A PARTIAL ECLIPSE OF SUN ON JANUARY 4 1973 AT 73.5 CM

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RESUMEN: La observación realizada en 73.5 cm permitió medir el tamaño de la radio corona para esa fecha y posiciones de las regiones activas en 408 MHz.

Fue intentada la correlación de estas regiones con plages observadas en Ca II con buen acuerdo. Altura de las regiones activas en radio fueron calculadas.

1) Introducción

The January 4 1973 solar eclipse was observed from La Plata Observatory Solar Radioastronomy Station on Pereyra Iraola $\lambda = 58°08'21"$ and $\phi = 34°52'02"$.

The eclipse was observed with a Dicke radiometer working at 408 MHz, equiped with a parabolic antenna of 6.60m between $11^h\ 30^m$ to $18^h\ 10^m$ U.T.

Control calibration with saturated current diode was made at the begin and the end of observation, chart speed of 1200 mm/hour and time constant of 10 milisecond, was used.

This partial eclipse had the beginning at $13^h41^m16.3^s$ the maximum $15^h30^m57.4^s$ and the end at $17^h19^m52.7^s$, magnitude of g=0,833 all this values are for La Plata $\phi = 34°55.0'$ $\lambda 5756.0'$ (Iannini 1972).

From the recorded chart, values of flux each minute are taken, and then computed the alope

$$\text{slope} = \frac{F(n+1) - Fn}{t(n+1) - tn}$$

Simultanuosly observation was made by means of La Plata Observatory Interferometer at 408 MHz.

This instrument composed by 10 antennas, is a transit type and has a resolucion of 4.5 minutes of are.

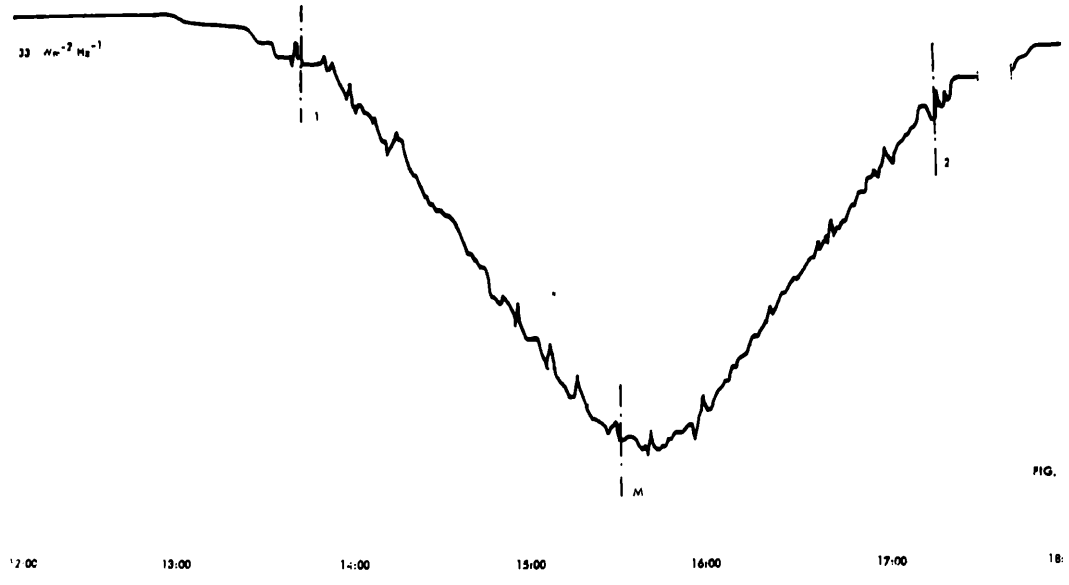
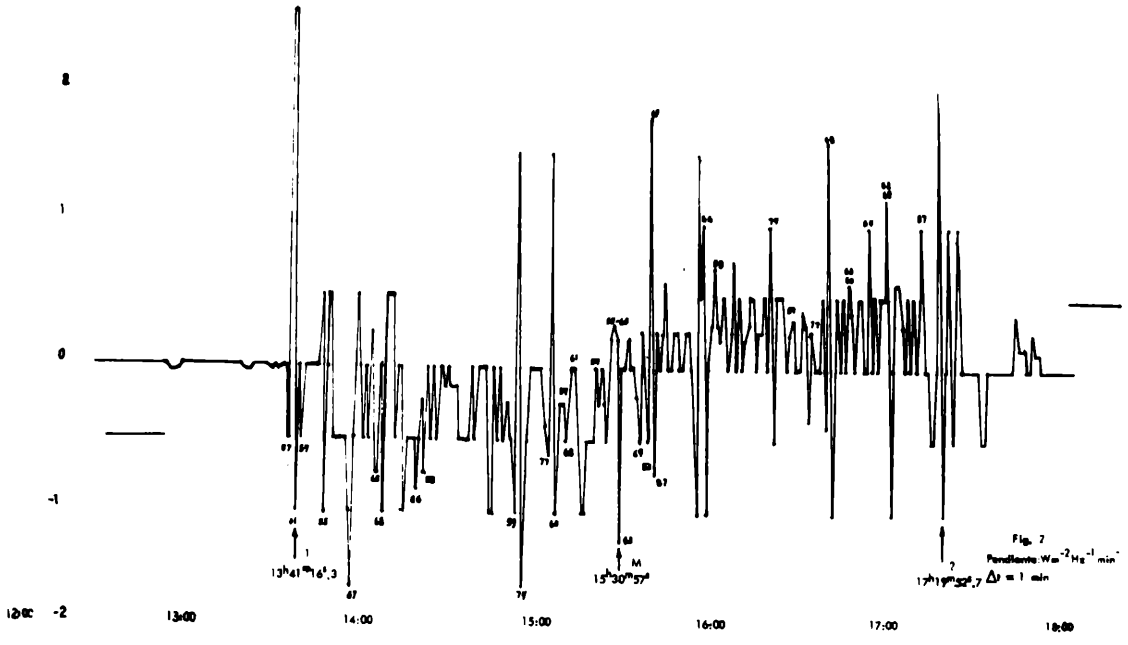


Fig. 1

2) Observed data:

Recorded values are plotted on figure 1. It shows a different time for optical and radio maximum eclipse; this a consequence of an active region.

