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IONOSPHERIC SCINTILLATIONS INDUCED BY CLOUD OF INTENSE SPORADIC E LAYER

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ABSTRACT

The simultaneous observations of vertical ionospheric soundings and the faraday fadings of the beacons from a low orbiting satellite have shown clearly that the existence of a cloud of intense sporadic E in the path of radio waves does produce scintillations even during the day time at low latitudes. The latitudinal width of E_s cloud is estimated to be around 300 km.

INTRODUCTION

EARLY studies of ionospheric scintillations were carried out at middle and high latitudes using the signals from radio stars which traversed the whole ionosphere. The signals received were found to fade violently during the night time. This phenomenon known as ionospheric scintillation of radio waves was found to be associated with the occurrence of spread F in the path of radio waves (Wild and Roberts, 1956; Booker, 1958).

With the advent of artificial earth satellites, scintillation studies have been extended to all latitudes. In middle latitudes again, a positive correlation was found between scintillations and spread F (Yeh and

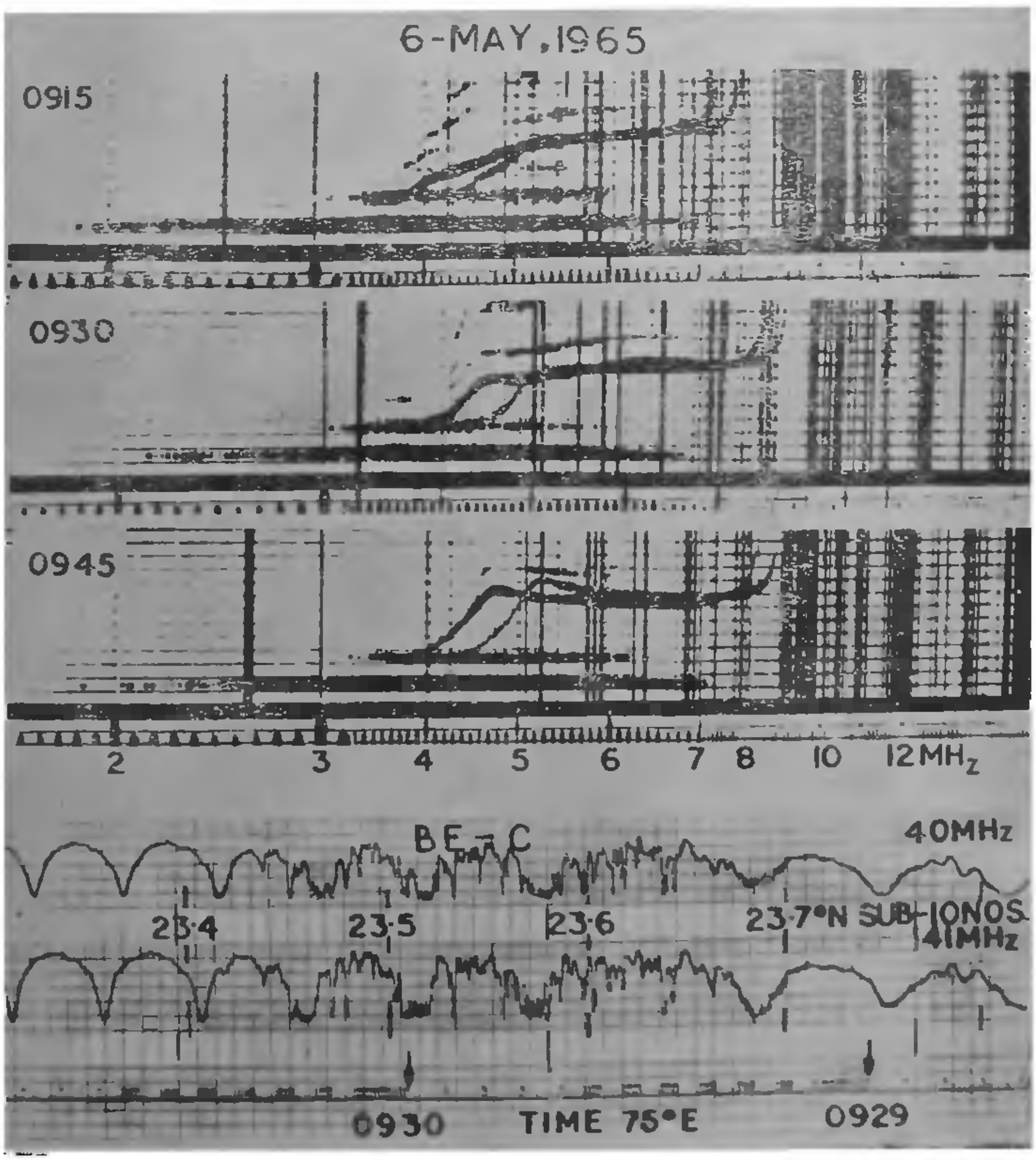

FIG. 1. Faraday fading records at 40 and 41 MHz from the BE C Satellite recorded at Ahmedabad on 6 May 1965 showing scintillations (bottom), caused by the intense sporadic E seen in the ionograms at the top.

Swenson, 1959; Beynon and Jones, 1964; McClure, 1964). At equatorial latitudes too, the scintillations were found to be a night time phenomenon associated with spread F (Kent, 1961; Koster, 1972; Chandra and Rastogi, 1974).

At high latitude stations scintillations have been found to occur some times during the day and are attributed to E-region irregularities (Bolton *et al.*, 1953; Dueno, 1956; Chivers and Greenhow, 1959; Munro, 1966). Using spaced receivers McClure (1964) estimated the height of irregularities causing the day time scintillations to be at 100 km. Aarons and Whitney (1968) showed that the day time scintillations observed at Sagamore Hill (dip 73° N) were correlated with the occurrence of E_s, the width of E_s cloud estimated by them was 300–600 km. At a low latitude station, Brisbane (20° N), Singleton and Lynch (1962) did not find any significant correlation between scintillations and