

Weather

Weather during Indian Mount Everest Expedition 1960*

1. Introduction

The Indian Mount Everest Expedition 1960 had, in addition to the 'mountaineering members', also a 'geologist' and a 'meteorologist' in the party. Shri S. U. Shankar Rao, Professional Assistant, India Meteorological Department, was sent on behalf of the India Meteorological Department to take systematic weather observations at scheduled hours and to interpret the forecasts supplied by the Meteorological Department and broadcast by the All India Radio for the use of the expedition party. Shri Shankar Rao was attached to the Expedition party for a period of four months from 18 February to 20 June 1960 and the observations were taken and recorded by him during the period 6 March to 29 May 1960. Observations from 13 April to 27 May 1960 were taken at the base camp at a height of 18,000 feet a.s.l. and during the rest of the period they were taken at different locations and heights. A short account of the weather as recorded by Shri Shankar Rao during the period of the expedition is given in this note.

2. Instrumental equipment

The following instruments were supplied to Shri Shankar Rao by India Meteorological Department for his use—

(1) An Aneroid Barometer, (2) A Whirling Psychrometer, (3) A set of Maximum and Minimum thermometers, (4) A Taylor Air-meter, (5) A portable Windvane with suitable stand and (6) Still and movie cameras and colour films.

In the absence of a Stevenson Screen, a packing case of thin plywood was used to

house the maximum and minimum thermometers. The box was erected on a stone structure. The windvane was fixed in the ice about 30 yards from Shri Rao's tent and had often to be attended to as the melting ice would not allow it to stand firm. The Taylor Air-meter was, unfortunately, not found to work satisfactorily in very thin air and on most occasions, only estimated wind velocity was reported in the coded telegrams sent to New Delhi from the expedition site.

3. Weather

3.1. *Weather during the period 6 March to 12 April 1960*—The party left Jaynagar (Lat. 26.7°N , Long. 86.2°E) on the Indo-Nepal border on 6 March and set up the Base Camp on 5 April. Shri Rao reached the Base Camp on 13th.

On 6 March when the party started from Jaynagar, weather was cloudy. Rain and thundershowers occurred during the whole night on 7th, with mist the following morning. The weather remained fair during the following 10 days. On 22 March when the party reached Namche Bazar, the weather was cloudy and the snow which had started from the previous evening continued till about 1400 hours and was about 4" to 6" deep at places. On the next day winds were quite gusty reaching about 30 kts in the afternoon.

From 23 March, the party camped at Pangboche at a height of about 13,000 feet a.s.l. for a 20-day stay in the area for acclimatisation. Except for occurrences of altocumulus and cirrus, occasionally lenticular—the weather was fine to fair for the next few days. On 28th, drizzle started in the

*This note was prepared in the Organisation Section of the Office of the Director General of Observatories, New Delhi by Shri S. B. Kulkarni, Assistant Meteorologist based on the notes and records brought back by Shri S. U. Shankar Rao

19		BAROMETER				THERMOMETERS								Humidity		WIND				VISIBILITY Code figure		
Date	Month	Altd. Therm. as Read Correct to 0 F/A	Bar. as Read	Bar. corrected for index variation, temperature and gravity	As Read				Corrected				Dew point °F (a)	% Rel. Humidity	Wind Dirn.	Anemometer		Speed at time of observation in m.p.h. (knots)	Av. Speed in 24 hours in m.p.h. (knots)		Av. Speed in 24 hours in m.p.h. (knots)	
					Dry	Wet	Max.	Min.	Dry	Wet	Max.	Min.				First reading	Second reading					
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	

A sample page showing observations on 23-24 May 1960 from the

afternoon with intermittent slight snow. On 30th weather again cleared. The next spell of bad weather commenced from 5 April and lasted till about 10 April. Snowfall during these days was at times heavy. During the disturbed periods, however, the surface wind speed seldom exceeded 15 kts.

