## SIMULTANEOUS SIGNAL STRENGTH MEASUREMENTS ON CONTINUOUS AND PULSED RADIO WAVE TRANSMISSIONS REFLECTED FROM THE IONOSPHERE

RAWER[1] compared noon-time ionospheric absorption data at two stations, Freiburg and Slough, 400 Km. apart, for a period of 26 months and observed that the mean amplitudes obtained at the two stations vary similarly. Subsequently Beynon and Davies[2] conducted a series of experiments in one of which they compared the day to day changes in the intensity of the signals received from distant short wave broadcast senders and vertical incidence ionospheric signals from a pulse transmitter radiating on an equivalent frequency. They observed that, in general, there is a quite close correlation between the monthly mean values of the two signals, the correlation coefficient obtained in summer being smaller due to sporadic E ionisation. No attempt has been made so far to study the extent of correlation between the short time variation of pulse and CW signals extending over a day. The authors have taken up the comparative study of the signal strength variations of oblique incidence CW and vertical incidence pulse signals over a short period of about an hour during afternoon every day with a view to find out the extent of correlation existing between them.

The experimental technique adopted in this investigation is conventional. Transmissions from A.I.R. station at Madras radiating on a frequency of 9·54 Mc/s. on the short-wave band have been chosen for obtaining the CW field strength records on an Esterline Angus pen recorder. The vertical incidence signal strength records were taken on a conventional ionospheric sounding equipment consisting of a pulse transmitter and receiver operating on a frequency of 3·15 Mc/s. which is the equivalent vertical incidence frequency for reflections from the E layer at a height of 110 Km. It is observed that during the period of recording the operating frequency is always lower than the critical frequency of the E layer. A good number of records taken during the months of May and June in the afternoon hours were analysed statistically for finding out the correlation coefficient between the signal strength variations in the two records. The pulse signal strength records were taken on single hop reflections from the E region. The following table gives the values of the correlation coefficients thus obtained for six typical days, along with the date and duration of the record.

TABLE I

| Sl. No. | Date | Duration of the record | Correlation coefficient |
|---|---|---|---|
| 1 | 21-5-1955 | 1630 to 1651 | 0·61 |
| 2 | 24-5-1955 | 1621 to 1644 | 0·45 |
| 3 | 2-6-1955 | 1627 to 1659 | 0·51 |
| 4 | 14-6-1955 | 1600 to 1632 | 0·27 |
| 5 | 22-6-1955 | 1605 to 1632 | 0·54 |
| 6 | 27-6-1955 | 1602 to 1630 | 0·61 |

It will be seen that the average coefficient is as high as 0·5. To illustrate the extent of correlation visually a graph is drawn showing the variation of mean signal strengths of pulsed and continuous radio waves with time for a record taken on 21-5-1955 and is reproduced in Fig. 1. The general similarity between these curves shows that the major absorption which occurs in the lower D-layer is also responsible for the short time variations in the signal strength. The general trend of increase in the signal strength in both the records towards evening is due to the decrease in the D-layer absorption. It is significant to note that the average correlation coefficient obtained here is higher than that reported by Beynon and Davies for summer months in spite of the high activity of sporadic E at this place during these months. Further work is in progress.

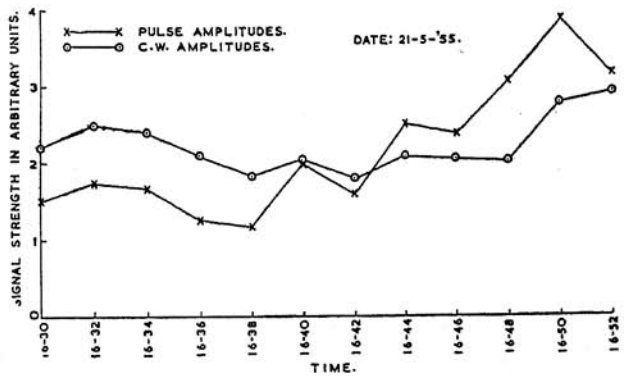


FIG. 1

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Waltair, *June* 20, 1956.

1. Rawer, K., *J. Atmos. Terr. Phys.*, 1951, **2**, 38.
2. Beynon, W. J. G. and Davies, K., *Ibid.*, 1954, **5**, 273.