the a parameter. The M–O distances vary only slightly, but we do notice a significant variation in the M_1–O_1–M_2 angle from 77·3° in pure Ti_2O_3 to 79·79° in the 10%V_2O_3-doped sample. Other angles which show significant variations are: O_1–M_1–O_2 and O_1–M_1–O_6 (decrease), O_1–M_1–O_5 (increase). The distances from M_1 (as well as O_4) to the O_1–O_3 plane also increase with incorporation of V_2O_3. Decrease in a_{hex} with % V_2O_3 is consistent with the reduction in the O_1–O_2 distance.

The Debye-Waller factor in pure Ti_2O_3 shows a marked increase in the temperature region of the transition. The Debye–Waller factor shows a similar variation with % V_2O_3 as well.

The results of the present study show that the electronic properties of V_2O_3-doped Ti_2O_3 can be explained by the band broadening mechanism of Van Zandt, Honig and Goodenough[3]. More specifically, the present study confirms that the two narrow d-bands cross each other following variations in the crystallographic c/a ratio[13].

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ONSET HEIGHT OF RANGE-SPREAD F OVER THE EQUATOR

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Abstract

It is shown that Range-Spread F over the dip equator is first generated in the region between the base of the F region and the normal E region height. Later intensification of spread F is due to the combined effect of upward drift of irregularity and downward movement of the F layer. Range-spread is suggested to be generated in regions of large plasma gradient which is present after sunset in 100–200 km range.

Introduction

Spread F is generally considered to be due to the existence of plasma irregularities within the F region. Equatorial spread F has been associated with post-sunset rapid rise of the F layer. A threshold height has been also suggested for the F layer to rise before spread F can be seen. The model suggested by Clemsha and Wright[2] (1966) assumes the presence of irregularities above a certain height which is seen as spread F once the F layer rises above them. Cohen and Bowles[3] (1961) have described transequatorial VHF forward scatter propagation through spread F and they estimated the height of these irregularities to be at the bottom or below the F layer. Rastogi[4] (1977) has shown the existence of spread F simultaneously with high order multiple echoes from the normal F region and suggested that even at the times of strong spread F, the normal F region has smooth ionization variation with height and that the irregularities responsible for the spread F are below the F region. Normally during the spread F condition the normal F region trace is mixed up with the spread F echoes and the former is not discernible. In this short note are presented some ionograms taken at the equatorial station Huancayo during spread F conditions.

Chandra and Rastogi[1] (1972) have shown that the equatorial spread F is of two types, Range and Frequency type spread. The spread F configuration during the early part of the night is of Range type while the Frequency spread is generally a post-midnight phenomenon.

