

DENSITY DEPLETIONS AT THE SCALE OF THE ION GYRO RADIUS IN THE ARECIBO HEATER VOLUME

T.L.Arce, M.C.Kelley

On June 8, 1992 at 05:32:06 U.T., a Black Brant 9 sounding rocket was flown through the Arecibo Heater beam as part of the CRRES Coqui Rocket Campaign. The rocket passed through the HF reflection point at $T_0 + 168$ sec. The Arecibo 430 MHz radar was used to verify that intense heating was occurring. The trajectory was slightly off and the payload passed through a portion of the beam where the signal strength was about 1/2 of the peak value. Nonetheless the data were excellent and will tell us a lot about the interaction of intense electromagnetic waves with the ionospheric plasma.

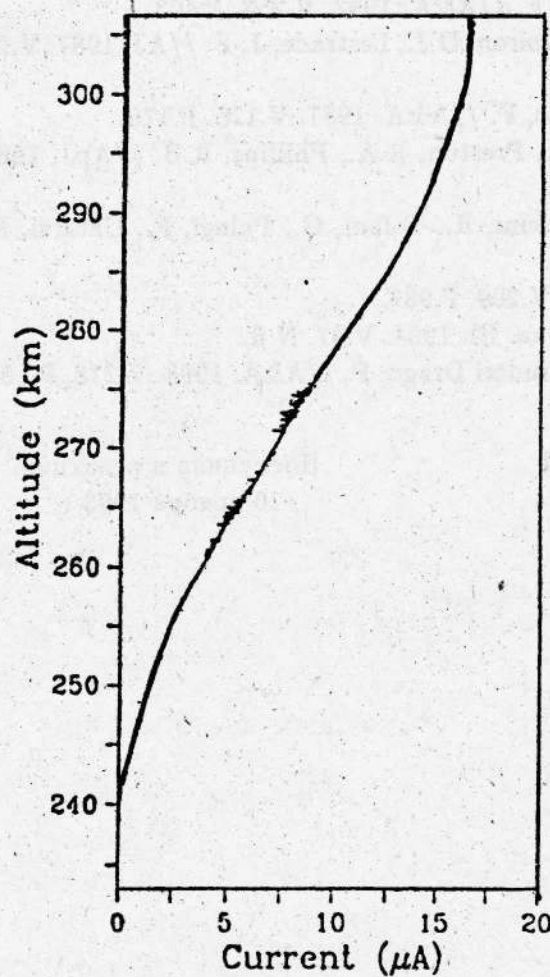


Рис.1

Thus far we have concentrated on the results of a single instrument: the fixed bias Langmuir probe. The profile of this instrument response is shown in Figure 1 near the reflection point.

Several patches of disturbed plasma are seen both above and below the reflection altitude.

An enlargement of the region is given in Fig. 2. The insert shows that the structures are depletions of the order of 8% and have an average size across the magnetic field of 8 m and average separations of 15 m.

A power spectrum of the region is shown in Figure 3. At the largest scales (small k values) there are several peaks in the spectrum which correspond to the groupings of the depletions.

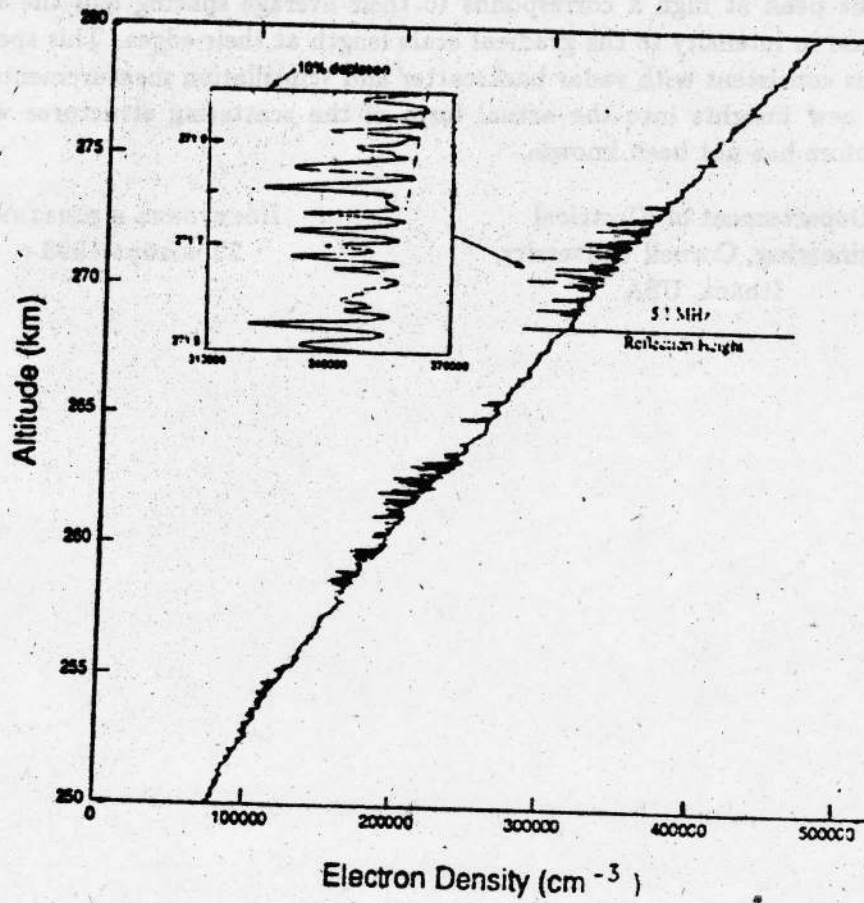


Рис.2.

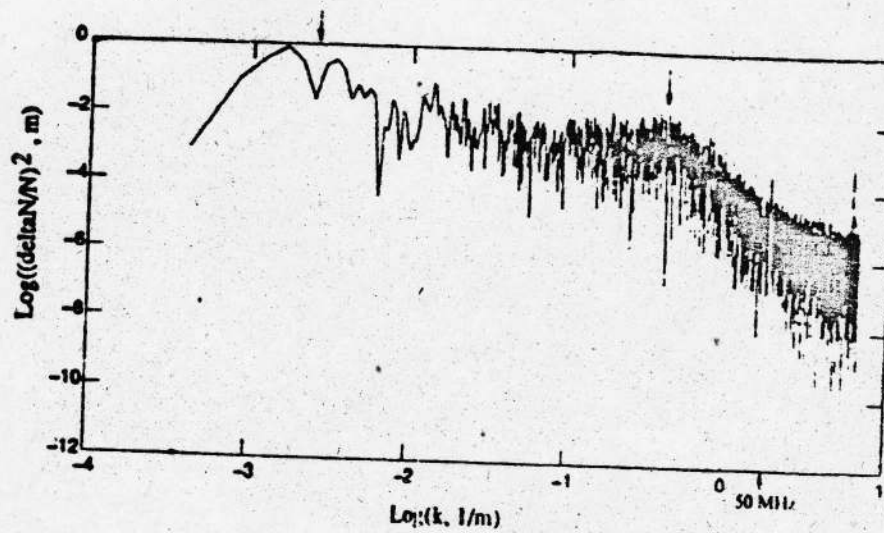


Рис.3.

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The peak at high k corresponds to their average spacing and the sharp decrease in intensity to the gradient scale length at their edges. This spectral form is consistent with radar backscatter and scintillation measurements but gives new insights into the actual form of the scattering structures which heretofore has not been known.

Department of Electrical
Engineering, Cornell University,
Ithaca, USA

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