3. Seismograms—The Milne-Shaw (N-S) Seismograph suffered a sudden jerk and the light speck got displaced suggesting ground movement towards the south at the first "supersonic bang". No such displacement was recorded by any of the E-W Component Seismographs (a Milne-Shaw and two Sprengnether instruments). However, these three E-W Seismographs did record effect similar to those usually recorded for local explosions. Fig. 3 is a reproduction of the relevant portion of the N-S Milne-Shaw record. All the seismograms have recorded the effect at 08h 41m 42s IST on 3 April 1960. Relevant portions of the Sprengnether E-W records are reproduced in Figs. 3(a) and 3(b). The E-W Milne-Shaw Seismograph at Colaba is generally more prone to undergo a slight displacement at the commencement of an earthquake shock than the N-S instrument; in spite of this feature, that instrument (E-W) did not undergo any such displacement at the time of the "supersonic bang". Apparently, the flight of the aircraft along a nearly S-N direction had something to do with it. Fig. 4 shows the effect of the first Bombay Dock explosion of 14 April 1944, on the N-S Milne-Shaw seismogram at 16h 06m 31s IST (war time).

Table 1 gives the constants of the seismographs.

4. The aircraft was not moving directly over Colaba Observatory when they gave the "supersonic bang" marking the end of the display. The microbarograph recorded only a very small kink in the pressure trace. The seismographs also recorded the effect at 0952 IST (Figs. 3 and 4), only to a relatively small extent.

During the rehearsals of the display, a "supersonic bang" was created on 1 April 1960, by breaking the sound barrier; this was distinctly heard at Colaba. The effects produced by this "bang" on the instrument of the Colaba Observatory were just perceptible and simultaneous among themselves; however, they were very feeble and would have been missed but for the observations of the prominent effect produced by the "bang" on 3 April 1960.

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TEST OF THE RANDOMNESS OF THE SERIES OF OCCURRENCES OF DEPRESSIONS/CYCLONES IN THE BAY OF BENGAL

1. Introduction

A statistical study of frequency of depressions/cyclones in the Bay of Bengal has been made by Rao and Jayaraman (1958). In their work they furnish tables showing the monthly, seasonal and annual frequencies of this phenomena. It is felt that it would be of interest to test the randomness of the series of occurrences of depressions/cyclones in the Bay of Bengal.

A series of observations may be regarded as a statistical sequence of variates. If the variation of this sequence is entirely random, the successive values are independent and the series may be the chance arrangement of a sample from some unknown population.

2. Method

The testing of the randomness of the series which is adopted in the present investigation, is by means of correlation methods.

3. Serial correlation

If \( x_1, x_2, \ldots, x_n \) denote the sequence to be tested, the cross product term

\[
R = \sum_{i=1}^{n} x_i x_{i+1}
\]

where \( x + 1 = x_1 \) differs considerably from
the cross product term $\sum_{i=1}^{n} x_i y_i$ in the ordinary correlation coefficient. It is well known that for large values of $n$, $R$ possesses an approximate normal distribution which may be used to test the hypothesis of zero serial correlation. For such a test, only the mean and variance of $R$ are necessary. These values are given by the formulae

$$E(R) = \frac{(S_1^2 - S_3)}{n-1}$$

and

$$\sigma^2_R = \frac{S_4 - S_1^2 - S_3}{n-1} + \frac{S_1^4 - 4S_1^2 S_2 + 4S_1 S_3 + S_3^2 - 2S_1}{(n-1)(n-2)} - E^2(R)$$

where $S_k = x_1^k + x_2^k + \cdots + x_n^k$

The test based upon $R$ is selected here because of its simpler form and also since it is equivalent to a test based upon the serial correlation coefficient with lag 1.

The results of the analysis are given in Table 1. It will be seen that the expression

$$y(R) = \frac{R - E(R)}{R}$$

has an insignificant value, in the all cases considered. It, therefore, can be concluded that the series is a random one.

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