f_0E_s. Koster and Wright (1963) have observed an unusually regular type of scintillation during day time at Accra (dip 8·5° S) which was associated with equatorial electrojet disturbances. Ramakrishnan (1966) has reported the associations between the occurrences of scintillations and E_s. The present note is concerned with a conclusive evidence for stroeng blanketing type of E_s causing scintillations at 40 and 41 MHz.

Results

In Fig. 1 are shown the ionograms taken at Ahmedabad at 0915, 0930 and 0945 hr 75° EMT on 6 May 1965. All these records show a strong E_s cloud over Ahmedabad with $fE_s > 7{\cdot}0$ MHz, and the second multiple of E_s is also clearly seen to be strong. In the lower part of the diagram are shown the fading records of 40 and 41 MHz radio beacons from the Satellite BE–C recorded at Ahmedabad. The sub-satellite pass was very close to the location of Ahmedabad, the maximum elevation of the satellite was 82° at 0930 hr 75° EMT. The fading records for periods prior to 0929 hr, *i.e.*, for sub-ionospheric position north of 23·7° N showed very clear Faraday fades. Between 09*h*, 29′, 12″ and 09*h*, 30′ 20″ strong scintillations were superimposed over the Faraday fades. The sub-ionospheric latitude varied from 23·7° N to 23·4° N during this period. After 0931 hr, when the satellite was south of 23·4° N the Faraday fades were again quite clear. This showed that strong irregularities were present in the ionospheric between latitues of 23·4° N and 23·7° N. This clearly shows a distinct correlation of strong blanketing E_s and the scintillations produced in the radio waves traversing through it. The E_s cloud seems to be about 300 Km wide in N-S direction.

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PREPARATION AND CHARACTERISATION OF ORTHOPHENYLENEDIAMINE COMPLEXES OF LANTHANIDES

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ORTHOPHENYLENEDIAMINE (OPDA) complexes of Fe (II) halides were prepared and characterised by infrared, electronic, Mössbauer spectroscopy and magnetic susceptibility measurements[1]. Some complexes of Co (II), Ni (II) and Cu (II) with orthophenylenediamine have been prepared and characterized by magnetic and spectral properties[2]. In all the above complexes it was observed OPDA acts either as a bidentate ligand or as a unidentate ligand.

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