SECTION-III

METEOROLOGY

Fifth Indian Expedition to Antarctica, Scientific Report, 1988
Department of Ocean Development, Technical Publication No. 5, *pp. 259-281*

Meteorological Studies at Antarctica During The Period March, 1986 to February, 1987.

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Abstract

A permanently manned meteorological observatory was established at the Indian Research Station, Dakshin Gangotri, during the Third Indian Scientific expedition to Antarctica, for continuous recording of meteorological parameters. The observatory is equipped with instruments to monitor the weather systems approaching and affecting the Station. Valuable data has been collected so far and such studies were continued during the period of March, 86 to Feb., 87 also, the results of which are presented in this paper. An automatic weather station (DCP) was also installed during the Fifth Indian Expedition, through which hourly data is being recorded and transmitted on real time basis to New Delhi through Indian National satellite INSAT-1B."

The meteorological data collected during the period of the report has also been compared with mean climatological values of some nearby stations.

Introduction

Meteorological observation programme has been an integral part of the Indian Scientific Expeditions to Antarctica ever since the first expedition to the icy continent during Antarctic Summer of 1981-82. The permanent Station at Dakshin Gangotri was established by India in January, 1984 during the Third Expedition. A manned meteorological observatory has since been functioning at the Station round the year.

The observatory at Dakshin Gangotri is equipped with autographic instruments for continuous recording of meteorological parameters e.g. surface wind direction and speed, pressure and temperature. It also has the facility for measurement of surface and global radiations, surface ozone and atmospheric electrical potential gradient. Periodic balloon ascents are also taken to obtain vertical profile of upper air temperature, humidity and radiation fluxes. It also has the equipment for the reception of weather charts broadcasts from forecasting offices in the region and the Automatic Picture Transmission (APT) equipment

for reception of cloud imageries from the polar orbiting weather satellites. The meteorological station at Dakshin Gangotri is thus a well equipped weather observatory which is capable of recording various meteorological observations as well as watching and monitoring the weather systems which may approach and affect the station during the course of next few days.

Programme

DCP Installation

The Indian Meteorological Programme planned for Third Wintering Team was to continue the ongoing observational programme and to make further efforts for the modernization of the station. For the latter purpose an Automatic Weather Station was established on experimental basis during the Fifth Expedition. It was aimed to conduct experiment on the reception of hourly surface meteorological observations of Dakshin Gangotri through Indian Geostationary Satellite INSAT-1B. In this connection a Data Collection Platform (DCP) was installed at the station. The sensors and the helical antenna of the DCP were installed on the top of the three container assembly structure. The electronic component and the power supply unit of the DCP were kept in thermally insulated boxes in the middle container of the assembly. During the third wintering period, a close watch on the performance of? this DCP system was kept and detailed report has been separately published in the Annual Report. 1987-88 of the Department of Ocean Development, New Delhi.

Real-time Transmissions

Another significant item of the programme of the Third Wintering Team was the commencement of the transmission of the coded meteorological observations of Dakshin Gangotri on real-time basis. The meteorological observatory at Dakshin Gangotri was allocated station index number (89510) by the World Meteorological Organisation (WMO) to. facilitate international exchange of the observations recorded at the Indian station. Surface observations of four main Synoptic hours viz. 00, 06, 12 and 18 GMT, are transmitted to IMD New Delhi through Telex System within 15-20 minutes of the time of observation for the international exchange over Global Meteorological Telecommunication Network. Dakshin Gangotri has thus become part of the WMO network of Meteorological Stations in Antarctica.

Ongoing Programme

The ongoing meteorological programmes which continued during the Third Wintering period, included the following:

(I) Study of daily, seasonal and annual variations of surface atmospheric pressure, winds, air temperature and cloud cover.

(ii) Study of vertical structure of the Antarctic atmosphere.

(iii) Study of atmospheric changes with reference to specific situations.

(iv) Radiation budget study.

(v) Measurement of atmospheric electric potential gradient and surface ozone.

(vi) Monitoring the weather systems affecting weather at the station by arranging reception of:

(a) Cloud imageries from polar orbiting satellites.

(b) radio-facsimile broadcast of charts from weather forecasting offices in the region and

(c) meteorological observations from stations in the neighbouring area.

Sixteen Radiometersonde and sixty-two Radiosonde ascents were attempted during the period. On an average four satellite pictures per day were received from the polar orbiting weather satellites. Regular reception of three to four analysed charts broadcasted from Molodezhnaya (USSR weather station at Antarctica) and Pretoria was also arranged. In addition, regular observations of surface-ozone, radiation and electric potential gradient were also recorded. The data is under scrutiny and validation.

Weather Over Dakshin Gangotri

Air Temperatures

Sensors

Three types of thermometers are in use at Dakshin Gangotri to record air temperature. They are the conventional Assmann Psychrometer, Whirling Psychrometer and electrical thermometers. The electrical (YSI thermister). thermometers were found to be best suited for Antarctic conditions for remote reading and tracing a continuous record. The drawback with these thermometers is, however, that these are susceptible to all types of electrical interferences such as High Frequency (HF) Transmission interference and static electric charge interferences. The only alternative to this problem is to switch off the uhit during such interferences which will apparently cause the break in the continuous record. With all such problems, temperature unit provided at Dakshin Gangotri developed defects at number of occasions. Temperature sensor used for measuring upper air temperatures with balloon ascents, was utilised to record air temperature at synoptic hours during such occasions.

Inter-annual Variations

The lowest minimum temperature of — 46.0°C was recorded on 29 July 1986. The comparative values for 1984 and 1985 winter periods were —50°C and — 52.0°C respectively, both recorded in August. The extreme values of

maximum and minimum temperature recorded during three winterings at Dakshin Gangotri are presented in Fig. 1. The records of these three years indicate that extreme lowest temperature recorded was in the month of August in the year 1984 and 1985. Month of July, however, recorded lowest temperature in 1986. Highest value of +6.0°C was recorded in January, 1987. The next high value of +5.0°C was in December, 1984. Exceptionally warm temperature of 0°C occurred in May, 1984 which was 13°C higher than the highest temperature value in the same month during 1985. The average monthly temperature values of these indicate variation of the order of 7-7.5°C in the month of May and August during the past three years. Average temperature variation was within 2.3°C during summer and spring months.

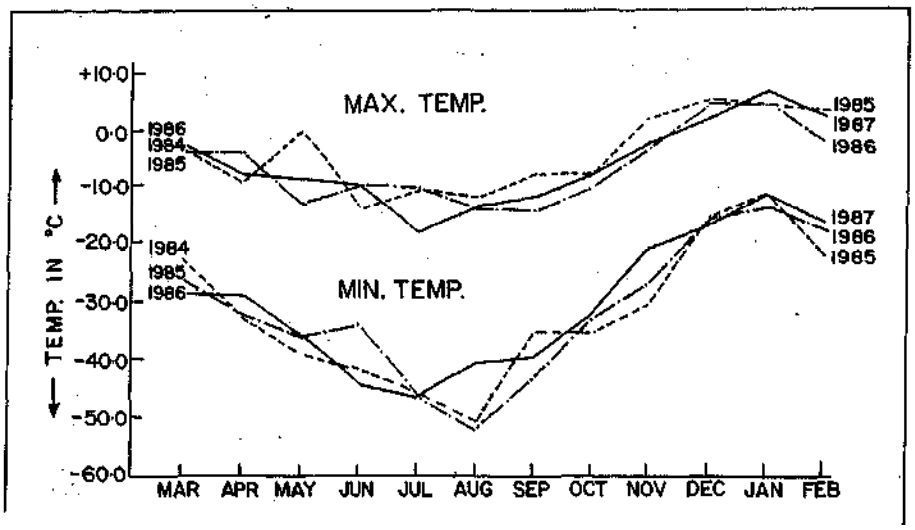

Fig. 1. Extreme monthly maximum and minimum temperature values recorded during 1985, 1986 and 1987 at Dakshin Gangotri

Comparison with Neighbouring Stations

Extreme maximum and minimum temperature. values of 3 neighbouring stations (Sanae, Syowa and Halley Bay) alongwith the values of Dakshin Gangotri during the third wintering are shown in Fig. 2. It can be seen that the maximum temperature values at Dakshin Gangotri were lower during the most part of the year as compared to the extreme values of other three stations in the area. The lowest minimum temperature values of the Indian station were, however, closer to the extreme values of Syowa compared to two other stations. The monthly temperature values of the four stations shown in Fig. 3, also indicate that Syowa has warmer temperatures round the year as compared to Sanae and Halley Bay.

