There is a diurnal variation of thermal comfort in all the months reaching low values around 0600 IST. The diurnal variation is large (greater than or equal to 5) in February, March and least in November.

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