

## Some Interesting Features of the Infrasonic Observation carried out during the Fifth Indian Antarctic Expedition (1985-86)

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### Abstract

Microbarograph observations taken at Antarctica in conjunction with the other observations there, as well as in India, have been reported. One significant feature 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 the sub-storm and their propagation to the lower latitude were inhibited.

### Introduction

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 sixty days from 29 Dec, 1985 to 27 Feb., 1986. One microbarograph station was set up by National Physical Laboratory (NPL) group primarily for studying magnetic disturbance effects near the auroral zone. Some salient features on Antarctic observations have been reported earlier (Venkatachari *et al.*, 1984).

Some interesting infrasonic features observed at Antarctica during the Expedition are reported here.

### Observations and Discussion

(a) During the period of observation, blizzard was observed nearly 10 times. On 26 Feb., 1986 there was a blizzard with a wind speed of 80 km gusting to 100 km (Fig. 1). Blizzards continued for several hours. The figure shows only a part of it. This is completely different from a mid-latitude wind variation pattern where blizzards are not observed.

(b) On 17 Feb., 1986 (Fig. 2) infrasonic record showed a pattern with

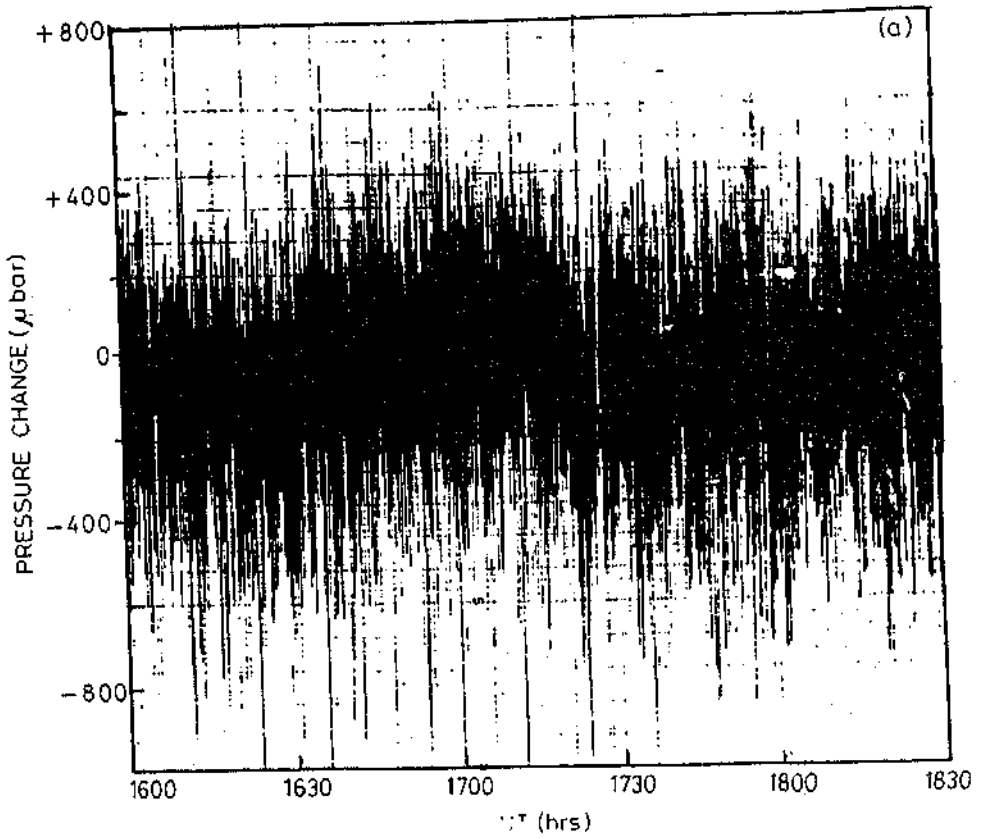


Fig. 1. Infrasonic pressure variations at Antarctica during a blizzard (26 Feb. 1986)