The average monthly temperaturre at Dakshin Gangotri during Third Wintering are found closer to the mean values of these two stations.

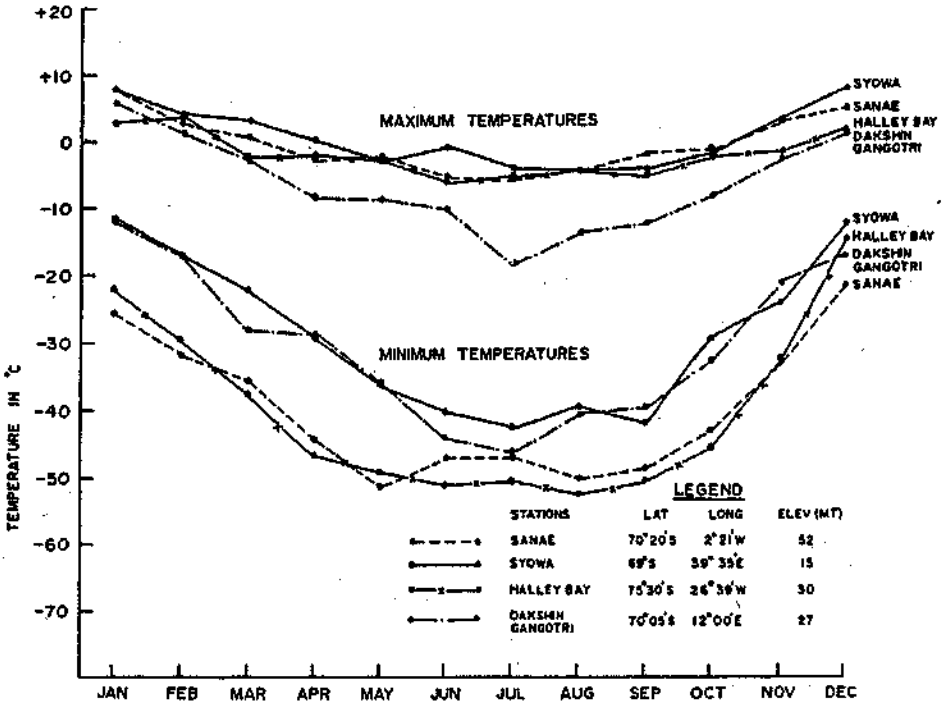

Fig. 2. Extreme maximum—minimum temperature values of Sanae, Syowa and Halley Bay from climatological records (Schwerdtfeger 1970). The values of Dakshin Gangotri for third wintering period are also shown.

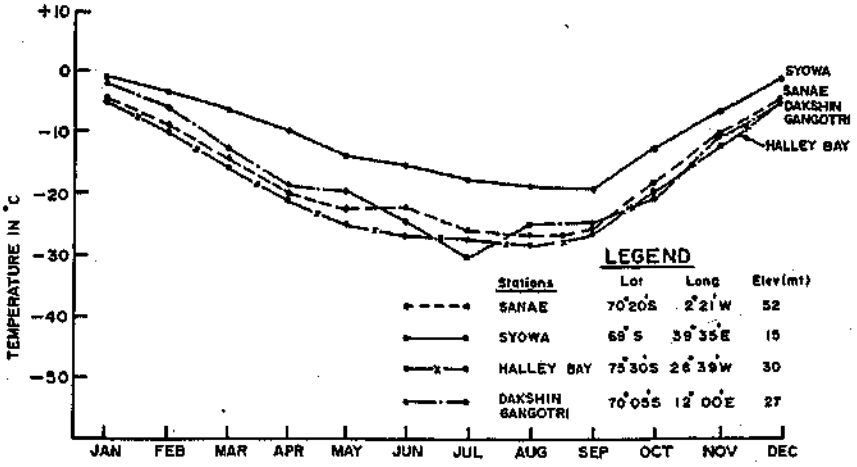

Fig. 3. Monthly mean temperature values of Sanae, Syowa and Halley Bay (Schwerdtfeger, 1970) and average monthly values of Dakshin Gangotri for the period of third wintering

Wind

Sensors

To record wind speed and wind direction, electrical cup generator anemometer and Synchro transducer wind-vane were used at Dakshin Gangotri. As in the case of electrical thermometer, these sensors also were susceptible to electrical disturbances.

Inter-annual Variations

The month of October was the windiest month during the Third Wintering period with average wind speed of 21.01 Kts. The station, however, experienced wind exceeding 100 Kts in gust on one occasion during winter season (July 10, 1986). Container housing hydrogen gas cylinders was tilted sideways down by this strong wind. There were three occasions in both the first and second wintering when strong winds exceeding 100 Kts were experienced. These were one in autumn (May) and two in spring (one each in September and October) during the first wintering and two in autumn (one each in March and May) and third in winter (July) during second wintering period. It is apparent from the record of three years that strong winds exceeding 100 Kts can occur during any season except summer. Average monthly wind speeds for the period of three Wintering Teams indicate that the First Wintering Team generally experienced strong winds compared to other two teams (Fig. 4). Autumn and spring months experience strong winds compared to winter and summer.

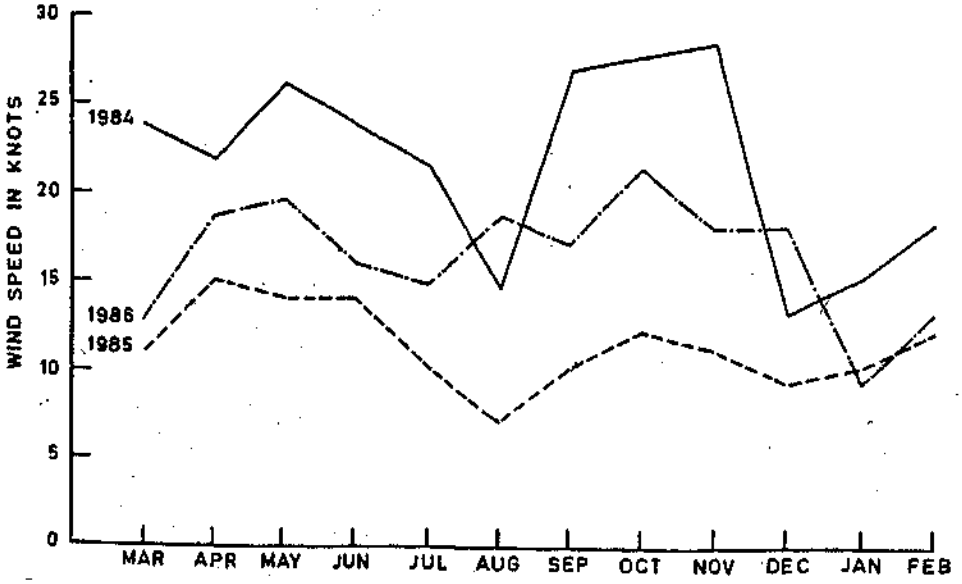

Fig. 4. Monthly average wind speed at Dakshin Gangotri for three wintering periods

Comparison with Neighbouring Stations

Annual mean wind speed of Halley Bay, Sanae and Syowa are 9.6, 14.8 and 11.8 Kts respectively. These values at Dakshin Gangotri for the first three wintering periods were 21.5, 11.3 and 16.2 Kts respectively. Apparently Halley Bay experiences light winds compared to other three stations in the area. The wind direction is generally easterly over Halley Bay and east-northeast over Dakshin Gangotri. It varies from northeast to east-northeast over Syowa.