3-2. *Weather at the Base Camp*—The regular series of the observations at the Base Camp (at about 18,000 feet a.s.l.) were commenced from 15 April. For a few days, the sequence of weather was clear skies in the morning, appearance of clouds—altocumulus and cirrus in the afternoons and the skies clearing again towards night. There was snowfall between 1500 and 1800 hours on 18th and 20th. Gusty winds were also experienced during the afternoons. Fair weather prevailed during the last week of April. On 7 May, it was quite interesting to note the clouds—altocumulus moving from west to east at a high velocity and forming and dissolving. The surface winds were also quite gusty on this day shaking the tents violently. Another spell of disturbed weather

started from 13 May. Thunderstorms occurred on 14 and 15 May with moderate snowfall. Slight snowfall, occurring mostly towards midday or night, continued till 20 May. Fair weather with light winds prevailed between 21 and 23 May. On the 24th morning, snowing started by 1000 hours in the morning with cloud base lowering to 500 feet above ground. It was on the morning of 25 May that the Expedition party made their first attempt on Everest. They had, however, to return due to the fury of strong winds and blinding snow. The weather at the base camp that day, however, showed an improvement since the previous day. The weather diary for this day runs as follows: "Early morning 8/8 *St* at 500'; at 0900 hours 3/8 *Cu* and 2/8 *Ac* appeared. Winds southerly, cloud direction southeasterly. Surface winds becoming gusty after 1200 hours". Wind was calm at the base camp at 0830 IST, and SW 8 kts both at 1130 and 1730 hours. This shows that while the weather at the base camp showed an improvement with only light or moderate winds, the weather at higher levels above

CLOUD							Cloud Height	Ind. or Lat. Cloud Layer	RAIN or other precipitation	WAVE Observations			WEATHER REMARKS	THERMOMETER					
Low (or Fog)			Medium or High							Code figure	Since Last obsn.	For 24 hour ending at 05:30 hrs. I.S.T.		Direction	Period	Height	AS READ AFTER SETTING		
Amt.	Form	Dirn.	Amt.	Form	Dirn.	Total Amt.											h	GN	h
(23)	(24)	(25)	(26)	(27)	(28)	(29)	(30)	(31)	(32)	(33)	(34)	(35)	(36)	(37)	(38)	(39)	(40)	(41)	(42)

Weather Register maintained by Shri S. U. Shankar Rao during the Expedition

25,000 feet became worse with very strong blinding snowstorms.

From 26th onwards, there was snowfall every day. The expedition then decided to give up the attempt and left the base camp on their return journey *via* Kathmandu by 1 June.

The extreme variations of weather met by the party as judged from the weather observations at the Base Camp may be easily seen from Table 1.

3.3. *Weather experienced by the climbers*—The above observations were taken at the Base Camp (height 18,000 feet). The following account gives an idea of the weather experienced by the climbers at high levels. Information about the weather experienced at the higher levels between 24 and 27 May has been extracted from the book *Lure of Everest* by Brigadier Gyan Singh, Leader of the expedition.

April 19: Between Lhotse Face and South Col—The Expedition's advance was

temporarily held up with western disturbances reaching the Everest region and high velocity winds blowing over the Lhotse Face.

May 14—The winds on the Lhotse Face remained strong and chilly and it started snowing intermittently.

May 22—Weather conditions showed some signs of improvement.

May 23—Raging avalanches on the steep Lhotse Face following heavy snowfall.

May 24—It was a very fine morning at the South Col. At 10 A.M. weather was good and hardly any wind. At Camp VII (height 27,600 feet), wind had started to blow but was not strong.

May 25: Camp VII (height 27,600 feet)—The wind was getting stronger during the night and showed no signs of abatement even with the sunrise. The first assault party commenced their march at about 7 o'clock for the final assault.

TABLE 1

Observations recorded at the Base Camp during 15 April to 27 May 1960

	Temperature (°C)	Date
Highest maximum	22.8	23 May
Lowest maximum	11.1	21 April
Highest minimum	— 1.1	27 May
Lowest minimum	— 15.7	1 May
Number of days with snowfall	21 days out of 43 days	

The wind was very strong and made the cold still more unbearable. By about 1030, the wind was like a gale, there was snow and visibility was also reduced due to clouds. The fury of gales, snowstorms and visibility which was almost nil made the climbers decide to return at about 1130 hours when they were at an altitude of about 28,300 feet. The weather continued to be bad during the rest of the day also.

May 26*—It was snowing heavily in the morning. There were heavy clouds around Everest and a huge plume of snow off the peak was indicative of strong winds.

May 27—Weather worsening still further and the second summit party returned from the South Col.

