CORONAL DENSITY STRUCTURES IN REGIONS OF TYPE III ACTIVITY

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Abstract (*Solar Phys.*). We identify from daily *K*-corona observations the coronal regions located above type III burst sources. The radio observations were made with the east–west log-periodic array at Clark Lake Observatory. East–west positions of 260 isolated type III bursts during March and April 1971 have been measured between 20 and 65 MHz (disregarding storms of type III bursts). The *K*-corona observations are made with the HAO *K*-coronameter at Mauna Loa, Hawaii. During 1971, the heights of observation were 3.6′, 5′, 9′ and 13′ above the limb.

Kuiper (1973) analyzed the radio observations and showed that type III bursts occur in discrete regions of the corona corotating with the Sun, below which Hα activity was simultaneously observed.

We have identified these regions with *K*-corona features at limb passage. It appears that nearly all type III burst regions are not located on the axis but rather at the edge of dense structures or in low density regions (Figures 1 and 2). By comparing the observed positions of the bursts at two frequencies, and assuming a radial propagation of type III exciters, we derive the electron density and the vertical gradient at 1.5 R_0. These values, corrected for scattering effects, are compared with electron density models (Figure 3) obtained from optical observations, and though the precision is poor, there is good quantitative agreement.

It is suggested that the propagation of the type III exciters does not occur along the neutral sheet of streamers which corresponds to the densest part of coronal structures but along field lines which delineate these structures and/or along radial field lines in regions of lower density.

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Gordon Newkirk, Jr. (ed.), Coronal Disturbances, 227–230.

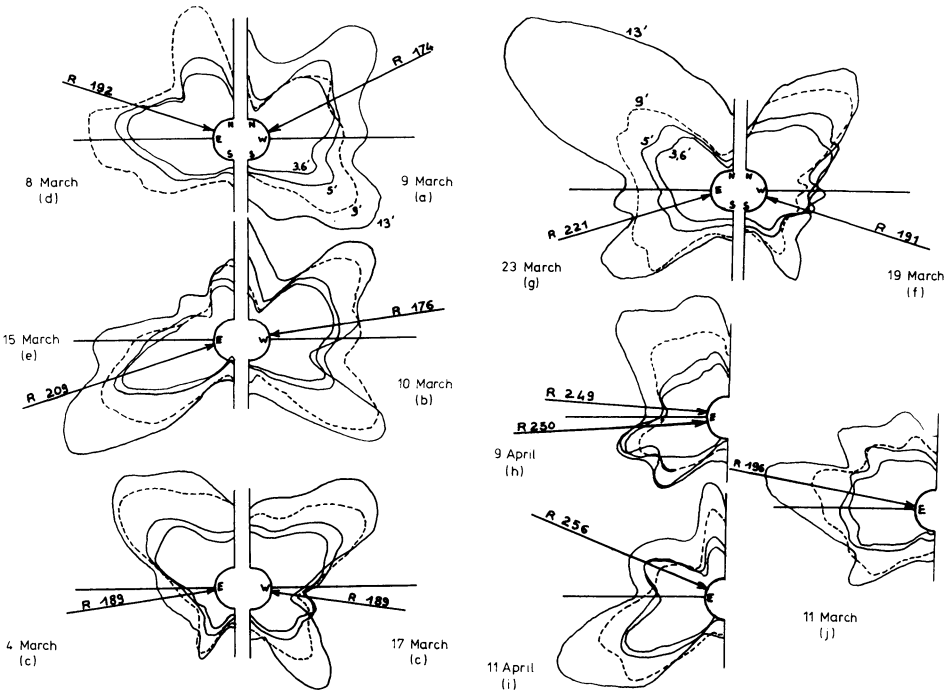

Fig. 1. *K*-corona observations: Intensity profiles obtained at four heights. The dashed line indicates the intensity at 9′ above the limb. The position (latitude) of the McMath region associated with a solar burst region is shown by an arrow. Region 196 did not show any type III activity.

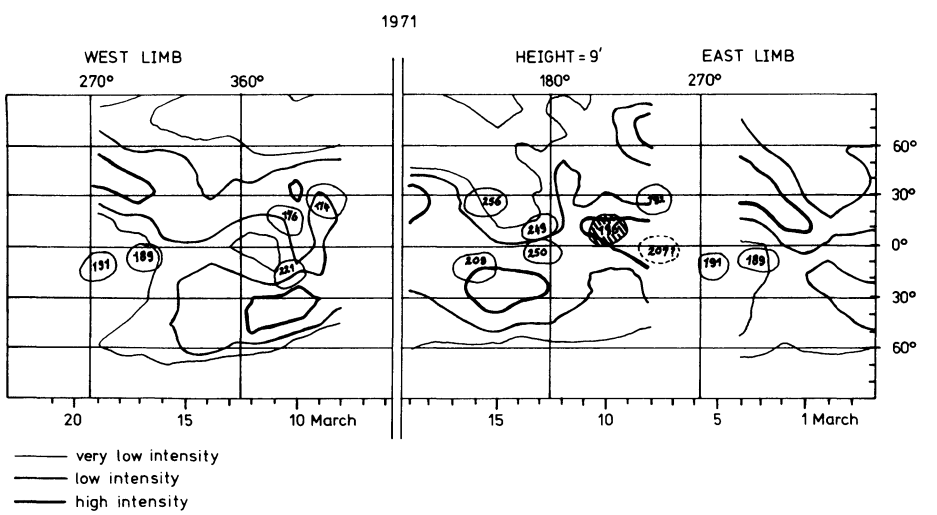

Fig. 2. *K*-corona observations: Synoptic maps, indicating positions of McMath plages (identified by last 3 digits) associated with type III regions.