Pressure

Sensors

To record the station level pressure, a precision aneroid barometer and a barograph were used at Dakshin Gangotri.

Inter-annual Variations

The highest pressure of 1013.0 mb and lowest of 940.1 mb were recorded during the winter months of 1986 on June 10 and July 3 respectively. The average monthly pressure curves during the three wintering' periods shown as Fig. 5, however, indicate that lowest monthly average pressures occur with spring

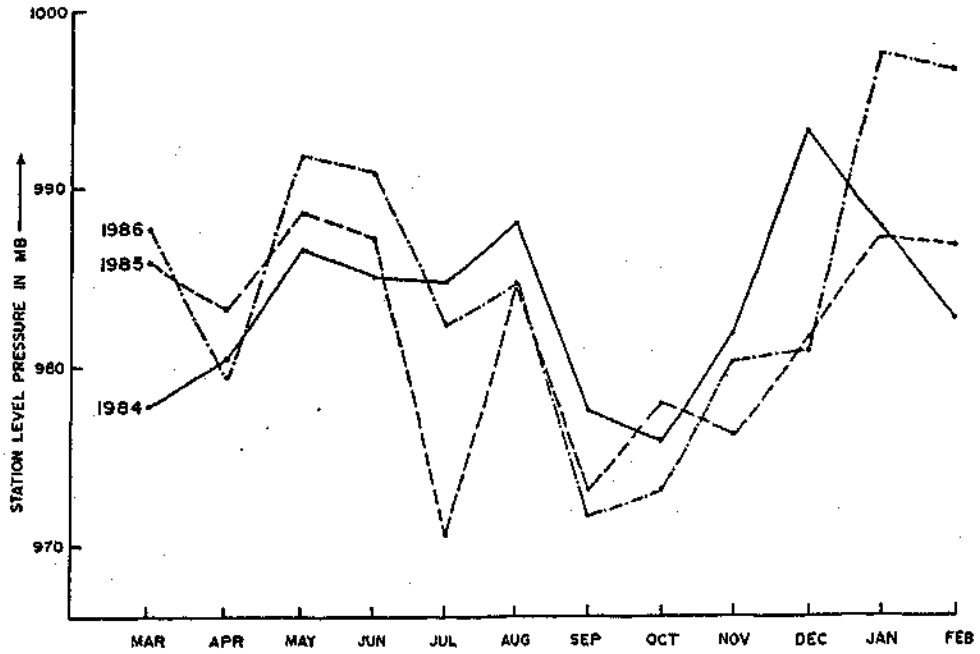

Fig. 5. *Monthly average pressure values recorded at Dakshin Gangotri during the three wintering periods*

onset in September-October. The average monthly pressure continued to rise during the season and commenced falling with the onset of summer in December-Tanuarv. Month of May and August recorded comparatively high values. An exceptionally *lowr* value of monthly average pressure of 970.1 mb occurred in July, 1985 which was associated with the eight blizzards during the month compared to four and three blizzards in the same month of 1984 and 1986 respectively. This apparently explains the abnormally low monthly average pressure.

The transition from autumn to winter during first wintering period was not so well marked as during the other two years. The onset of spring also appears to have been delayed by about a month in 1984.

Comparison with Neighbouring Stations

The highest and lowest monthly mean station level/sea level pressure values in respect of the three neighbouring stations alongwith average values of Dakshin Gangotri for the three wintering periods are given in Table I below:

Table I. Station/Sea level pressure Values in millibars

Monthly Mean/Av	Halley Bay	Sanae	Syowa	Dakshin Gangotri 1984	1985	1986
Highest	993.1	992.0	989.3	992.9	988.5	997.0
Lowest	983.1	982.8	982.2	975.9	970.6	971.7
Difference	10.0	9.2	7.1	17.0	17.9	25.3

The available climatological data from the neighbouring stations which are located near the coastal ring of the continent indicate that the Intra-annual variation in the monthly mean surface pressure values is of the order of 7-10 mb. The observations at Dakshin Gangotri, for the three years, however, reveals that year to year variations in the monthly average values are comparatively large and of the order of two to three times the mean intra-annual variations.

Blizzards

Antarctica is known as the windiest continent. Blizzards are very frequent and it is just not possible to do any outside job during such periods. The blowing snow drops the horizontal visibility drastically to few metres in which it is hazardous to move out. Precipitation does occur in the form of snow flakes

but it is not possible to record the amount of precipitation due to the drifting/blowing snow. A total of fiftysix blizzards were experienced during March, 1986 to February, 1987. The longest one. lasting for 140 hrs was in the month of August. There were 110 blizzard days compared to 148 and 139 during first and second wintering period, respectively.

Upper Air Observations

Indigenous Radio Sonde Ground Equipment (RSGE) operating on 401 MHZ was installed at Dakshin Garigotri for recording observations of upper air temperature profile. The station did not have indoor facility for filling the balloons with hydrogen gas. It was, therefore, not possible to arrange balloon ascents during the windy weather. Periodic ascents were taken as and when weather conditions permitted.

Preliminary analysis of upper air observation taken at Dakshin Gangotri during the summer months indicate that the tropopause height varies from 8 to 11 kms during the season with temperature between —45°to —61°C. The data for the Autumn season of third wintering team also show similar results. The ascents during the winter and spring generally provided data upto the height of 10-11 kms or below. These records do not indicate existence of tropopause. More frequent ascents for longer period will be necessary for a meaningful analysis of the upper atmosphere.

Table II. Monthly Weather Summary

Station: Dakshin Gangotri, Antarctica.

	Pressure (Mb)			Temperature (°C)			Wind Speed(Kts)			Blizzards	
Month	Av	Highest	Lowest	Av	Highest	Lowest	Av	Highest	Total	No. of Days	Longest Duration (in Hrs.)
March, 86	987.6	1007.0	961.7	-12.8	-2.5	-28.0	12.8	50.0	5	6	30
April, 86	979.5	955.8	994.5	-18.62	-8.0	-28.5	18.51	62.0	6.	10	74
May, 86	991.69	1006.8	959.6	-19.34	-8.5	-35.5	19.4	60.0	6	13	57
June, 86	990.70	1013.0	959.0	-24.41	-10.0	-44.0	15.92	55.0	7	11	60
July, 86	982.2	1003.0	940.1	-30.3	-18.0	-46.0	14.66	75.0	5	8	50
August, 86	984.44	1008.4	959.2	-25.26	-13.5	-40.3	18.38	80.0	5	13	140
Sep., 86	971.73	992.7	946.2	-25.25	-12.0	-39.6	16.83	65.0	3	8	117
Oct., 86	973.04	986.6	956.6	-21.05	-8.0	-32.5	21.01	65.0	7	14	75
Nov., 86	980.02	995.3	964.8	-11.2	-2.5	-21.0	17.68	50.0	7	11	61
Dec, 86	980.7	992.0	965.0	-5.6	+1.5	-17.0	17.72	55.0	4	14	108
Jan., 87	997.0	1009.3	976.9	-1.9	+6.0	-12.0	9.02	36.0	0	0	0
Feb.87 (l-15th)	996.2	1010.3	980.9	-6.0	+1.2	-17.0	12.91	40.0	1	2	27

Summary

Monthly average and extreme values of pressure, temperature and wind speed alongwith monthly blizzard frequency are given in Table II for the period March 1, 1986 to Feb 15, 1987. It will be seen that January, 1987 was the warmest and July, 1986 the coldest month with average temperatures of — 1.9°C and —30.3°C respectively. During the previous two winters August was, however, the coldest month with average monthly temperature of -32.6°C (1984) and —33°C (1985). The monthly average temperature in January, 1985 and 1986 were —2.2°C and —3.0°C respectively. Observation summary of daily average and maximum—minimum pressure, temperature and wind speed values are presented for each day in the Tables III.1 to III.12. The summary is based on eight synoptic observations per day at three-hourly intervals.

