

RADIO OBSERVATION OF THE PARTIAL SOLAR ECLIPSE, 20 JUNE 1955

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The partial solar eclipse of 20 June 1955 was observed at Tokyo and Toyokawa, where regular solar radio observations are conducted. A party was sent to Kagoshima by the Tokyo Astronomical Observatory. The locations, the frequencies observed and the types of aerial are listed in Table 1. The paths of the northern limb of the moon at three stations are shown by dotted lines in Fig. 3.

Table 1

Station (latitude and longitude)	Magnitude of the eclipse	Frequency (Mc./s.)	Type of aerial	Organization
Kagoshima (+31° 37', E. 130° 32')	0.38	3000	2 metre dish	Tokyo Astronomical Observatory
Toyokawa (+34° 50', E. 137° 22')	0.21	3750	2.5 metre dish	Research Institute of Atmospherics
		4000	Eight 1.5 metre dish interferometer	
Tokyo (+35° 40', E. 139° 33')	0.16	3000	10 metre dish	Tokyo Astronomical Observatory

The variations of the total flux at three stations are shown by the curves marked *A* in Fig. 1. The observed variations in flux at the three stations show marked differences. These differences are apparently due to the different magnitudes of obscuration at the three stations of an enhanced region at the position of the sunspot group in the southern hemisphere. At Toyokawa the interferometric observation with eight dishes has been continued during the day. Curves *A* in Fig. 2 give the drift curves before and during the eclipse.

It is possible to determine the location, the size and the brightness distribution of the enhanced region by combining these eclipse curves. The contours for the radio isophotes thus obtained are shown by full lines

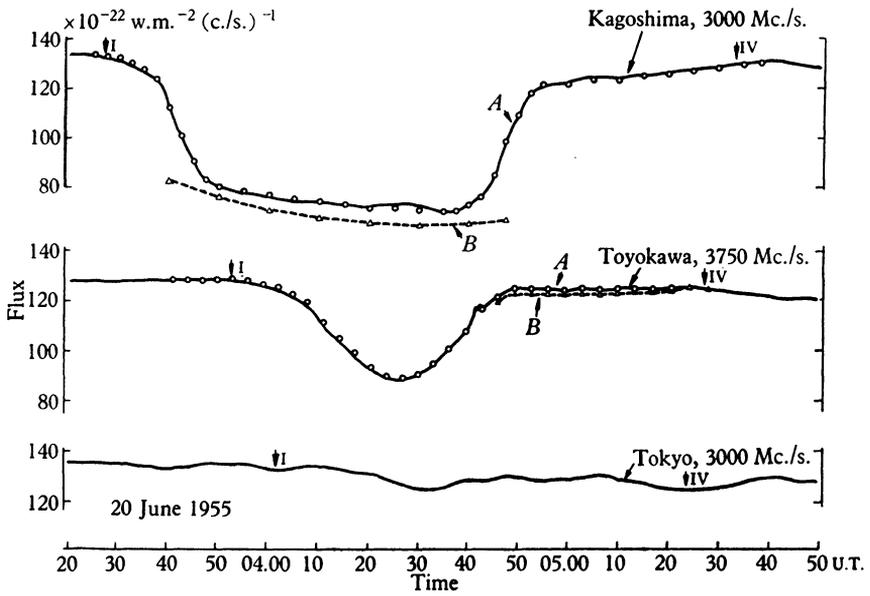


Fig. 1. Variation of flux at three stations. Arrows with I and IV indicate the time of the first and fourth contacts.

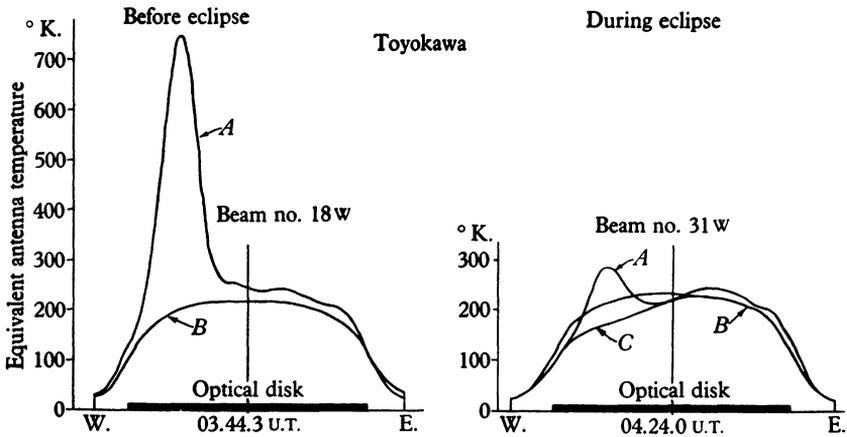


Fig. 2. Drift curves with eight-dish interferometer. *A*, observed curve. *B*, lower envelope of the drift curves observed during June 1955. *C*, calculated drift curve for the basic radiation during the eclipse.