Brigadier Gyan Singh has appreciated the work of the meteorologist member of the team in the following words—"Rao, our Meteorological Officer, was my constant adviser on weather conditions and gave a reliable interpretation of the very accurate weather forecasts sent to us by the Meteorological Department three times a day through the courtesy of All India Radio. He was also a great help to me in administrative matters and, although he had never been on mountain or ice before, he had the guts to go three quarters of the way up the ice-fall in order to take certain meteorological observations."

This was the first occasion when an officer from the India Meteorological Department was deputed for a Himalayan expedition for taking systematic weather observations. This first experience will be of great help in planning similar meteorological projects at high altitudes in future.

*This seems to be the author's surmise of the over-all picture of the weather, most probably as seen from a number of observing points—*Editor*

WEATHER—WINTER SEASON (JANUARY—FEBRUARY 1961)

Chief features—(1) More than usual activity of western disturbances in north India; (2) Formation and movement of two depressions in the Bay of Bengal and (3) A cold wave during the month of February.

Nine western disturbances moved across north India during this season. Of these, the first between 1 and 5 January and three others between 30 January and 10 February were all quite active and gave abundant rainfall over the northern and the central parts of the country. Brief description of the disturbances is given below.

The first western disturbance lay over northern divisions of West Pakistan on 31 December 1960. It moved across the western Himalayas on 3 January and across the Eastern Himalayas on 5 January. In association with it, fairly widespread or local snow occurred in Jammu and Kashmir, Himachal Pradesh and the Punjab-Kumaon hills from 1 to 3 January. Local or scattered rain also occurred in the plains of north India between 1st and 5th. The three western disturbances which followed were relatively weak and caused only scattered showers in the Western Himalayas on a few days between 11 and 17 January. The next disturbance was active and attained the intensity of a depression while it lay over the Punjabs on 30 January. Progressing in an easterly direction, it moved away across Assam by 3 February. In association with it, fairly widespread precipitation with a few heavy falls occurred in the Western Himalayas and the adjoining plains. Ambala reported 9 cm of rainfall, Mandi and Dharamsala 8 cm each and Chandigarh 7 cm on 30 January. Fairly widespread thundershowers also occurred in northeast India on 3 February. A few hailstorms were reported from Madhya Pradesh. The sixth western disturbance of the season caused fairly widespread rain in the plains of the Punjab(I) on 2 February and

fairly widespread rain or snow in the Punjab-Kumaon hills and in Himachal Pradesh on 2nd and 3rd. The next disturbance appeared over Baluchistan on 3 February, lay over northwest India on 5th, moved across the Western Himalayas on 8th and across the Assam Himalayas on 10th. It caused extensive rainfall over practically the whole of India outside the south Peninsula. Fairly widespread snow fell in the Western Himalayas on 6th and 7th. Rain or thundershowers occurred at most places in the plains of north India from 6th to 8th. A few noteworthy amounts of rainfall were—Angul 9 cm and Nainital 7 cm on 6th, Dehra Dun and Ambikapur 6 cm each on 7th and Asansol 7 cm and Jamshedpur 6 cm on 8th. The eighth western disturbance was located over west Baluchistan and adjoining Afghanistan on 9th and over the Punjabs on 11th. It moved across the Western Himalayas on 13th and across the Assam Himalayas by 15th. It induced a low which lay over northeast Arabian Sea on 10th and later moved in an easterly direction. The induced low crossed Orissa and coastal West Bengal on 14th and became unimportant thereafter. In association with this western disturbance and the associated induced low, a few falls of rain or snow occurred in the Western Himalayas from 11th to 14th and some thundershowers in east Madhya Pradesh and northeast India from 12th to 14th. The ninth western disturbance which was the last of the season was feeble and caused only a few showers in the Western Himalayas between 17th and 19th.