Table III.l. Daily Observation Summary
(ending at 0900 hrs GMT)

StatioiI: Dakshin Gangotri. Month : March.
Year : 1986

Date	Pressure (mb)			Temperature (°C)			Wind Speed (Kts)	
	Av*	Max.	Min.	Av*	Max.	Min.	Av*	Max.
01	988.75	989.0	988.5	-6.37	-5.0	-11.0	15.5	25.0
02	991.26	992.3	989.5	-10.8	-8.0	-12.0	8.8	12.0
03	988.5	992.4	984.1	-7.12	-6.0	-8.0	5.8	12.0
04	980.5	984.4	978.7	-8.5	-5..0	-11.0	1.25	5.0
05	984.2	986.9	980.4	-6.5	-4.0	-11.0	10.62	20.0
06	984.0	986.9	982.5	-6.5	-4.0	-10.0	8.6	15.0
07	983.8	985.2	983.0	-7.28	-4.0	-12.0	14.15	20.0
08	988.8	—	—	-11.0	-6.0	-10.0	12.8	15.0
09	990.67.	991.3	990.2	-6.12	-2.5	-12.0	2.5	5.0
10	992.9	994.3	992.1	-11.4	-8.0	-14.t)	2.1	10.0
11	995.5	996.1	994.9	-8.8	-8.0	-9.0	13.6	18.0
12	992.9	993.5	992.5	-9.6	-9.0	-10.0	21.6	
13	998.0	1000.7	994.9	-10.5	-10.0	-12.0	14.12	20.0
14	1003.2	1006.7	1000.73	-12.8	-11.0	-16.0	17.7	30.0
15	1003.5	1007.0	1000.0	-15.0	-11.0	-18.0	5.6	10.0
16	995.7	999.2	991.6	-16.5	-13.0	-20.0	9.8	20.0
17	998.4	990.0	987.7	-10.1	-9.0	-12.0	24.1	40.0
18	990.1	992.5	988.6	-7.25	-6.0	-10.0	30.0	50.0
19	993.5	994.5	993.0	-10.25	-7.0	-14.0	21.25	25.0
20	994.4	995.6	993.2	-12.7	-11.0	-15.0	17.29	20.0
21	996.0	997.2	993.1	-12.2	-11.0	-17.0	14.6	20.0
22	984.4	991.3	978.4	-17.5	-14.0	-20.0	5.75	8.0
23	979.5	986.8	972.6	-22.7	-19.0	-26.0	3.2	5.0
24	990.2	992.4	989.2	-22.25	-18.0	-28.0	7.6	12.0
25	988.46	992.0	983.9	-17.37	—1/5.0	-20.0	13.75	17.0
26	978.1	982.8	974.0	/ -17.75	-15.0	-20.0	12.12	15.0
27	976.55	976.8	976.1	-19.4	-17.0	-22.0/	8.75 •	13.0
28	973.16	976.4	970.3	-20.75	-18.0	-23.0	2.1	5.0
29	965.1	969.7	961.7	-20.87	-18.0	-24.0	3.6	8.0
30	969.9	977.8	962.3	-18.25	-12.0	-23.0	10.0	25.0
31	—	983.1	978.9	—		—	—	45.0

Average of 8 observations per day.

Table III.2. Daily Observation Summary
(ending at 0900 hrs GMT)

Station: Dakshin Gangotri. Month : April.
Year : 1986

Date	Pressure (mb)			Tempierature (°C)			Wind Speed (kts)	
	Av.*	Max.	Min.	Av.*	Max.	Min.	Av.*	Max.
01	977.12	980.5.	975.2	-21.75	-18.0	-25.0	5.5	10.0
02	*973.77*	979.1	971.2	-14.85	- 9.0	-26.0	23.5	45.0
03	*976.02*	978.7	972.4	-13.5	-10.0	-16.0	23.87	45.0
04	976.54	981.0	974.0	-14.44	-12.0	-18.0	10.75	22.0
05	981.25	984.2	975.7	-20.75	-17.0	-26.0	8.0	15.0
06	976.8	979.0	974.0	-24.9	-21.0	-27.5	5.62	10.0
07	982.15	984.3	979.7	-25.75	-23.5	-28.5	7.87	12.0
08	988.00	990.4	983.2	-21.18	-16.8	-25.2	11.75	20.0
09	989.4	990.4	988.6	-16.5	-14.5	-18.4	26.5	35.0
10	986.92	989.1	985.5	-18.93	-17.0	-20.6	22.25	25.0
11	988.76	990.8	986.0	-21.16	-18.5	-24.0	10.62	20.0
12	990.95	991.3	990.6	-25.83	-24.0	-27.2	9.3	12.0
13	988.86	990.7	988.1	-24.18	-22.5	-26.0	12.25	23.0
14	986.25	988.0	984.1	-25.62	-24.0	-27.0	7.3	10.0
15	980.45	983.8	977.1	-22.12	-17.5	-26.5	23.12	35.0
16	977.12	977.8	976.4	-17.07	-14.5	-18.4	32.25	48.0
17	969.23	976.4	964.0	-14.65	- 9.8	-21.0	17.12	25.0
18	967.55	971.4	963.6	-13.2	-10.6	-16.0	21.12	35.0
19	979.13	986.1	972.7	-13.6	-13.0	-14.2	26.12	40.0
20	988,42	989.6	986.3	-23.13	-16.0	-26.0	6.25	13.0
21	976.1	984.8	971.1	-18.6	-15.2	-25.0	41.4	55.0
22	966.86	970.3	965.2	-13.12	-10.5	-16.0	54.45	62.0
23	966.69	967.2	965.5	-9.45	- 8.0	-11.5	44.48	55.0
24	976.16	993.0	966.8	-9.06	-,8.5	-9.5	41.45	55.0
25	992.08	995.4	987.8	-18.0	-15.0	-21.5	16.5	35.0
26	980.36	985.7	976.6	-18.3	-15.0	-22.0	23.12	40.0
27	983.01	983.8	982.2	-22.85	-20.0	-24.6	10.75	18.0
28	983.1	983.5	982.3	-26.31	-24.5	-27.0	6.87	10.0
29	978.71	983.2	971.8	-16.13	-12.8	-24.0	11.5	18.0
30	959.53	968.1	955.8	-12.95	- 9.0	-23.0	9.44	15.0

*Average of 8 observations per day.