in Fig. 3. The numbers 1, 2 and 3 in the figure give the measurements for the relative brightness and roughly correspond to $10^{6^{\circ}}$ K., $2 \cdot 10^{6^{\circ}}$ K. and $3 \cdot 10^{6^{\circ}}$ K. in brightness temperature. The curve in dotted line gives the calcium plage observed at Mount Wilson kindly made available to us by

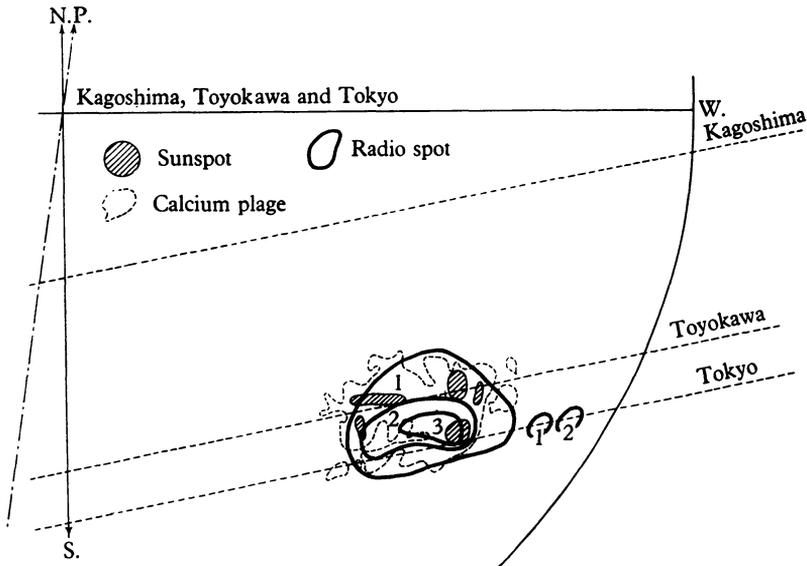


Fig. 3. Comparison between radio and optical observations. Dotted lines indicate the paths of the northern limb of the moon at three stations.

Table 2. (Unit: 10^{-22} w.m. $^{-2}$ (c./s.) $^{-1}$)

Source	Research Institute of Atmospherics (3750 Mc./s.)	Tokyo Astronomical Observatory (3000 Mc./s.)
Radially symmetric disk	62	66
Strong radio spot	41	45
Main part	38	42
Small patch	3	3
Eastern part	4	4
Other area	21	20
Total	128	135

Dr S. B. Nicholson. The close agreement between the radio spot and the calcium plage is very remarkable.

Besides the discussion on the radio spot it was also possible to estimate the contributions to the total flux by the different regions over the solar disk. This estimation was done almost independently by two ways as is shown in Table 2: one by combining the flux observations at Kagoshima

and Tokyo and the other by combining two observations at Toyokawa. It is found that these two sets of estimations came out very closely to each other. It is to be emphasized that the brightness distribution of the so-called basic radiation cannot be radially symmetric over the solar disk, but only two-thirds of the basic radiation is radially symmetric. (Curves *B* in Fig. 1 are the eclipse curves reconstructed on the assumption that the whole basic radiation is radially symmetric.) The remaining one-third is denoted in Table 2 as 'other area'. 'Eastern part' in the table means the contribution by less enhanced regions in the eastern part as judged from the drift curves. The open circles in Fig. 1 show the reconstructed eclipse curve based on the present conclusion.

Details will be published elsewhere [1, 2].

REFERENCES

- [1] Hatanaka, T., Akabane, K., Moriyama, F., Tanaka, H. and Kakinuma, T. *Rep. Ionosphere Research, Japan*, **9**, 195, 1955.
- [2] Hatanaka, T., Akabane, K., Moriyama, F., Tanaka, H. and Kakinuma, T. *Publ. Astr. Soc. Japan*, **7**, 161, 1955.