

THE SEVERE MAGNETIC STORM OF SEPTEMBER 18, 1941

BY

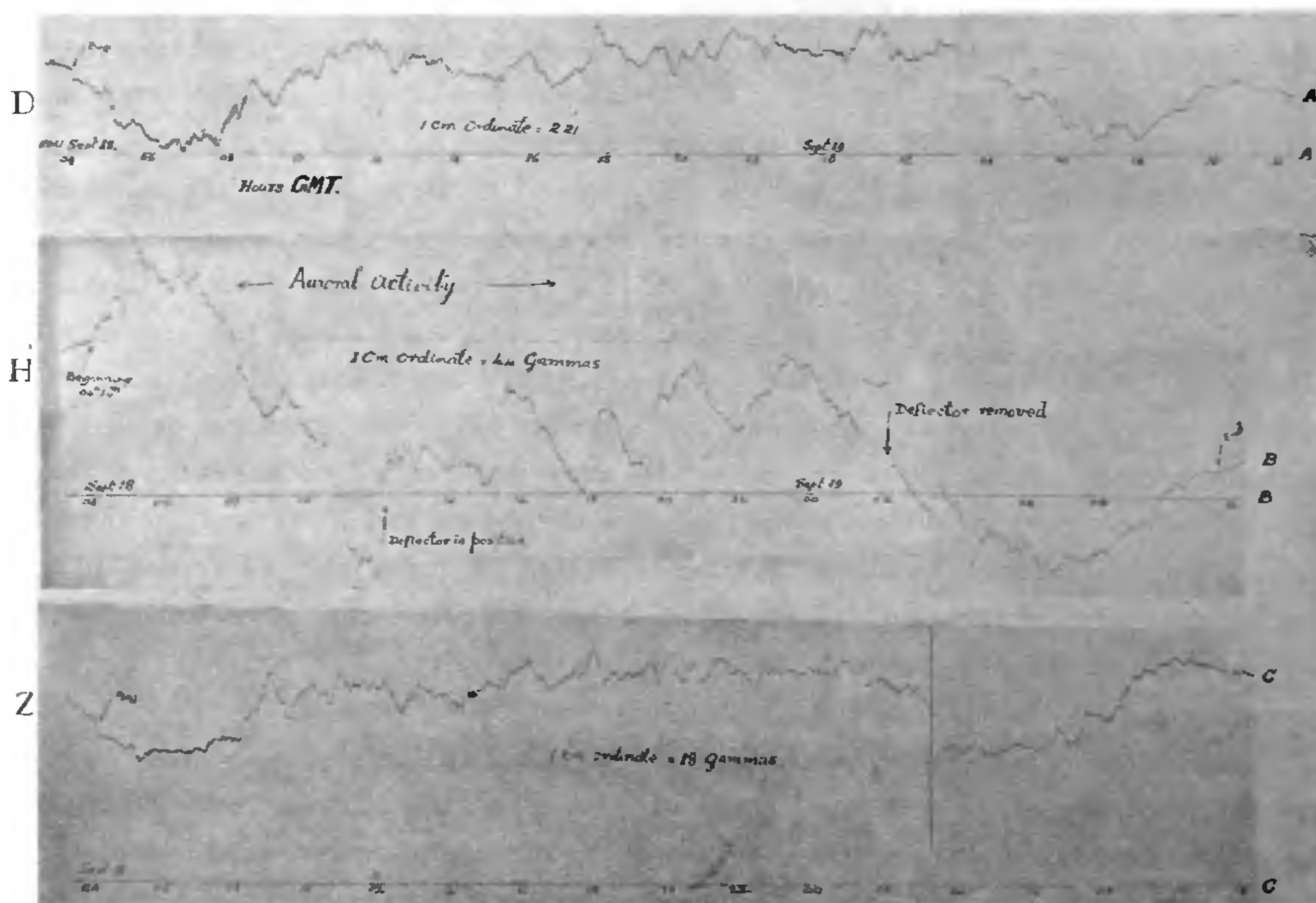
M. R. RANGASWAMI AND A. S. CHAUBAL

(Alibag Magnetic Observatory, Bombay)

AT 4^h 14^m G.M.T. (corresponding to 9^h 44^m Indian Standard Time) on Thursday, the 18th September 1941, the magnetographs at the Alibag Magnetic Observatory recorded the commencement of a severe magnetic storm which upset wireless and telegraph traffic all over the world. According to Reuter's reports, there was a display of Aurora Borealis for two nights in succession from the 18th September 1941 and the lights which were very brilliant were seen from many parts of Britain particularly in East Anglia. The Indian Telegraph Department experienced considerable

The storm can be considered to be the severest of its kind during the current year. The two other storms of importance during the year were those of 1st March 1941 and 5th July 1941. Both these storms were of severe intensity and caused moderate dislocation to the telegraph traffic. A detailed description of one of these storms, viz., that of March 1, 1941, which was the intenser of the two, has been given in a note by one of us in an earlier issue of that Journal.