In association with an easterly wave, a depression developed in the southwest Bay of Bengal with centre about 100 km north-northeast of Trincomalee on the evening of 9 January. It crossed the extreme south Peninsula, weakened and moved away as a low pressure wave across the southeast Arabian Sea by 13th. Under its influence

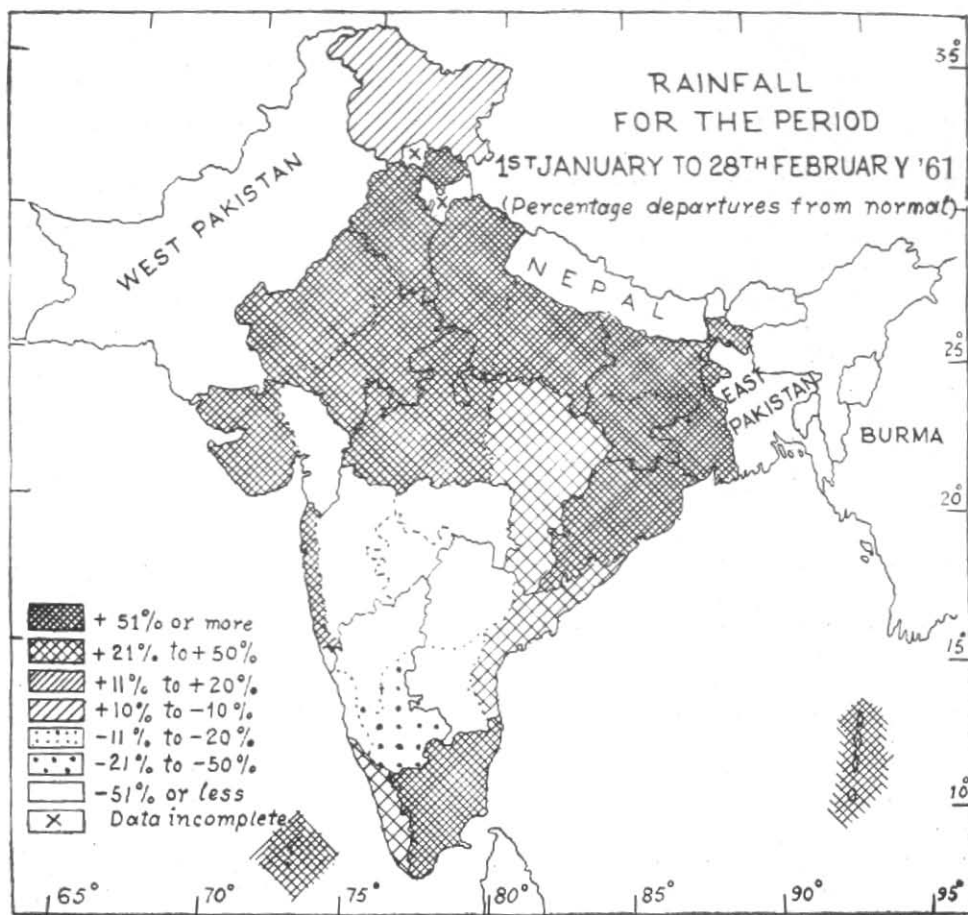


FIG.1

rainfall was fairly widespread in the Madras State on 11th and 12th. Cuddalore and Palayamcottai each reported 13 cm of rain and Tuticorin 9 cm on 11th. Squally weather occurred over the seas near Tuticorin which resulted in the sinking of ten cargo boats off Tuticorin port on the night of 10-11 January.

Another depression formed in the south Bay of Bengal with centre near Lat. $4\frac{1}{2}^{\circ}\text{N}$ and Long. $86\frac{1}{2}^{\circ}\text{E}$ on the morning of 17 February. It moved slowly in a northerly direction till 21st and then weakened into a low pressure area over the southwest and adjoining southeast Bay of Bengal on 22nd. Later, it moved in a westerly direction and filled up over the southeast Arabian Sea by 25th. In association with it, there was a spell of fairly widespread or local rains in the Bay Islands with a few showers in the extreme south Peninsula.

Night temperatures were below normal over north India during the second week of January, being appreciably so in Gujarat State, south Rajasthan and west Madhya Pradesh on a few days. Thereafter, weather warmed up and temperatures rose above normal over the country during the last week of January. In the wake of the western disturbance which moved across north India from 8 to 10 February, temperatures fell rapidly and a cold spell of severe intensity affected the entire country outside south India. Night temperatures were 4° to 7°C below normal at several places during the second week of February. In Gujarat State and neighbourhood, [night temperatures were 8 to 10°C below normal on 8 and 9 February.

The season's rainfall in terms of its departure from normal over various sub-divisions of the country is shown in Fig. 1.