

SHORT COMMUNICATIONS

PHOTOMETRIC OBSERVATIONS OF SUBVISUAL RED AURORAL ARCS AT MIDDLE LATITUDES*

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A photometer (Roach *et al.* 1958) sensitive to the red oxygen emission at 6300 \AA has been in operation at Camden, near Sydney (geomagnetic latitude 42°), since July 1958. In this period three bright aurorae have been seen in southern Australia; on July 8–9, September 4–5, and September 25–26. Following the first two the photometer detected a subvisual stable red arc the next night. On the night after the third aurora, observation was prevented by cloud.

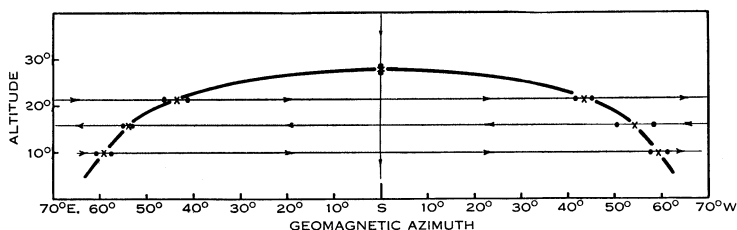


Fig. 1.—Shape of auroral arc observed between 1930^h and 2330^h September 5, 1958. The photometer scanned the sky along the paths indicated by the fine arrowed lines. A complete sky scan was completed once every 5 min. The crosses show the mean positions at which the arc was intercepted. The dots are the quartile points.

These arcs had the following characteristics :

- (1) They occurred on the night following a bright visual aurora. By this time the magnetic disturbance index (K) at Watheroo had fallen to 5 or less.
- (2) Periodic checks on the 5577 \AA emission showed no departure from the quiet airglow pattern. Indeed, during the previous 15 months 5577 \AA emission was intensively studied and auroral activity was never detected at this wavelength unless the disturbance index (K) equalled or exceeded 6.
- (3) The arcs were centred (to within 1 or 2°) on geomagnetic south, and maintained these positions for some hours. The arc seen on September 5–6 is shown in Figure 1. It maintained this position from 1938 till 2330 E.S.T. After this it began to sink slowly, being 5° lower by 0245.
- (4) The intensities of the arcs varied steadily with time (Fig. 2) in marked contrast to the rapid fluctuations which we usually observe during visual aurorae.

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Using a photometer at Haute Provence (geomagnetic latitude 45.7°) Barbier (1957) found a red arc on January 21, 1957, but this was during a great magnetic storm ($Kp=9$). Störmer (1955) states that only four visual red arcs were observed in southern Norway in the 40 years ending 1955.

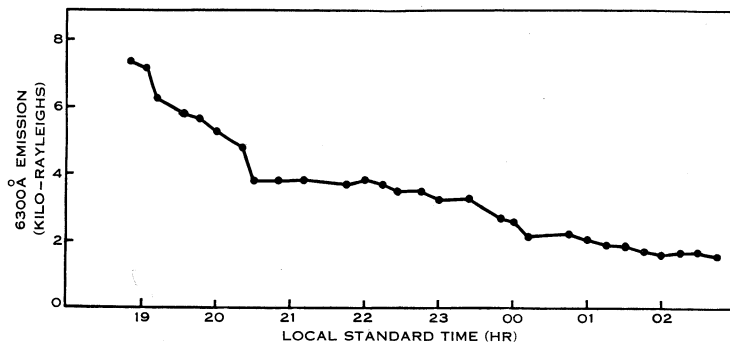


Fig. 2.—Time variation of the brightness of the red auroral arc observed on September 5–6, 1958. The brightness plotted here is that of a point on the eastern limb 15.7° above the horizon (see Fig. 1) but is representative of all parts of the arc.

The existence of auroral arcs at middle latitudes during times of only moderate geomagnetic disturbance does not appear to have been previously reported.

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