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ATMOSPHERIC OSCILLATIONS OF 4-5-DAY PERIOD

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IN a paper published in the Memoirs of the India Meteorological Department 75 years ago, Eliot (1895) drew attention to short period barometric oscillations with a mean period of 4-5 days, (periods in individual cases ranging from 2 to 8 or 9 days), which occurred nearly simultaneously over India and neighbourhood. According to him, these oscillations are "a normal and regular feature of the meteorology of India".

Eliot's work has remained unnoticed in the literature. Nearly fifty years later Frolov (1942) reported the existence of "widespread stationary oscillations of 5 or 6 days' period" over the Caribbean and western Indian Ocean. Similar oscillations were noticed over the equatorial Pacific by Palmer and Ohmstedt (1956). These authors have suggested that the pressure oscillations may be due to extra-terrestrial causes such as solar flares.

Pisharoty (1957) found evidence for such oscillation in the upper atmosphere by examining the height variations of standard isobaric levels at radiosonde stations over India and adjacent areas. He has also favoured the solar flare hypothesis as a possible mechanism.

In a recent study Wallace and Chang (1969) have examined the surface pressure data of 15 tropical stations between 8° S and 19° N distributed round the globe and have concluded that the 4-5-day pressure oscillation is a "westward propagating wave with a zonal wavelength equal to the circumference of the earth".

For the proper understanding of these oscillations it is important to know: (i) the seasonal and latitudinal behaviour of the oscillations as regards their period and amplitude; (ii) the latitudinal extent to which they can be traced; (iii) whether they are stationary or propagat-

ing; and (iv) whether their origin is to be attributed to terrestrial or extra-terrestrial causes. All these questions can be answered only after a detailed study of pressure data of representative stations round the globe for a few years, preferably a complete solar cycle.

In connection with such a study we have, in the first instance, examined the 24-hour pressure tendency data of seven Indian stations for the 12-year period 1950-61, which covers the sunspot minimum in 1954 and sunspot maximum in 1957. The stations chosen for study are Trivandrum, Madras, Bombay, Nagpur, Calcutta, New Delhi and Srinagar covering the latitude interval from 8° N to 34° N. The study has brought out the following results:

(i) The mean period of the pressure oscillations is between 4 and 5 days at all stations irrespective of season.

(ii) The amplitude of the oscillations increases from Trivandrum to Srinagar. The northern stations show slightly larger amplitude in the winter months, while there is little variation at the southern stations.

(iii) The oscillations do not show any dependence on the phase of the solar cycle. Hence they have to be regarded as terrestrial in origin.

The fact, that the 4-5-day pressure oscillations are noticed very conspicuously at Srinagar, led us to investigate whether they can be traced at still higher latitudes. For this purpose, we have examined the daily 24-hour pressure tendencies at the following four Japanese and three USSR stations for 1964 and 1965:

S. No.	Station	Lat. (N.)	Long. (E.)
(i)	Kagoshima	31° 34'	130° 33'
(ii)	Tokyo	35° 41'	139° 46'
(iii)	Akita	39° 43'	140° 06'
(iv)	Wakkanai	45° 25'	141° 41'
(v)	Blagovescensk	50° 16'	127° 30'
(vi)	Vanavara	60° 20'	102° 16'
(vii)	Ojmjakon	63° 16'	143° 09'

The daily pressure data were extracted from the *Japanese Daily Weather Reports* which also contained the data of the USSR stations in question. It has been found that the 4-5-day pressure oscillations exist at all these stations. The behaviour of the oscillations as regards period is practically the same as at the Indian and other tropical stations, but the amplitude is found to be higher at the high latitude stations.

Our study leads to the conclusion that the 4-5-day pressure oscillation is not a phenomenon confined to the tropics but is perhaps global in character and that its origin cannot be extra-terrestrial. We are currently engaged in a study of the daily pressure data of selected stations in zonal belts of both the hemispheres.

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