Table III.3. Daily Observation Summary
(ending at 0900 hrs GMT)

Station: Dakshin Gangotri. Month : May
Year : 1986

Date	Pressure (mb)			Tempexature (°C)			Wind Speed (kts)	
	Av.*	Max.	Min.	Av.*	Max.	Min.	Av.*	Max.
01	967.98	979.6	959.6	-19.8	-10.7	-27.0	9.25	15.0
02	988.4	991.5	983.3	-12.86	- 8.2	-19.0	14.12	20.0
03	979.4	983.8	977.0	-14.02	-11.5	-18.4	28.0	40.0
04	989.87	991.9	984.8	-19.4	-12.2	-28.2	8.37	15.0
05	988.96	990.8	988.1	-24.32	-16.7	-30.5	7.12	10.0
06	988.57	989.7	987.5	-12.4	-12.0	-13.0	24.93	40.0
07	986.16	990.1	983.0	-12.0	-11.5	-13.0	36.62	40.0
08	985.5	993.1	981.3	-10.1	-10.5	-12.0	25.25	45.0
09	996.18	997.5	995.1	-11.41	-10.5	-12.0	48.0	60.0
10	998.12	1004.2	996.1	-11.58	-11.2	-12.0	53.12	60.0
11	1004.3	1006.8	1001.3	-13.53	-10.0	-17.5	18.25	35.0
12	1000.27	1002.0	999.3	-18.42	-16.5	-21.2	14.37	32.0
13	1004.27	1005.3	1002.5	-21.86	-16.5	-26.5	11.25	20.0
14	1004.58	1005.3	1004.0	-19.98	-15.2	-26.5	11.8	18.0
15	1001.52	1004.0	988.8	-18.38	-16.0	-21.2	15.25	20.0
16	997.41	998.2	996.8	-19.43	-19.0	-20.5	20.5	27.0
17	996.9	997.9	994.8	-20.41	-19.0	-23.0	14.5	27.0
18	990.01	993.8	987.5	-31.32	-25.0	-29.5	10.87	20.0
19	989.65	994.8	986.7	-31.37	-28.5	-35.5	7.25	10.0
20	996.5	997.8	994.3	-30.36	-27.8	-33.0	10.00	20.0
21	990.51	993.2	989.0	-27.72	-23.0	-32.0	12.0	15.0
22	983.73	988,5	978.2	-22.98	-14.0	-26.2	16.12	35.0
23	979.16	981.7	976.7	-15.56	-14.0	-17.5	40.0	45.0
24	982.8	984.6	980.0	-15.93	-14.0	-17.0	32.72	40.0
25	988.11	991.7	985.4	-20.56	-19.0	-23.0	17.62	22.0
26	995.85	997.3	993.6	-29.27	-27.0	-32.0	11.5	13.0
27	990.58	995.0	986.6	-28.27	-21.0	-23.0	8.5	13.0
28	991.43	999.5	983.1	-23.0	-20.0	-30.5	12.5	20.0
29	1002.2	1004.2	1000.2	-21.22	-17.0	-27.0	9.0	13.0
30	997.12	1002.5	993.7	-11.8	-8.5	-13.0	27.62	35.0
31	985.8	991.3	999.2	-11.12	-9.5	-12.5	25.0	30.0

* Average of 8 observations per day.

Table III.4. Daily Observation Summary
(ending at 0900 hrs GMT)

Station: Dakshin Gangotri.

Month : June
Year : 1986

Date	Pressure (mb)			Temperature (°C)			Wind Speed (lets)	
	Av.*	Max.	Min.	Av.*	Max.	Min.	Av.*	Max.
01	972.37	976.4	965.7	-16.31	-11.0	-24.0	19.37	34.0
02	980.72	983.3	976.7	-23.37	-16.5	-31.0	8.5	15.0
03	971.67	976.4	967.7	-18.5	-14.0	. -33.5	18.5	30.0
04	966.55	969.1	965.5	-25.87	-19.0	-29.0	15.87	22.0
05	976.27	978.9	971.5	-27.11	-17.5	-35.8	16.56	40.0
06	977.71	981.4	974.8	-13.75	-13.0	-14.5	46.25	50.0
07	981.7	982.2	981.4	-20.93	-13.0	-28.0	10.12	28.0
08	981.93	987.0	979.6				2.5	5.0
09	1001.12	1010.4	990.4	-24.2	-18.0	-32.6	11.75	25.0
10	1012.12	1013.0	1011.9	-21.12	-16.5	-24.0	9.56	15.0
11	1000.95	1010.3	992.2	-16.51	-10.0	-22.0	14.12	30.0
12	998.5	1002.6	995.6	-15.87	-11.0	-19.0	18.5	32-0
13	1007.95	1009.6	1004.3	-17.87	-16.0	-20.0	15.5	20.0
14	1002.25	1008.2	998.0	-24.93	-22.0	-28.0	12.25	18.0
15	996.51	997.7	994.9	-12.81	-11.0	-14.0	48.12	55.0
16	997.9	998.8	997.5	-17.81	-15.0	-23.5	21.25	45.0
17	997.23	997.8	996.9	-29.18	-26.0	-33.0	9.5	12.0
18	996.21	997.9	994.3	-32.25	-30.0	-35.0	8.62	10.0
19	994.5	996.1	993.2	-22.87	-21.0	-28.0	9.75	12.0
20	998.87	1000.7	996.4	-34.5.	-29.0	-39.5	7.0	10.0
21	996.21	1000.7	995.3	-30.0	-26.0	-41.0	5.0	5.0
22	994.25	995.7	993.0	-28.12	-26.0	-29.0	15.25	25.0
23	1000.83	1002.9	997.4	-29.81	-28.0	-33.0	14.12	28.0
24	996.98	1001.7	992.4	-22.27	-18.5	-32.0	16.12	18.0
25	991.86	994.8	990.3	-19.5	-17.0	-24.0	28.25	35.0
26	993.55	995.9	998,9	-29.68	-25.5	-34.0	9.37	10.0
27	987.26	988.5	986.4	-40.0	-25.0	-44.0	8.37	12.0
28	993.82	996.5	990.0	-35.08	-27.0	-40.5	10.25	15.0
29	971.07	989.7	958.0	-24.07	-15.0	-27.5	22.62	40.0
30	982.22	994.3	962.9			-23.5	24.5	40.0

* Average of 8 observations per day

Table III.5. Daily Observation Summary
(ending at 0900 hrs GMT)

Station: Dakshin Gangotri. Month :- July
Year : 1986

Date	Pressure (mb)			Tempei•ature (°C)			Wind Speed (kts)	
	Av.*	Max.	Min.	Av.*,	Max.	Min.	Av.*	Max.
01	989.44	994.7	983.0	-28.9	-28.8	-29.0	12.42	40.0
02	974.80	983.0	956.0	-33.53	-25.2	-41.0	15.12	50.0
03	943.47	950.4	940.1	-26.40	-25.0	-28.0	44.37	75.0
04	959.51	970.6	950.5	-30.01	-25.5	-34.5	7.37	18.0
05	975.87	977.5	973.4	-27.7	-26.0	-28.5	11.25	20.0
06	974.32	977.0	972.3	-25.1	-21.5	-28.5	20.62	35.0
07	976.06	977.1	975.0	-26.18	-22.0	-28.0	15.37	30.0
08	982.77	988.1	976.8	-27.62	-25,5	-30.5	19.37	28.0
09	990.26	991.7	989.2	-28.23	-24.5	-30.5	13.75	25.0
10	975.77	988.2	978.5	-35.13	-33.7	-37.3	5.0	5.0
11	971.33	976.5	967.9	-24.48	-18.0	-34.5	9.37	20.0
12	968.87	980.8	965.8	-27.67	-19.3	-32.0	9.0	20.0
13	993.73	998.1	986.6	-23.0	-20.0	-27.5	9.75	18.0
14	995.62	1000.9	991.6	-23.97	-19.5	-28.5	6.25	15.6
15	999.18	1001.2	997.2	-21.93	-18.0*	-25.0	16.5	20.0
16	997.52	998.7	995.7	-23.11	-20.0	-26.5	7.5	15.0
17	995.92	999.1	996.4	-24.92	-22.2	-29.5	15.37	25.0
18	999.68	1001.2	996.9	-32.87	-27.0	-37.0	16.25.	25.0
19	993.61	995.8	991.9	-35.2	-32.0	-44.5	8.12	10.0
20	999.37	1001.8	997.0	-35.95	-28.5	-41.2	6.0	10.0
21	1002..18	1003.0	1000.2	-37.4	-35.2	-40.8	13.12	15.0
22	993.61	999.8	986.9	-33.21	-29.8	-35.3	13.62	18.0
23	975.67	983.7	970.0	-36.85	-33.0	-39.7	12.0	17.0
24	973.02	977.3	970.0	-34.37	-30.3	-40.0	14.5	17.0
25	982.18	984.1	978.18	-36.31	-35.0	-39.0	14.87	20.0
26	976.41	982.2	971.9	-37.63	-36.5	-40.5	9.62	20.0
27	969.51	970.7	968.9	-37.97	-32.0	-42.0	11.12	15.0
28	980.06	986.5	972.8	-34.36	-27.0	-40.7	12.37	18.0
29	981.75	985.8	977.5	-33.52	-29.0	-46.0	24.50	45.0
30	981.16	982.0	978.8	-30.82	-25.0	-34.0	9.0	18.0
31	975.51	978.0	973.4	-25.02	-19.2	-26.8	51.0	60.0

*Average of 8 observations per day.

