Communications

Interesting Features in Infrasonic Observation: Fifth Indian Antarctic Expedition (1985-86)

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Examination of microbarograph observations taken at Antarctica in conjunction with other observations taken there as well as in India is reported. One significant feature that has been noted during this expedition in a sunspot minimum year as compared to the second Indian expedition (when the sunspot activity was higher) is that the generation of infrasonic waves in sub-storm and their propagation to lower latitude is apparently inhibited.

The Fifth Indian Scientific Expedition team to Antarctica (1985-86) set up a base camp at 70°06'S, 12°00'E and carried out various experiments with ground-based instruments for a period of nearly 60 days from 29 Dec. 1985 to 27 Feb. 1986. One microbarograph station was set up by a group from the National Physical Laboratory, New Delhi, primarily for studying magnetic disturbance effects near the auroral zone. Some salient features on Antarctic observations have already been reported earlier. In this communication, we are reporting some interesting features observed at Antarctica during this expedition.

(a) During the period of observation, blizzards were observed for nearly 10 days in different spells. Fig. 1(a) shows a diagram taken on 26 Feb. 1986 when there was a blizzard with a wind speed of 80 km gusting to 100 km. The blizzard continued for a few days at a stretch. Fig. 1(a) shows only a part of it. Its pattern is completely different from that of a mid-latitude wind variation where blizzards are not observed. Fig 1(b) shows the pattern before the blizzard (22 Feb. 1986).

(b) On 17 Feb. 1986 (Fig. 2), infrasonic record showed a pattern with violent variation (as in a mid-latitude station). The temperature was, perhaps, high on that day compared to other days. Anyway, that was the only day where such pattern was observed during the period of observation.

(c) Fig. 3 shows an interesting record on 21 Feb. 1986, where an impulsive variation (of nearly 1000 μbar) is seen. Scientists from the National Geophysical Research Institute (NGRI), Hyderabad, were conducting some experiments with explosive devices for elastic wave generation at the same site on that day. This impulsive variation coincides with the timing of one of those explosions. But on careful scrutiny, it is concluded that this variation is not an effect of the explosion for the following reasons: (1) NGRI conducted such experiments on three days exploding a number of devices on each day, but barring one coincidence, none of them produced any effect, and (2) the experiment was conducted in an ice-shelf (and not in the ocean) and as such the coupling between this and the atmosphere was weak. The possibility of infrasonic wave generation is, therefore, ruled out.

During the period of observation, impulsive record was seen on one more occasion. Perhaps, it was due to the effect of some explosion conducted in the ocean by some other country. In the absence of any reliable data, it is difficult to conclude anything.

(d) The microbarograph records were studied in conjunction with the details on X-ray activity, electric field, etc. (obtained through balloon experiments) given by Prof. Edgar A Bearing (III), a member of SCAR Working Group on Upper Atmospheric Physics. As expected, no effect was observed in infrasonic pressure variations since the given parameters affect only the ionosphere.

(e) Antarctic microbarograph records were examined in conjunction with the magnetic records
Fig. 1—Infrasonic pressure variation at Antarctica [(a) during blizzard (26 Feb. 1986); and (b) before blizzard (22 Feb. 1986)]
taken at Hyderabad to find out the characteristic signatures associated with magnetic sub-storms (bays). During the period of observation, a number of bays were observed in the magnetic records. It is surprising to note that the bays did not produce any effect in infrasonic pressure variations at Antarctica as well as in Hyderabad. The generation and propagation of infrasonic waves appear to be inhibited. Perhaps, this has a bearing on sunspot activity, 1986 being a year of minimum sunspot activity.

A big bay was observed at 2050 hrs UT on 7 Feb. 1986 in the Hyderabad magnetic records where change in the horizontal field (H) was more than 100 nT. Even though sinusoidal variation was observed in Antarctic microbarograph records (Fig. 4) from 2100 hrs (in conformity with our earlier findings), this was not very significant. Because of background nighttime oscillation, the effect of even this big bay could not be conclusively identified in Hyderabad microbarograph records.

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References
2 Edgar A Bearing (III), Private communication, 1986.