LETTERS TO THE EDITORS

ASTROPHYSICS

The Solar Flare of June 1, 1960

A SOLAR flare in the 3^+ category of importance and of exceptionally large extension was observed on June 1 at the Royal Greenwich Observatory, Herstmonceux, and at a number of other solar stations in Europe. We have recently been analysing the film in $H\alpha$ light taken with the Lyot heliograph at the Royal Observatory, Cape of Good Hope, which gives a complete record of the flare at 1-min. intervals under cloudless conditions.

The spot group over which the flare occurred was of complex E-type containing 24 spots and had extended rapidly in area since its first appearance on the east limb on May 29. The flare began at 0823 U.T. and developed rather slowly until about 0837 when the 'flash' phase occurred with a rapid increase in area and intensity at the main centre (N., 30° lat.; E., 50° long.). The greatest extent of the emission filaments was recorded at about 0900 (Fig. 1) when the measured area was 27 (unit = 1 sq. degree heliographic at the centre of the solar disk). If we correct for foreshortening, the heliocentric angle (h) being 54°, we obtain a corrected area of 46 square degrees, or 2,230 millionths of the hemisphere, which makes this flare one of the largest observed in recent years and comparable in area with that of July 25, 1946.

From the measured co-ordinates we have re-plotted the shape of the flare as it would have appeared had it been seen on the Sun's central meridian. The emission filaments in this way can be seen to extend across the spot group in a north-east – south-west direction for a distance of 290,000 km., and some of the isolated outlying bright regions were located 200,000 km. to the south of the main centre.

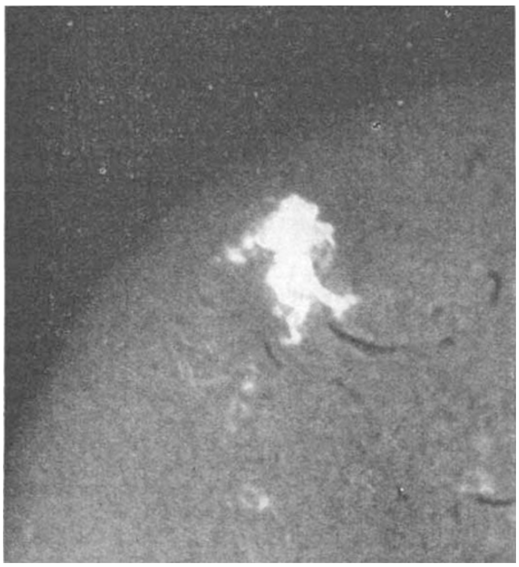

Fig. 1. Class 3^+ flare of June 1, 1960 (0900 U.T.), recorded with the Lyot $H\alpha$ heliograph at the Royal Observatory, Cape of Good Hope

The Tatsfield Receiving Station of the B.B.C. (engineer-in-charge, H. V. Griffiths) reported a very severe sudden ionospheric disturbance occurring from 0837 until 1200, absorption remaining greater than normal until about 1400. In the peak period about 0900 all communications at high frequency were affected.

In the geomagnetic field a sudden commencement was recorded at 1800 on June 3, and this was followed by a minor storm (K_p max. = 7) lasting for two days. However, the distance of the flare from the Sun's central meridian reduced the probability that a magnetic storm would follow, and the long time interval between the flare and the sudden commencement, s.c. (57 hr.), suggests that this particular storm was caused by particles emitted from a subsequent flare.

A fuller account of the flare will be published elsewhere with accompanying light-curves. We wish to express our thanks to the staff at the Royal Observatory, Cape of Good Hope (under Prof. R. H. Stoy), for the fine film record; J. Churms, in charge of the Lyot heliograph, assisted by Mrs. E. Fiamingo, J. D. Laing, R. Lake and D. S. Malan.

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Effect of Upper Atmosphere Wind on the Rotation of Satellite 1958δ1

CHANGES in the rotation of 1958δ1 (*Sputnik* 3 rocket) can apparently be explained by, and give additional evidence of, strong westerly wind in the upper atmosphere. According to Merson, King-Hele and Plimmer[1] such air-flow, accompanying the Earth's rotation, accounts for observed effects in the movement of the orbital planes of satellites.

The rotation period of 1958δ1, estimated from its regular fluctuations of brightness, increased at a decreasing rate, from just over 8 sec. in June 1958, to about 9·5 sec. in mid-November. It then decreased by at least 0·3 sec. during the last few days of flight, as noted, for example, by Carr, Stewart and Senne[2]. Late in July 1958, the rate of increase decreased significantly. This effect is mentioned by Esipova and Zverev[3]. It coincided with entry of the perigee into denser tropical atmosphere; King-Hele and Walker[4] found a change in the rate of decay of the orbital period at this point.

Air resistance at perigee alone would be expected to exert a progressively increasing deceleration of spin. The observed behaviour reveals an opposing acceleration, which increased with the air density at perigee, and in the end became dominant.

Esipova and Zverev determined from visual observations that the rotation axis was transverse