551.573 : 551.508·72(54)

WATER TEMPERATURE IN EVAPORATION PANS IN INDIA

In this note, the general characteristics of water temperature as measured in the evaporation tanks during the past 5 years at 20 stations fairly well distributed throughout India are briefly discussed mainly from the point of industrial application.

The evaporation tank used in all the observatories is the U.S.A. Standard type. To ensure identical exposure conditions at all the observatories, it is situated near the Stevenson Screen where thermometers and other meteorological instruments are housed. Water temperature is measured twice a day, 0830 and 1730 IST. Tables 1 and 2 give the mean monthly temperature of water at 0830 and 1730 IST respectively at these stations.

Seasonal variation

Winter Season (December to February)—Water temperature attains its minimum in the winter season. It increases from the north to the south. However in the Peninsula its distribution undergoes some changes. In the forenoons the lowest temperature is observed away from the coast in Rayalaseema and Hyderabad. This low temperature region shifts to the east coast in the afternoons.

Hot Weather Season (March to May)—As the winter comes to a close, water temperature steadily increases. There is a general tendency in this season also for the coastal regions to maintain higher water temperature than the interior. In the Peninsula the zone of relatively low water temperature observed in the forenoons over Rayalaseema and Hyderabad shifts to the east coast in the afternoons. The highest temperature of about 37°C is observed normally in the coastal region of the NE Arabian Sea in the afternoons of May.

Monsoon Season (June to September)—It is seen that there is a general decrease of temperature in the monsoon season particularly over peninsular India.

TABLE 1

Mean temperature of water (°C) at 0830 IST

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Ahmedabad	12·7	14·1	19·1	21·7	25·7	27·4	26·4	25·7	25·6	22·5	17·3	14·1
Allahabad	12·4	13·6	18·7	22·6	26·4	28·7	28·6	28·1	27·2	23·1	16·4	12·5
Asansol	14·7	15·6	20·6	25·0	28·7	28·0	28·0	28·1	27·9	25·1	18·3	14·9
Bangalore	16·1	16·8	19·6	22·6	22·8	21·4	20·6	20·8	20·9	21·2	18·9	16·8
Begumpet	15·8	16·9	20·1	23·4	24·9	23·7	23·1	22·9	23·1	22·2	18·3	16·1
Bikaner	9·1	10·8	17·0	21·3	25·1	27·9	27·9	27·7	25·7	20·2	13·9	9·8
Bombay	20·1	20·0	22·9	26·0	28·0	27·9	26·5	26·1	26·2	25·8	23·9	22·0
Calcutta	15·8	20·2	25·6	29·1	29·8	29·3	29·4	29·2	29·2	26·9	21·3	16·8
Dum Dum	15·2	17·2	22·9	26·8	28·9	28·6	27·8	28·6	28·0	20·1	20·3	15·8
Gaya	12·1	14·2	18·7	23·6	27·4	28·8	28·5	27·6	27·1	24·4	16·3	12·4
Imphal	10·3	12·4	16·2	20·1	24·1	25·4	25·8	25·2	25·2	22·6	16·4	11·4
Jamshedpur	14·4	16·1	20·1	24·9	28·2	28·2	27·6	27·6	26·9	24·3	17·5	14·9
Jodhpur	10·8	12·3	17·3	21·2	24·8	27·7	27·2	26·7	25·3	20·6	15·3	11·9
Lucknow	10·6	11·6	17·1	21·3	25·5	27·5	27·8	27·7	26·9	22·3	14·8	11·2
Madras	21·9	22·8	25·3	27·8	28·4	27·2	26·3	26·1	26·9	26·2	24·2	22·6
Mohanbari	14·2	15·8	19·4	22·7	24·9	27·1	27·6	27·6	27·7	24·4	19·7	14·8
Nagpur	16·6	17·7	20·9	24·5	27·1	27·1	26·4	26·8	26·3	24·2	19·6	17·1
New Delhi	9·9	11·3	16·9	20·9	24·2	27·5	28·1	27·9	26·2	20·5	13·7	10·7
Trivandrum	23·1	24·2	25·2	26·4	26·3	25·3	24·7	24·7	24·6	25·3	24·5	23·8
Visakhapatnam	19·9	21·6	24·7	27·9	29·4	28·6	27·4	27·4	27·3	26·3	22·8	20·6