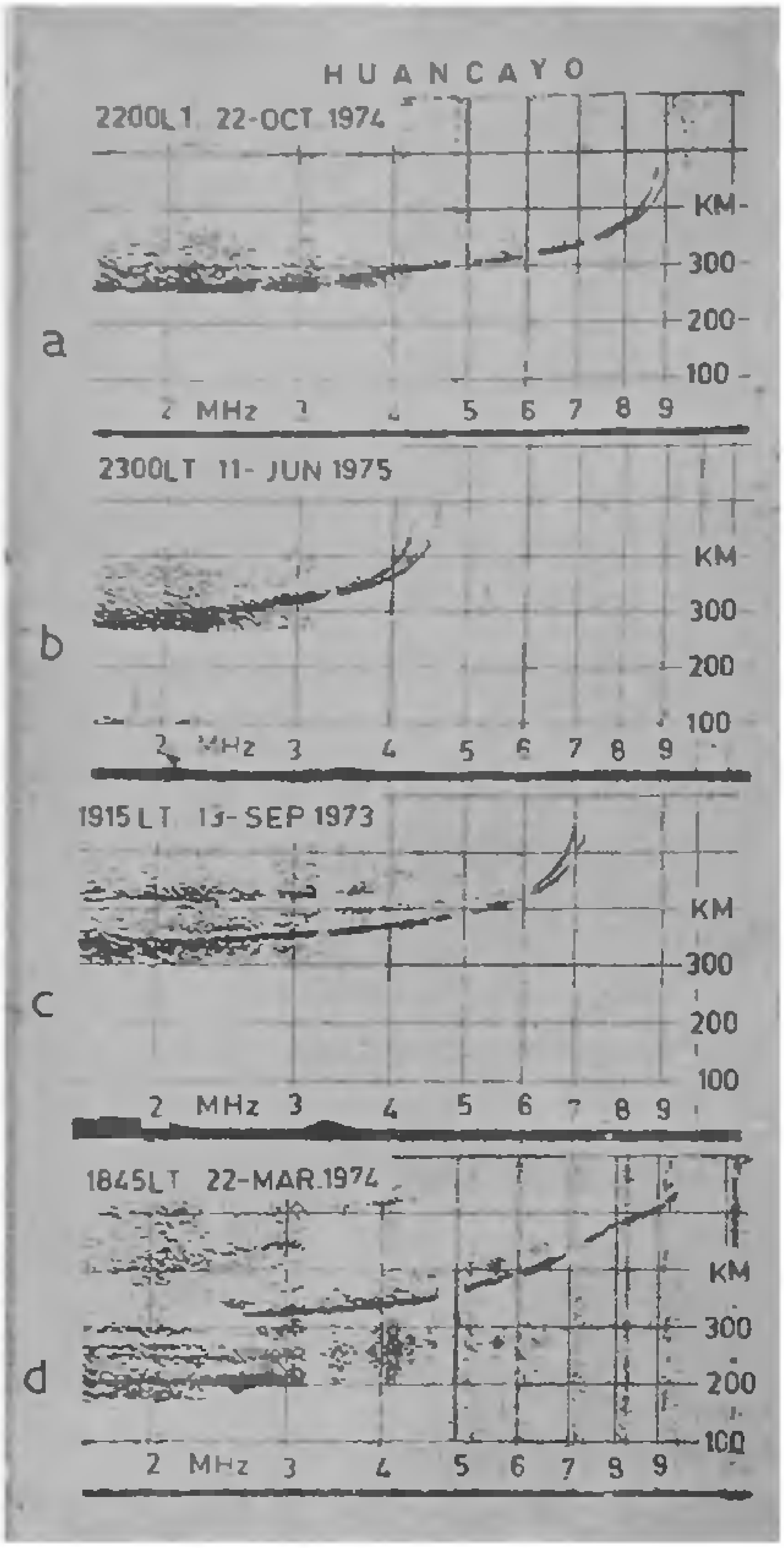

FIG. 1. *A few ionograms at Huancayo showing* Range-spread F simultaneously with clear *h'–f* trace.

RESULTS

In Fig. 1 are shown a few sample ionograms of Huancayo with Range-spread F configuration. The ionogram in Fig. 1 (*a*) is the generally common type of Range-spread in which the critical frequencies are very clear and the diffuse echoes are seen only at the lower frequency end of the ionogram. The normal *h'–f* trace cannot clearly be seen in these conditions within the spread F echoes. The virtual heights of the normal trace and the spread F echoes cannot be differentiated in most of these cases. In Fig. 1 (*b*) is shown the ionogram at 2300 LT on 11 June 1975. Here too the critical frequencies are very definitely identified. The spread F echoes have a clear minimum virtual height which is more or less constant with frequency. Within the frequency range 2–3 MHz the minimum height of the spread is lower than the virtual height of the normal echoes; however, it is difficult to be sure if the height of the spread F echoes is less than the base of the F layer. In Fig. 1 (*c*) is reproduced the ionogram at 1915 LT on 13 September 1973 where the normal F region trace can be seen below 2 MHz even within the spread F configuration. The spread F is seen from heights significantly below the base of the F layer. A more remarkable ionogram is shown in Fig. 1 (*d*) at 1845 LT on 22 March 1974. In this case the spread F echoes are seen even at the height of about 180 km whereas the minimum virtual height of the F layer is more than 300 km. The trace of the ionogram being fairly constant with frequency, the base of the F layer would not be much different from *h'*F. This record clearly demonstrates that the Range-spread F starts at a height significantly lower than the base of the F layer sometimes by more than 100 km.

Further close examination of the spread F configuration suggests a number of regions of constant height from where the scattering occurs. It is suggested that these spread F layers below F layer are due to large plasma density gradients present between the E and F regions during nighttime hours.

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