Table III.6. Daily Observation Summary
(ending at 0900 hrs GMT)

Station: Dakshih Gangotri. Month : August
Year : 1986

Date	Pressure (mb)			Temperature (°C)			Wind Speed (kts)	
	Av.*	Max.	Min.	Av.*	Max.	Min.	Av.*	Max.
01	971.81	976.8	968.1	-25.53	-24.5	-27.5	43.37	55.0
02	972.63	975.1	971.4	-31.78	-28.0	-35.5	6.0	10.0
03	975.12	978.6	965.7	-31.81	-26.7	-35.5	26.62	70.0
04	966.25	970.9	960.7	-26.9	-26.8	-30.0	45.26	80.0
05	970.76	974.2	968.7	-26.9	-22.7	-30.7	11.0	15.0
06	978.57	981.8	975.2	-28.51	-27.3	-30.5	12.5	15.0
07	980.16	982.2	978.6	-26.6	-23.7	-32.0	12.12	18.0
08	987.5	994.4	982.3	-31.11	-24.8	-35.0	5.25	10.0
09	995.75	997.1	994.2	-18.0	-16.6	-25.8	14.62	45.0
10	994.22	996.4	992.7	-18.86	-16.6	-25.2	24.62	50.0
11	1001.65	1006.3	997.9	-25.42	-22.0	-30.0	5.0	5.0
12	1002.21	1008.4	986.8	-22.8	-18.7	-26.7	18.75	55.0
13	978.36	980.3	976.0	-16.4	-13.5	-18.7	48.37	65.0
14	989.46	997.6	982.0	-20.13	-17.4	-24.5	5.0	8.0
15	999.43	1001.3	996.7	-22.31	-17.5	-29.5	12.12	32.0
16	994.51	996.8	993.0	-18.42	-17.6	-19.0	37.37	50.0
17	991.82	993.1	990.7	-19. 05	-17.5	-22.6	20.62	25.0
18	982.77	991.6	971.2	-25.3	-24.2	-27.5	23.17	55.0
19	961.31	967.3	959.2	-21.58	-19.8	-24.0	55.0	65.0
20	967.73	973.9	961.1	-16.18	-15.5	-18.5	46.5	60.0
21	980.5	982.8	978.3	-18.18	-15.0	-21.8	13.5	30.O
22	976.68	977.8	975.7	-26.53	-22.0	-30.7	5.0	8.0
23	976.85	978.8	995.5	-28.31	-23.2	-34.8	8.12	15.0
24	984.8	993.1	979.4	-24.45	-23.7	-31.0	17.5	25.0
25	997.81	999.2	995.0	-37.66	-34.2	-39.0	6.5	12.0
26	998.41	1000.4	995.4	-36.52	-32.4	-40.3	5.0	5.0
27	988.97	994.5	982.6	-36.67	-35.0	-39.6	7.5	12.0
28	980.53	981.0	979.6	-28.3	-27.5	-37.0	6.0	11.0
29	983.63	988.5	980.6	-20.23	-19.0	-23.0	13.0	17.0
30	995.1	998.5	989.8	-21.48	-18.8	-26.5	8.62	20.0
31	992.32	997.4	988.2	-13.13	-27.2	-35.5	6.25	10.0

*Average of 8 observations per day

Table III.7. Daily Observation Summary
(ending at 0900 hrs GMT)

Station: Dakshin Gangotri. Month : September
Year : 1986

Date	Pressure (mb)			Temperature (°C)			Wind Speed (kts)	
	Av.*	Max.	Min.	Av.*	Max.	Min.	Av.*	Max.
01	983.97	987.0	980.1	32.6	-28.2	-36.5	7.37	12.0
02	980.07	983.7	977.4	27.75	-26.0	-29.5	12.5	16.0
03	985.76	986.9	983.8	28.88	-26.4	-31.5	6.5	12.0
04	977.62	982.4	975.8	27.49	-25.2	-31.5	6.62	15.0
05	974,0	978.1	968.7	30.28	-27.2	-33.0	8.62	12.0
06	970.02	972.5	968.0	31.75	-27.0	-35.0	9.25	18.0
07	973.95	975.0	972.9	32.37	-29.8	-38.2	9.5	12.0
08	965.02	974.2	967.3	38.0	-34.0	-39.6	5.0	7.0
09	967.02	969.4	965.4	31.71	-24.5	-39.5	4.62	8.0
10	973.81	974.9	971.1	24.58	-23.7	-25.0	9.37	12.0
11	974.31	974.7	974.1	24.45	-18.0	-25.5	10.87	18.0
12	978.61	984.3	974.8	25.61	-24.5	-27.5	12.85	20.0
13	988.95	992.0	985.7	25.12	-24.2	-27.5	19.87	24.0
14	991.03	992.7	987.6	28.13	-27.0	-29.3	11.62	15.0
15	983.32	986.7	980.3	24.17	-25.0	-30.6	17.75	28.0
16	970.61	978.8	964.3	20.81	-19.0	-23.0	56.87	65.0
17	965.0	967.9	959.2	17.68	-17.5	-18.5	49.37	60.0
18	951.48	958.4	955.0	14.62	-12.0	-17.0	39.5	45.0
19	960.17	968.7	956.0	15.22	-12.5	-17.0	29.87	40.0
20	976.8	979.7	971.1	17.21	-12.5	-27.0	15.62	40.0
21	959.07	971.0	949.0	21.93	-19.0	-24.5	16.87	20.0
22	948.58	950.7	946.2	27.12	-24.7	-30.9	12.87	22.0
23	959.16	968.3	951.2	27.95	-25.0	-31.0	10.0	17.0
24	970.66	972.1	968.8	30.28	-25.8	-37.5	•10.5	15.0
25	975.4	978.5	971.7	19.48	-17.5	-28.0	13.75	20.0
26	969.37	978.4	961.0	17.77	-17.5	-18.9	45.0	60.0
27	956.67	959.3	954.6	17.65	-14.5	-22.5	26.87	40.0
28	968.6	957.7	962.1	24.43	-21.1	-30.0	11.12	18.0
29	979.77	981.2	976.9	26.33	-23.5	-29.4	8.5	18.0
30	973.11	979.1	969.3	28.21	-27.0	-32.5	5.5	10.0

* Average of 8 observations per day.