TABLE 2

Mean temperature of water (°C) at 1730 IST

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Ahmedabad	24·8	27·2	30·8	33·0	34·6	33·6	31·0	31·8	33·1	31·8	28·3	24·8
Allahabad	20·9	23·6	28·7	31·7	34·3	35·4	33·9	33·3	31·6	29·7	24·8	21·4
Asansol	22·6	25·1	29·5	32·3	33·4	32·2	31·7	31·6	31·2	30·1	26·0	22·3
Bangalore	26·2	28·5	30·3	31·6	31·3	28·5	26·9	27·6	28·8	28·2	26·7	25·3
Begumpet	26·4	28·1	30·4	32·7	32·4	29·7	27·3	28·3	29·2	28·9	26·7	25.9
Bikaner	20·1	23·8	29·1	32·8	34·8	35·9	34·8	35·8	33·9	30·3	25·4	20.9
Bombay	30·2	32·1	34·5	36·6	37·6	34·5	32·0	31·5	33·7	34·3	32·4	30·9
Calcutta	22·9	27·4	32·0	34·8	34·9	32·5	32·2	32·2	32·2	29·6	26·1	22·6
Dum Dum	24·4	26·7	31·1	33·6	33·8	32·7	31·6	32·4	31·2	30·5	27·8	24·3
Gaya	21·2	23·6	27·2	30·1	32·1	32.1	31·3	31·7	31·1	29·0	23·9	22·1
Imphal	17·7	19·2	22·3	25·3	27·4	28·7	29·2	29·2	28·9	26·9	22·9	18·6
Jamshedpur	23·6	25·4	28·9	31·7	32·7	31·5	31·4	30·9	30·4	29·6	25·3	23·6
Jodhpur	21·6	24·9	29·8	33·1	35·6	36·9	34·8	34·7	33·4	31·3	26·4	21·8
Lucknow	18·8	21·4	26·8	29·8	32·3	33·8	32·2	32·4	31·9	28·8	23·2	19·6
Madras	28·6	31·6	33·7	35·0	34·9	33·4	31·8	32·3	33·2	31·6	28·8	27.7
Mohanbari	20·2	21·7	35·0	27·7	28·4	30·9	32·1	31·7	32·4	28·3	24·6	20·8
Nagpur	27·4	29·9	32·4	34·6	35·6	33·3	30·9	31·7	32·2	31·9	28·9	27·5
New Delhi	18·6	21·8	27·5	31·3	33·4	35·0	34·3	34·7	32·9	28.8	23·3	19·3
Trivandrum	31·6	32·4	33·6	33·6	32·2	31·2	30·8	30·9	31·2	31·1	31·6	31·7
Visakhapatnam	26·6	28·3	30·3	31·7	32·4	31·8	30·7	30·8	30·6	29·6	27·2	25·7

In NW India water temperature attains its maximum generally during June before the monsoon sets in. On the other hand, in NE India maximum water temperature is recorded during July when the monsoon is fully established.

The most important feature of this season is the reversal of the distribution of water temperature for the country as a whole. The highest temperature does not occur in south India as in the other seasons but it occurs in the north. The lowest water temperature in this season is observed in the central parts of the Peninsula.

Post Monsoon Season (October and November)—This is the season when a secondary maximum occurs for the water temperature. The distribution pattern of the water temperature resembles that of the hot weather season, and over a major part of the Peninsula water temperature is higher than that in north India. Anywhere the temperature decrease is from the coastal regions to inland in the forenoons. In the afternoons, on the other hand, the decrease is mainly from the west to the east for the whole country in general.

Annual Range of Temperature

The difference in temperature between the coldest and the hottest months (annual range of temperature) decreases from about 18°C in the north to 2°C in the south. The mean annual range of temperature for the forenoon is given in Fig. 1. This is practically the same for the afternoon also.

