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SOLAR TIDES IN THE F2 REGION  
OVER KODAIKANAL

1. The tides in the ionosphere have been studied by Appleton and Weeks (1939), Martyn (1947, 1948, 1949), Mitra (1950), Jones and Jones (1950) and others. Though an automatic ionosphere recorder has been in operation at Kodaikanal (lat.  $10^{\circ} 14' N$ , long.  $77^{\circ} 28' E$ ) since the beginning of 1952, due to various reasons, the ionospheric soundings so far have had to be restricted to day-light hours. However, in order to study the effect of the eclipse of 20 June 1955 on the ionosphere, an intensive programme was specially planned and a 24-hour

TABLE 1

Harmonic analysis of the h'F2 variation at Kodaikanal

Order of the harmonic	Amplitude (km)	Phase angle ( $^{\circ}$ )	Time of first maximum (Local mean time)
1	40.3	273.5	11.8
2	46.1	64.2	0.9
3	1.4	302.5	3.0
4	10.4	261.75	3.0

watch on the behaviour of the ionosphere over Kodaikanal was kept during the period 13 to 27 June 1955. The observations made during this period were availed of in order to obtain an idea of the magnitude of the tidal oscillations of the F2 layer over Kodaikanal.

2. The values of the virtual height of the F2 layer and its critical frequency at intervals of 30 minutes have been used for this analysis. On each of the 15 days the

variations of the two parameters, corrected for non-cyclic variations, were analysed harmonically. The results of the analyses are as follows.

3. h'F2 variation—The values of the amplitudes of the first and second harmonic co-efficients were nearly the same, the first harmonic co-efficient being higher than the second on some days and the second harmonic co-efficient being higher on other days. The mean values of the first four harmonic co-efficients are given in Table 1. It is found that the semi-diurnal component was larger than the diurnal component by about 15 per cent. Again, it was noticed that the amplitude and phase of the semi-diurnal component changed only, by small amounts during these 15 days but the variabilities of the amplitude and the phase of the diurnal component were very large. The standard deviation of the first and second harmonic co-efficients were 11.7 and 5.85 km respectively. The time of maximum of the first harmonic co-efficient varied from 6.8 to 14.1 hrs local mean time in the course of this period, whereas the time of maximum of the second harmonic varied from 0.2 to 1.5 hrs local time only. These show that the most consistent variation was the semi-diurnal one. Its amplitude was also higher than that for many of the middle latitude stations and is of the order of the value at Huancaayo (about 50 km—Mitra 1950).

4. foF2 variation—The mean amplitude of the first two harmonic co-efficients were 2.79 Mc/s and 1.75 Mc/s respectively. The two harmonics attained their maximum at 14.7 and 8.0 hrs local mean time respectively. It is not surprising that the foF2 variations do not show the tidal effects so convincingly since the very large diurnal ionizing term due to direct solar radiation is likely to mask the semi-diurnal tidal effect.

The results indicated above are only of a preliminary character. Kodaikanal Observatory will shortly begin a continuous 24-hour watch on the ionosphere; it will then be possible to undertake a fuller analysis of the data for a much longer period.

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