Table III.8. Daily Observation Summary
(ending at 0900 hrs GMT)

Station: Dakshin Gangotri. Month : October.
Year : 1986

Date	Pressure (mb)			Temperature (°C)			Wind Speed (kts)	
	Av.*	Max.	Min.	Av.*	Max.	Min.	Av.*	Max.
01	964.68	969.8	957.0	-26.13	-24.8	-31.5	34.62	55.0
02	963.76	965.6	958.8	-22.62	-20.5	-25.0	39.62	60.0
03	972.5	978.1	968.4	-22.33	-20.0	-23.2	19.5	28.0
04	975.62	980.4	966.8	-23.75	-21.0	-26.0	30.87	60.0
05	969.68	971.6	967.2	-20.8	-20.0	-21.7	40.0	55.0
06	968.66	971.1	965.0	-16.25	-11.3	-19.0	7.5	30.0
07	974.67	985.4	963.4	-16.77	-15.0	-22.6	17.37	35.0
08	979.77	985.2	973.5	-20.88	-23.2	-24.5	16.25	30.0
09	972.17	973.6	968.6	-21.67	-18.0	-27.5	10.75	30.0
10	961.17	966.4	956.6	-15.98	-8.0	-24.0	17.87	35.0
11	977.05	981.0	969.9	-20.58	-18.0	-25.0	24.37	35.0.
12	976.06	977.8	973.7	-17.5	-14.5	-19.0	31.25	45.0
13	975.42	979.2	970.6	-12.5	-12.0	-13.0	49.25	65.0
14	975.98	979.3	973.6	-15.13	-10.0	-23.0	22.62	35.0
15	969.06	971.8	965.9	-24.12	-15.5	-30.0	6.5	11.0
16	969.2	970.7	969.0	-25.6	-21.5	-29.3	10.12	15.0
17	976.55	980.2	972.0	-22.53	-17.0	-29.5	10.62	15.0
18	980.8	981.6	980.4	-24.71	-17.0	-31.7	5.62	10.0
19	984.71	985.6	982.8	-22.35	-16.0	-30.0	13.12	17.0
20	971.4	984.7	966.7	-24.72	-20.5	-29.5	11.25	20.0
21	960.63	963.2	958.7	-26.31	-21.5	-29.5	10.0	15.0
22	970.57	975.6	964.8	-22.81	-21.0	-24.4	12.12	17.0
23	977.58	977.8	976.8	-23.57	-20.4	-28.6	16.25	20.0
24	979.87	981.0	978.0	-26.81	-20.5	-32.5	6.37	8 0
25	979.61	979.9	979.3	-25.26	-16.2	-31.5	9.75	12 0
26	984.06	986.6	980.3	-21.98	-12.0	-30.7	10.37	15.0
27	978.27	983.1	975.7	-20.47	-15.0	-26.0	12.25	15.0
*8	976.25	978.4	974.4	-21.26	-18.0	-26.5	21.12	30.0
29	973.05	978.9	965.9	-19.02	-15.5	-22.5	37.37	50.0
>0	964.77	965.5	964.3	-14.21	-12.5	-16.0	23.12	40.0
n	966.71	969.0	964.9	-14.08	-11.0	-21.5	15.87	28.0

*Average of 8 observations per day.

Table III.9. Daily Observation Summary
(ending at 0900 hrs GMT)

Station: Dakshin Gangotri. Month : November.
Year : 1986

Date	Pressure (mb)			Temperature (°C)			Wind Speed (kts)	
	Av.*	Max.	Min.	Av.*	Max.	Min.	Av.*	Max.
01	967.43	970.8	964.8	-13.11	-8.2	-18.0	11.0	15.0
02	984.72	992.7	974.0	-13.02	-7.0	-17.4	10.37	15.0
03	993.32	995.3	990.2	-11.16	-5.8	-17.5	15.25	30.0
04	989.02	991.1	985.5	-10.01	-5.6	-15.8	11.62	22.0
05	977.72	982.5	976.1	-12.1	-6.5	-17.3	19.5	40.0
06	979.43	980.3	978.2	-13.9	-9.5	-20.8	15.87	25.0
07	984.87	988.1	980.1	-13.6	-8.0	-21.0	8.87	15.0
08	987.68	988.7	986.7	-11.8	-9.0	-17.5	16.62	23.0
09	981.63	986.9	J>76.7	-14.21	-11.2	-17.5	16.5	20.0
10	975.05	975.9	974.2	-13.26	-11.5	-16.6	33.75	45.0
11	977.42	980.8	976.3	-10.32	-8.2	-17.5	35.25	45.0
12	981.23	982.6	979.6	-10.1	-6.5	-15.8	8.12	22.0
13	976.82	979.9	973.9	-13.98	-8.0	-18.8	5.0	8.0
14	973.73	975.5	973.1	-13.56	-7.2	-20.5	7.87	15.0
15	973.53	976.4	972.0	-13.38	-10.3	-19.8	27.75	35.0
16	977.3	978.6	976.2	-11.3	-9.5	-13.0	22.5	30.0
17	973.66	975.8	971.8	-8.97	-5.8	-11.9	29.12	35.0
18	972.5	974.1	971.5	-9.17	-5.8	-13.6	15.37	20.0
19	979.12	980.6	975.3	-9.3	-7.4	-12.0	21.12	30.0
20	974.05	979.6	970.7	-9.83	-8.0	-14.5	40.62	50.0
21	975.56[1]	979.7	971.7	-8.73	-6.7	-10.5	36.0	45.0
22	974.61	987.1	981.4	-9.18	-6.5	-14.5	18.76	35.0
23	' 985.22	987.3	983.5	-7.43	-6.5	-10.6	24.5	30.0
24	985.57	986.1	984.1	-8.35	-7.0	-10.2	23.75	28.0
25	985.56	986.8	983.3	-8.53	-6.4	-12.3	15.87	22.0
26	979.37	982.1	977.7	-12.42	-5.6	-16.5	10.00	17.0
27	981.42	983.4	978.5	-11.25	-2.5	-18.0	4.37	15.0
28	984.3	985.0	983.2	-10.55	-8.0	-14.5	10.5	15.0
29	983.62	984.7	983.1	-12.52	-6.5	-17.5	5.0	10.0
30	985.28	986.2	983.4	-11.02	-5.8	-18.8	9.75	17.0

* Average of 8 observations per day.

Table 111.10. Daily Observation Summary
(ending at 0900 hrs GMT)

Station: Dakshin Gangotri Month : December
Year : 1986

Date:	Pressure (mb)			Temperature•<°c)			Wind Speed (kts)	
	Av.*	Max.	Min.	Av.*	Max.	Min.	Av.*	Max.
01	984.93	986.2	983.2	-8.03	-3.5	-11.2	10.25	18.0
02	983.01	985.6	980.9	-8.93	-5.0	-13.0	12.12	20.0
03	978.6	980.5	975.7	-9.32	-3.5	-17.0	8.62	14.0
04	976.43	977.3	975.2	-8.91	-1.0	-15.5	10.87	18.0
05	982.27	985.4	978.9	*-7.77*	-1.7	-16.0	9.12	14.0
06 '	986.78	988.9	985.5	-7.16	-3.5	-10.5	8.12	18.0
07	999.01	992.0	989.8	-8.22	-2.5	-15.8	11.0	17.0
08	997.3	990.0	986.6	-7.57	-1.5	-12.8	17.87	25.0
09	983.78	986.0	982.4	-7.71	-5.0	-12.5	25.37	35.0
10	981.21	982.6	980.3	-5.1	-4.2	-6.2	45.37	55.0
11	988.08	991.8	985.0	-5.13	-3.5	-8.1	24.62	50.0
12	987.03	991.0	982.3	-7.06	-5.0	-9.0	27.0	38.0
13	982.75	984.3	981.1	-5.75	-4.3	-6.5	34.5	40.0
14	983.33	985-8	981.2	-5.31	-3.5	-7.4	26.12	30.0
15	982.15	983.5	980.8	-3.57	-1.8	-5.5	20.5	25.0
16	984.45	985.3	983.4	-5,95	-1.8	-6.5	15.37	22.0
17	982.52	983.0	982.1	-4.72	-1.0	-6.5	6.87	15.0
18	983.5	984.3	982.7	-7.62	-4.2	— 11.0	8.25	12.0
19	980.67	982.1	979.8	-6.18	-4.5	-11.0	20.78	30.0
20	977.87	979.8	976.3	-4.18	-2.6	-5.0	24.62	30.0
21	975.71	976.5	975.1	-5.0	-3.5	-6.0	27.5	30.0
22	977.18	977.8	976.6	-3.13	-1.8	-5.0	21.5	25.0
23	976.96	977.4	976.0	-3.22	-1.8	-5.0	19.12	28.0
24	974.31	975.3	973.3	-5.92	4-0.6	-9.6	5.0	12.0
25	977.16	901.1	972.6	-6.62	-5.0	-11.0	15.0	25.0
26	981.33	982.2	980.1	-4.35	-1.8	-6.5	19.5	25.0
27	973.53	978.8	967.1	-1.56	+ 1.5	-3.5	14.87	23.0
28	966.0	967.3	965.0	-2.0	+0.6	-6.5	17.87	25.0
29	972.2	973.5	969.3	-1.66	0.0	-3.5	25.75	36.0
30	972.08	972.6	971.5	-4.33	+ 0.5	-9.0	11.0	19.0
31	976.68	979.7	973.1	-3.27	+ 1.5	-10.5	7.12	10.0