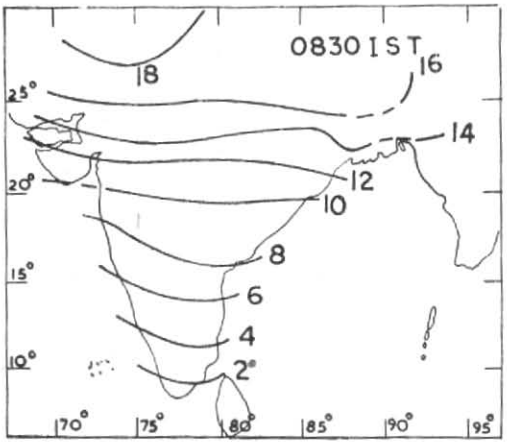

Fig. 1 Mean annual range of water temperature (°C)

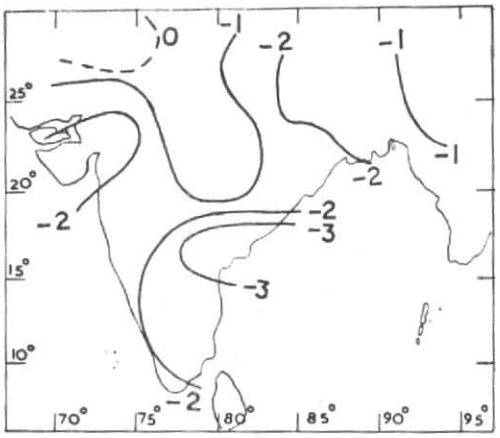

Fig. 2 Water temperature in excess of air temperature (+excess, —defect) —January, 0830 IST

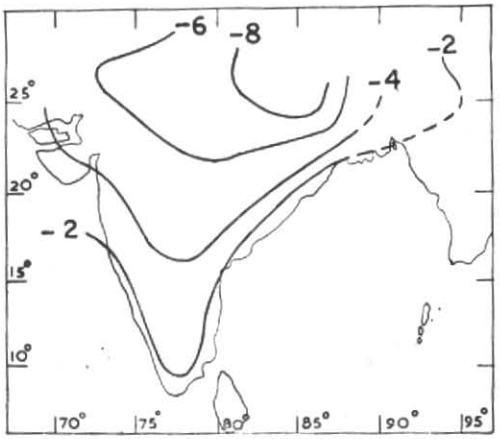

Fig. 3. Water temperature in excess of air temperature (+excess, —defect) —April, 0830 IST

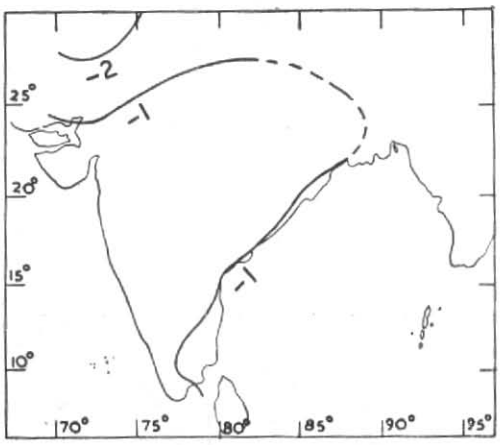

Fig. 4. Water temperature in excess of air temperature (+excess, —defect) —July, 0830 IST

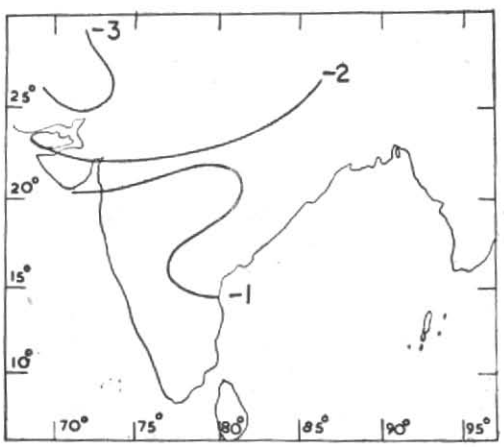

Fig. 5. Water temperature in excess of air temperature (+excess, —defect) —October, 0830 IST