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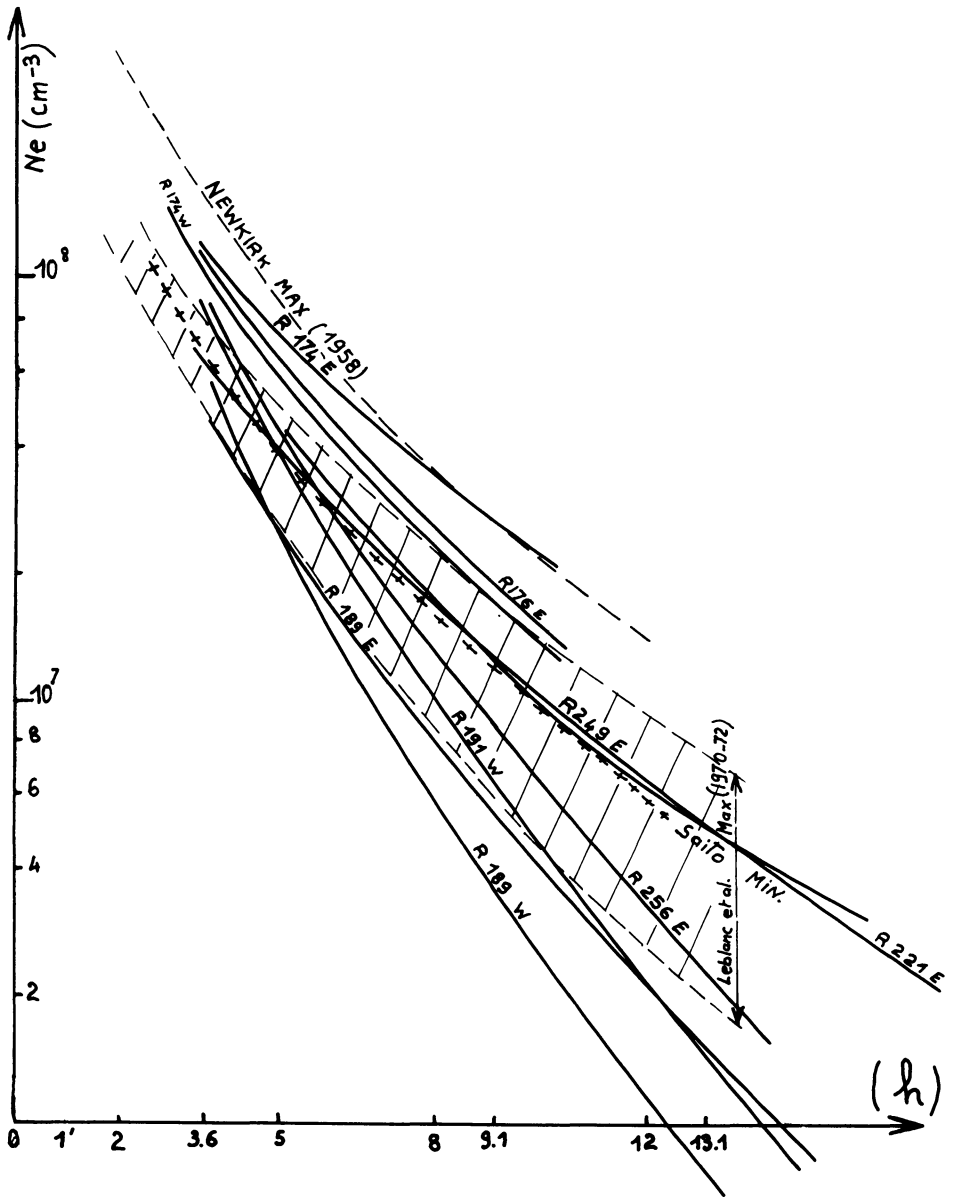

Fig. 3. Calculated electron density models. For comparison are also given: Newkirk's model (1956–58 maximum), Saito's model (average model at minimum), the Leblanc *et al.* (1973) models (1970–1972 maximum-hatched area).

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COMMENTS

Kundu: This morning we heard from Ron Stewart that type III electrons travel through dense coronal regions. On the other hand, you imply that the electrons travel through low density regions. I am wondering whether you are not reaching important conclusions on the basis of insufficient data.

Leblanc: I agree that a more systematic study should be done, however for all the set of data considered here, the type III burst regions avoid the centres of large dense structures in the corona, and it is of interest to consider MacMath region 196 located in a dense structure: while it showed considerable Hα activity no type III bursts were associated with this region.

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