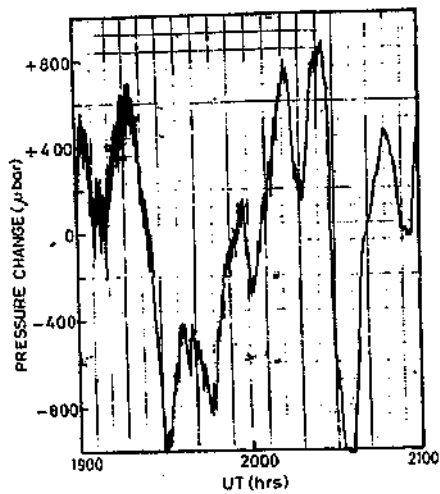


Fig. 2. Violent infrasonic pressure variation (17 Feb. 1986).

violent variation (as in a mid latitude station). The temperature was high on that day compared to other days. That was the only day where such pattern was observed.

(c) Fig. 3 shows an interesting record on 21 Feb., 1986, where an impulsive variation (of nearly 1000 microbars) is seen. Scientists from National Geophysical Research Institute, Hyderabad (NGRI) were conducting some experiments with explosive devices for elastic wave generation at the same site. This impulsive variation coincided with the timing of one of these explosions. But on careful scrutiny, it was concluded that this variation was not an effect of this explosion for the following reasons. NGRI conducted such experiments on three days exploding number of devices on each day. Except for one coincidence, none of them has produced any effect. Secondly, 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 ruled out.

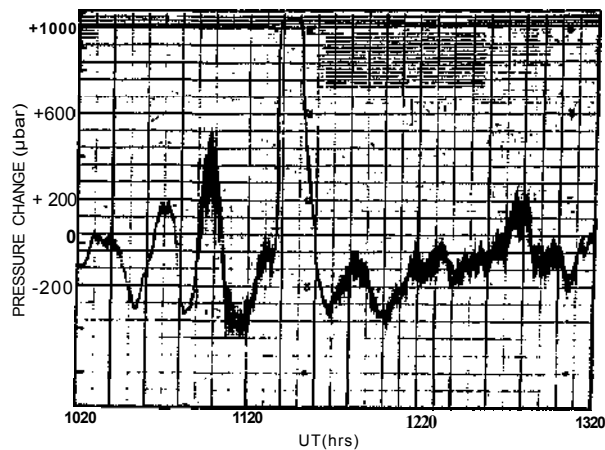


Fig. 3. *Impulsive infrasonic pressure variation (21 Feb. 1986).*

During the period of observation, impulsive record was seen on one more occasion. Perhaps, this was the effect of some explosion conducted in the Ocean by some other country. In the absence of any reliable data, it is difficult to make any definite conclusion.

(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 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 was 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. U.T. 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 confirmity with Srivastava *et al*, 1982), this was not very significant. Because of background night time oscillation, the effect of even this big bay could not be conclusively identified in Hyderabad microbarograph records.

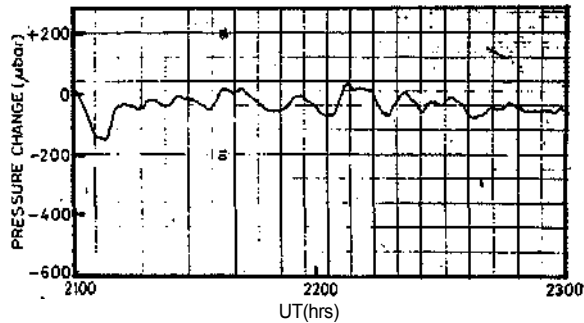


Fig. 4. Infrasonic pressure variation after a sub-storm (7 Feb. 1986).

#### Acknowledgement

We are thankful to Dr. Shikhar Jain, NGRI, for giving details on explosions conducted for elastic wave generation. Our thanks are due to the Department of Ocean Development for participation of one of us (DRN) in the Expedition and to Mr. M.K. Kaul, Leader and other members of the Expedition for their active help.

#### References

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