The magnetograms of the few days prior to the day of the storm do not indicate



Severe Magnetic Storm of 18th September 1941. (D. H. & Z. Magnetograms recorded at the Alibag Observatory.)

disturbances on their circuits and made very frequent telegraphic enquiries from the Alibag observatory which promptly gave the details regarding the progress of the storm. In India, receptions of the broadcasts of the B.B.C. and other foreign stations were also affected.

any special activity. The days 14th to 17th September 1941 were slightly disturbed being of international character No. 1. On the 17th, the day previous to the storm however, the Solar Physics Observatory at Kodaikanal observed a large sun-spot group crossing the central meridian. This spot

activity may perhaps be associated with the severe storm of the 18th September.

Characteristics of the storm of September 18, 1941.—The beginning of the present storm of September 18, 1941, was marked by a sudden rise of 26 gammas in horizontal force H , and of 1.3 minutes in Westerly declination D and a fall of 9 gammas in the vertical force Z . H rose gradually till 4^h 48^m G.M.T. and after this the magnet became quite unsteady with low-period oscillations of varying amplitudes. At 5^h 7^m, H shot up rapidly by 141 gammas in barely fourteen minutes. At about 5^h 22^m, the maximum value in H occurred but the position of the light speck was just beyond the recording limit of the photographic paper. The value of H at this time was more than 470 gammas above the baseline value. The vertical force attained its minimum value at about the same time. Westerly D attained its maximum value at 7^h 10^m. A gradual fall in H associated with rapid vibrations commenced at 5^h 26^m and continued till 10^h 36^m when a large decrease of 224 gammas occurred in 52 minutes. At this time the value of H oscillated about this value for about 20 minutes and showed a tendency to fall rapidly from 11^h 50^m onwards. The value of H rapidly decreased and as there was the risk of the light speck going off the recording limit of the photogram,

a deflecting magnet was used at 12^h 6^m and the trace was shifted upwards by 169 gammas. Rapid fluctuations in H were continuing till 15^h 20^m when there was a sudden rise of 144 gammas in about twenty minutes. From 15^h 44^m H began to fall again to attain its minimum at 17^h 50^m. Both the vertical force and westerly D attained their maxima a few minutes after H reached its minimum value. Immediately after attaining the minimum H rose by 149 gammas in twenty-four minutes and thereafter rose and fell at stages with ups and downs such as have been noticed in terrestrial magnetic records associated with Auroral activity. As the need for a deflector magnet disappeared, it was removed from its position at 2^h 16^m on the 19th, resulting in the curve being shifted downwards by 158 gammas. The H , D and Z magnetics continued unsteady till 6^h 44^m on the 19th September, after which H began to rise very gradually with minor fluctuations. The range in horizontal force during the storm exceeded 650 gammas, while the ranges of D and Z were 12.0 minutes and 87 gammas respectively. The storm practically ended at 11.5^h on the 19th although H continued low for a couple of days.

The magnetograms of the day of the storm as recorded at the Alibag Observatory have been reproduced in the figure.

WHISTLING METEORS. A DOPPLER EFFECT PRODUCED BY METEORS ENTERING THE IONOSPHERE

THE Research Department of All-India Radio has recently concluded an investigation of an effect hitherto unobserved. It is reported that the flight of meteors through the upper atmosphere, which results in clouds of ionized gases following the meteors at their tremendously high velocities of several kilometres per second, gives rise under certain conditions to peculiar types of low frequency whistles on the unmodulated carrier waves from nearby shortwave transmitters. The production of these

whistles is explained on the basis of interference between the ground wave and a weak sky wave which has undergone a slight change in its frequency due to 'Doppler Effect', i.e., due to reflection from the head of the rapidly moving ionized cloud caused by the passage of a meteor. This conclusion which is supported by observations and experiments is likely to be of far-reaching importance in the realm of astronomy. A detailed account of the investigation appears elsewhere.