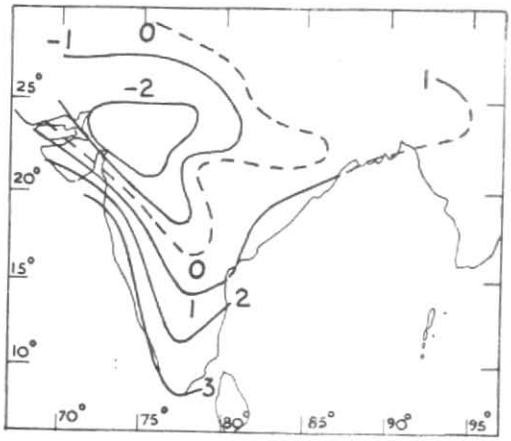

Fig. 6. January (1730 IST)

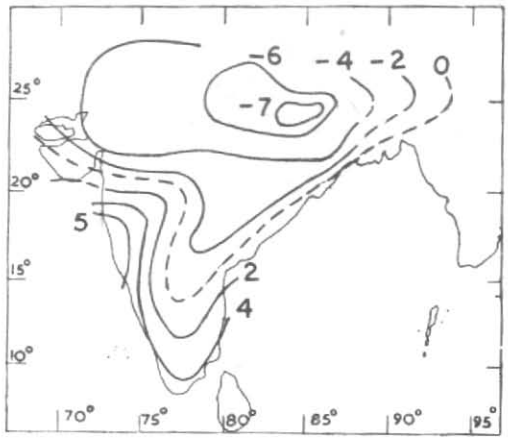

Fig. 7. April (1730 IST)

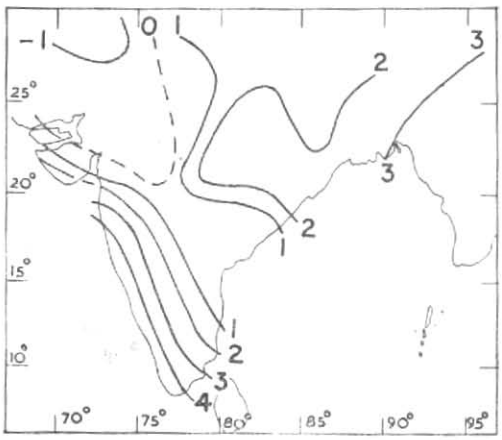

Fig. 8. July (1730 IST)

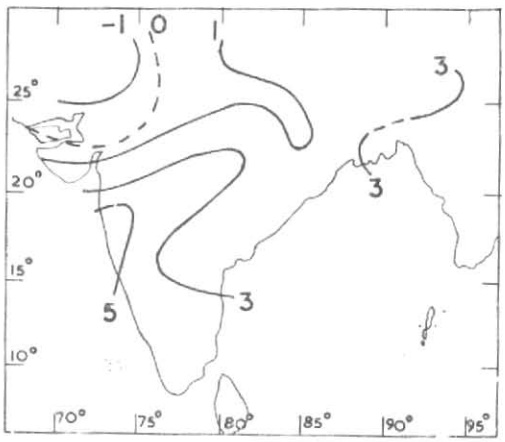

Fig. 9. October (1730 IST)

Figs. 6—9. Water temperature in excess of air temperature (+excess, —defect)

Water-Air Temperature difference

It is found that the difference between the water temperature and the air temperature concurrently observed at 0830 and 1730 IST in the Stevenson Screen at a height of about 4 ft above ground, undergoes considerable variations during the course of a day. In the forenoons the water is generally colder than the air; maximum difference is observed in the month of April and a minimum in July. Figs. 2–5 show the departure of water temperature from air temperature at 0830 IST and Figs. 6–9 give the above departure at 1730 IST during four typical months January, April, July and October.

It is important to note that the west coast of the Peninsula is the region where the largest positive departure is observed throughout the year in the afternoons. The region of maximum negative departure is not similarly steady. However it is seen that north Rajasthan is the only region where the water is colder than the air throughout the year from morning till evening except in the afternoons of August when the water is warmer than air all over the country.

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