Figure 2 shows the values of computed slopes. The general slope of the eclipse is negative for occultations and positive for reappearances. The mean value of it is 0.5 Wm^{-2} Hz^{-1}/minutes, traced at each side of the figure.



Fig, 2

Looking the general geometry of this eclipse, solar radio sources on the edge of the corona, can be occulted until 17^h 04.2^m and reappearances can be feasible after 1400^h U.T.

A general representation of the calcium plages regions at 1600 U.T. on solar surface are given in figure 3. The position of plages are taken from Solar-Geophysical Data (Comprehensive reports) number 347 and 348. Numbers correspond to McMath-Hulbert Observatory serial numbers.

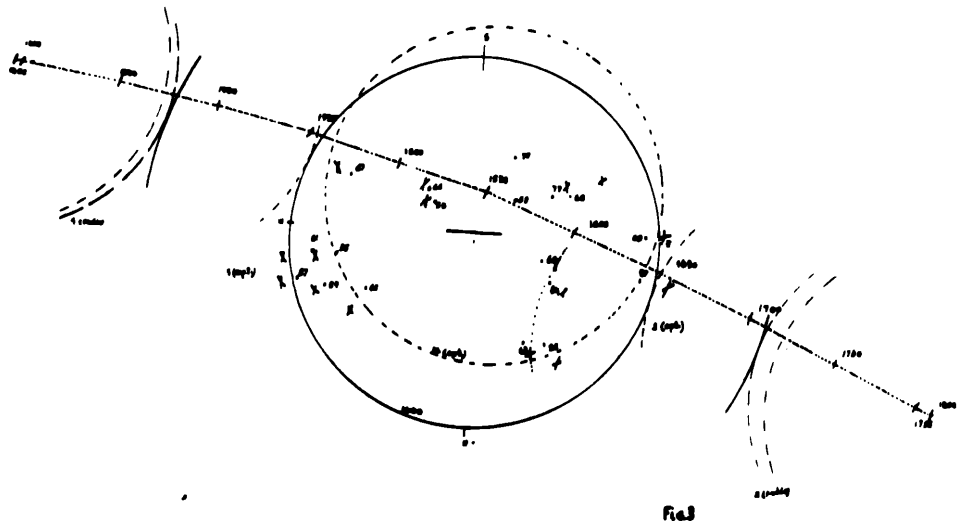


Fig. 3

The long dashed curve represents the place of the moon center along all the time of eclipse. Points each 30 minutes are given and time for the first and second contact of the with radio corona (408 MHz).

Also dashed arcs represents the moon for maximum, optical and radio contacts.

The crossed arc over plage regions are positions of the moon for occultations and reappearances.

Using the curve for the moon center trajectory and times obtained from fig. 2, for occultations and reappearances, is possible to determine the position of radio sources over the solar disk.

Comparing this positions with plages positions we can get:

a) Correspondence or not between calcium plages and radio surces.
b) High of radio surces, if a) affirmative.

3) Results

During the eclipse was all kind of solar activy. Taking from Solar-Geophysical Data number 347 Part II:

a) Solar flare.
   Start 1257; End 1332, importance 1N, N04-E15

b) Radio Emission:

Frecuency MHz	Starting time U.T.	Time of maximum U.T.	Duration min.
245	1218	1316.8	541
1415	1252.2	1257	26
2800	1610	1640	70

The representation of slopes (fig. 2) may be disturbed by the action of this activity, however was identified: eighteen sources from occultations (negatives peaks of slopes) and reapearances (positives peaks of slopes).

On table I are given the McMath-Hulbert calcium plages serial number, time for optical and radio occultations and reappearances, heigh over plages regions.

Looked in white light, the sun for January 4, we can see only three sunspots. Interferometric observation of the eclipse maximum gave two hot regions on west and east of the solar disk (corona) and other to the east respect to South-North direction. Figure 4 represents

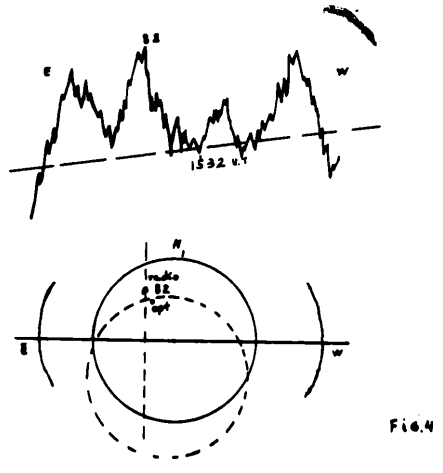


Fig. 4

a) Interferometric record.
b) direction of source from interferometric record and calcium plage position number 82.

The size from eclipse data is for the west side 29.6 minutes of arc and for the east is 26.8 minutes of arc,

interferometric value is 54.75 minutes of arc, for solar diameter measured in west to east directions.

That difference is because the minimum change of flux level that we can read in the total flux record have best accuracy than the interferometer. The eclipse give a very high resolution about 0.28 minutes of arc for each minutes of time. Interferometer 4.5 minutes of arc.

This work is sopported by contract with the C.N.E.G.H.

References

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2) Iannini, G. 1972. O.A. Córdoba
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4) Planet Space Sci. 1968, Vol. 16, Pergamon Press.