* Average of 8 observations per day.

Table III.11-Daily Observation Summary
(ending at 0900 hrs GMT)

Station: Dakshin Gangotri. Month: January
Year : 1987

Date	Piressure (mb)			Temperature (°Q			Wind Speed (kts)	
	Av.*	Max.	Min.	Av.*	Max.	Min.	Av.*	Max.
01	982.18	983.1	981.0	-2.47	0.0	-8.0	14.14	20.0
02	978.87	980.7	977.9	-1.66	0.0	-3.5	18.62	22.0
03	982.4	986.2	979.6	-2.95	0.0	-5.5	12.0	17.0
04	988.7	991.2	986.9	-2.64	0.0	-5.7	13.25	17.0
05								
06	984.0	988.4	980.4	-2.45	0.0	-6.5	10.28	14.0
07	979.7	985.1	976.9	-6.12	-2.0	-12.0	11.12	20.0
08	989.8	991.6	987.2	-2.95	-0.5	-7.5	22.0	36.0
09	987.71	989.6	986.6	-2.9	-1.7	-3.5	23.25	30.0
10	995.16	998.7	991.1	-1.6	+ 3.5	-4.5	7.0	13.0
11	1000.86	1002.2	998.9	-2.42	+ 1.9	-6.5	11.0	13.0
12	1000.86	1000.2	993.2	-1.11	+ 3.8	-3.5	12.0	14.0
13	997.1	1000.0	992.4	-1.11	+ 0.2	-3.0	12.0	25.0
14	1001.4	1002.4	999.0	-2.4	+ 0.5	-5.9	11.0	20.0
15	1000.75	1002.0	998.0	-1.95	0.0	-3.5	12.62	25.0
16	1001.55	1004.8	998.1	-0.5	+2.0	-6.5	2.0	6.0
17	1005.3	1008.2	1002.7	-0.5	+4.5	-6.7	2.0	7.0
18	998.6	1001.5	995.5	-2.75	+0.3	-8.0	5.0	10.0
19	1001.67	1003.4	999.0	+0.25	+4.5	-5.5	5.0	9.0
20	1007.9	1009.3	1005.8	+ 1.46	+6.0	-2.0	2.0	7.0
21	1003.82	1005.1	1002.2	-1.6	+2.7	-6.8	7.5	13.0
22	1001.7	1002.4	1000.8	-2.0	-0.2	-3.5	10.62	17,0
23	1002.11	1003.2	1001.2	-1.34	+2.5	-4.5	3.0	9.0
24	1002.2	1002.9	1001.5	-1.77	+ 1.0	-6.5	5.0	7.0
25	1001.58	1002.1	1000.6	-2.72	+ 1.0	-6.5	6.57	14.0
26	1000.93	1001.5	1000.5	-1.38	+2.5	-6.5	7.5	13.0
27	1000.47	1000.9	997.7	-0.54	+6.0	-7.0	4.0	7.0
28	1003.0	1003.7	1002.2	-0,78	+ 4.5	-7.0	6.5	9.0
29	1002.82	1003.7	1001.7	-1.62	+ 1.5	-5.5	9,0	12.0
30	1001.98	1002.9	1.001.7	-2.5	+ l!7	-7.3	5.75	8.0
31	1005.27	1006.6	1002.7	-4.55	-1.9	-8.5	9.0	16.0

* Average of 8 observations per day.

Table III.12. Daily Observation Summary
(ending at 0900 hrs GMT)

Station: Dakshin Gangotri. Month : February (First Fortnight)
Year : 1987

Date	Pressure (mb)			Temper ature (°C)			Wind Speed (Kts)	
	Av.*	Max.	Miru	Av.*	Max.	Min.	Av.*	Max.
01	1009.57	1010.3	1007.2	-2.8	4-1.2	-8.1	5.0	10.0
02	1008.18	1009.7	1006.8	-5.3	-1.0	-10.0	6.25	9.0
03	1007.35	1009.0	1006.2	-5.66 •	-2,9	-10.5	9.37	18.0
04	1008.7	1009.3	1007.9	-4.17	-2.3	-5.5	10.2	17.0
05	1004.8	1007.3	1000.9	-5.47	-2.8	-8.5	7.0	11.0
06	1001.62	1003.7	1000.0	-5.95	-3.0	-11.5	19.0	27.0
07	999.96 '	1000.6	991.1	-3.06	-1.0	-4.5	34.25	40.0
08	979.07	1001.0	996.4	-2.57	-1.9	-4.5	28.5	35.0
09	990.1	994.9	984.5	-3.85	-2.0	-6.0	20.4	25.0
10	981.68	984.2	980.9	-4.65	-2.0	-8.0	18.25	25.0
11 .	986.8	987.7	985.4	-6.12	-2.6	-11.5	11.0	16.0
12	986.5	987.5	985.9	-8.9	-0.5	-14.2	5.25	8.0
13	988.65	989.2	988.1	-8.75	-2.5	-15.0	5.6	10.0
14	986.87	987.9	985.8	-11.0	-3.5	-14.5	5.6	8.0
15	.984.66	985.9	984.3	-12.17	-7.5	-17.0	8.0	15.0

* Average of 8 observations per day.

Conclusion

A continuous record of surface meteorological observations for three years now available has been utilised to present annual weather summary as well as inter-annual variability of weather at the Indian permanent station. The data for the period of third wintering team is also compared with mean climatological values of other stations in the area. For this purpose the three stations viz., Halley Bay, Sanae and Syowa which are located on the coastal ring of the continent, have been chosen. The data of USSR station Noyolazarevskaya is not utilised in the comparison as it is located inland in the Schirmacher hill area.

The analysis indicates significant year to year variations in the intensity, duration and onset of various seasons. These variations are apparently caused due to oscillations in the location and intensity of the Sub-polar low pressure belt which surrounds the near circular coastal belt. This may influence Southern Hemispheric oscillations which are known to affect the monsoon circulation over Indian sub-continent. Long period record of meteorological data from a number

of stations may, therefore, the necessary for detailed study of the variations of Antarctic weather and its effect on global circulation in general and Indian monsoon in particular.

Acknowledgements

I express my gratitudes to the Secretary, Department of Ocean Development and the Director General of I.M.D. for the advice and encouragement given to me to continue with the third wintering team at Antarctica. I also acknowledge with many thanks the assistance given to me by other wintering team members in the arduous task of maintaining round the clock meteorological observation programme.

I am grateful to Shri M.G. Gupta, Director for his guidance and support during my stay at Antarctica as well as in the preparation of this report.

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