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Letters to the Editor

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ANTARCTICA AND INDIAN MONSOON

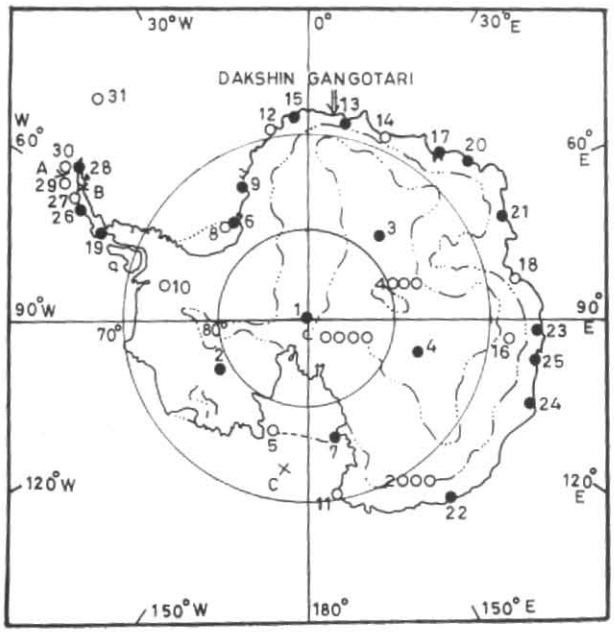
Although certain relationships between pressure and other weather elements at two different locations were known earlier (Hildebrandsson 1897 and Lockyar *et al.* 1902) but detailed study of the relationship between weather of distant regions was done by Sir Gilbert Walker (1924). He observed three dominant meteorological circulations, namely, Southern Oscillation, North Atlantic Oscillation and North Pacific Oscillation. No satisfactory physical basis could be found for these oscillations, but nevertheless the relationship determined by Sir Gilbert Walker was found to be very useful for foreshadowing Indian Monsoon rainfall.

Southern Oscillation (SO) out of three oscillations discovered by Sir Gilbert Walker gained prominence after study by Bjerknes (1972) when he showed the significance of SO depicting sea-saw type relationship between weather systems over Southeast Pacific and Indian Ocean regions.

Abnormal Sea Surface Temperature Anomalies (SSTA) are observed to originate over and near the southeast pacific region. This phenomenon, well known as El-Nino propagates westward after commencement and is associated with intense contrasting type of weather pattern in various parts of the globe. Large scale drought over Sahel and Indian sub-continent during the 1972-73 was also periods of intense El-Nino. Recently, it has been shown (Rasmusson and Carpenter 1983) that El-Nino and SO are intimately linked and the combined effect called as ENSO is considered a very important signal for foreshadowing the variability of Indian monsoon as well as climate in various other parts of the globe.

While determining the correlation coefficient between seasonal values of pressure, temperature, rainfall etc at number of representative places scattered over the earth in pursuance to the development of the techniques for long range forecasting, Sir Gilbert Walker also considered seasonal values of pressure over Antarctica. He observed that the December-February pressure of Mc Murdu Sound (Antarctica, 166.4 deg. E and 77.5 deg. S) has positive correlation of 0.8 with pressure over northwest India during following March to May and a correlation of 0.6 with rainfall over Peninsular India during subsequent June to August. No significance seems to have been given to these correlation, probably because of shorter period of data from Antarctica. Antarctica region forms a major area in the Southern Hemisphere and the seasonal variation in ice cover and circulation feature over Antarctica greatly control the heat budget of the Southern Hemisphere. The observational studies on Asiatic monsoon clearly show a significant influence of the intensity and location of Mascrene High on the performance of the monsoon. The inter-annual variations in the ice cover and circulation of the region could influence Mascrene high. We, thus believe that the variations over Antarctica and their study would be very useful.

In order to study the possible relationship between the seasonal variation of surface temperature over Antarctica (which is related to the variation of ice cover) and performance of monsoon, we examined the temperature variation over SANE, (02.21 deg. W, 70.19 deg. S) in Antarctica. Incidentally this station is very close to the recently established observatory Dakshin Gangotri (12.00 deg. E, 70.06 deg. S) by India. The location of various stations in Antarctica along with Dakshin Gangotri is given in Fig. 1. In Fig. 2, we present variation of surface temperature from normal for the year 1971 to 1980. For comparison, we



No.	*Station*	*Index number*
1	AMUNDSEN-SCOTT	89009
2	BYRD	89125
4	VOSTOK	89606
7 (c)	MCMURDO	89664
9	HALLEY	89022
13	NOVOLAZAREVSKAJA	89512
15 (b)	S.A.N.A.E.	89001
17	SYOWA	89532
18	DAVIS	89571
19 (b)	GENERAL SAN MARTIN B.E.	89066
20	MOLODEZHNAJA	89542
21	MAWSON	94986
22 (c)	DUMONT D'URVILLE	95502
23	MIRNYJ	89592
24	CASEY	89611
26	FARADAY (ARGENTINE ISLAND)	88952
28	ESPERANZA B.E.	88963
30	ARCTOWSKI	89052
31	ISLAS ORCADAS D.N.	88968
A	BELLINGSHAUSEN	89050
B	CENTRO MET. ANTARTICO "VICECOMODORO MARAM BIO" B.A.	89055
C	LENINGRADSKAJA	89657

Fig. 1

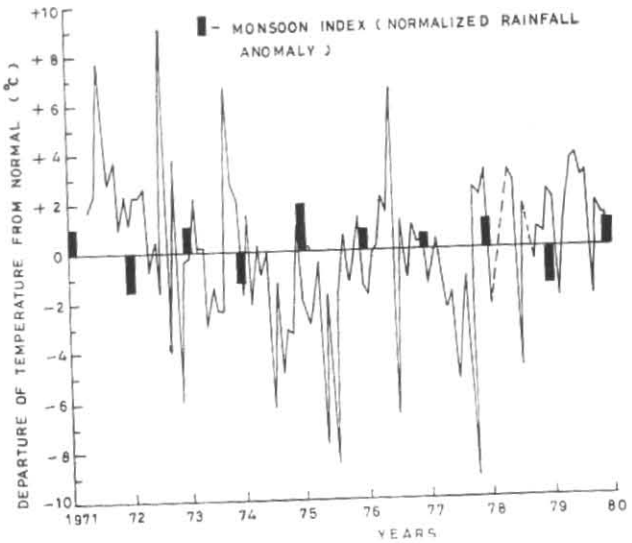


Fig. 2. Variation of surface temperature (departure from normal) at SANE (70.19°S, 02.21°W) Antarctica represented in thin line. Monsoon index has been plotted as normalized rainfall anomaly in black bars (dotted line shows missing data)

have also presented the monsoon index (normalized monsoon departure from normal) on the same fig. It is interesting to see that there is a tendency for the performance of the monsoon to be good following cold epoch over the Antarctica, reverse seems to be the case in case of warm epoch. This period 1971-80 had two significant droughts, namely, 1972 and 1979. 1972 and 1982 were also El-Nino years.

This preliminary study clearly shows that there is some signal in the variation of the temperature over the Antarctica which can be used to foreshadow the performance of monsoon. We, however, do not understand how exactly the Antarctica circulation affects the middle-latitude circulation of the Southern Hemisphere and in turn the monsoon circulation.

It is necessary to carry out more detailed studies to firm up our ideas.

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