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CORONAL STRUCTURE AT THE SOLAR ECLIPSE OF
SEPTEMBER 22, 1968: PREDICTION AND OBSERVATION

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CORONAL STRUCTURE AT THE SOLAR ECLIPSE OF
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Technical Report

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Coronal Structure at the Solar Eclipse of
September 22, 1968: Prediction and Observation

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Abstract. The coronal structure to be expected during the solar eclipse of 22 September 1968 has recently been published in Nature. Prof. M. Waldmeier has made available a sketch that he prepared from photographs obtained during this eclipse. Many of the features seen in the eclipse (streamers, open-rayed configurations, and condensations) were in good qualitative agreement with those predicted from the model. Comparisons of the exact shape of many features may lead to improvements in the model and to a better understanding of coronal processes.

A prediction of the coronal structure to be expected during the eclipse of 22 September 1968 has recently been published in this journal¹. Prof. M. Waldmeier has kindly made available a sketch that he prepared from his photographs obtained during this eclipse. The observations of Waldmeier were obtained with a 120 cm focal length telescope near Yurgamysh, USSR.

The prediction and observation appear to have several features in common. Figure 1a is the sketch of the eclipse of 22 September 1968 and Figure 1b is the prediction of the coronal structure prepared on 20 September 1968. No prediction near the poles was made because observations of the photospheric magnetic field are of low quality in these regions. Proceeding counterclockwise

from the north pole one can note a variety of similarities between the two figures. In the northeast quadrant, an open-rayed structure is predicted and observed. The southeast quadrant shows two large helmet-type streamers. Two large streamers are observed. The resolution of the pictures was insufficient, however, to capture enough detail to trace any closed looped structure that may exist within these streamers. The model that predicts the structure of the streamers does so only as far as 0.6 solar radii above the photosphere. Hence the exact predicted direction of these streamers beyond this distance is somewhat uncertain.

Above the southwest limb, one large streamer is predicted and observed. This streamer appears to consist of several coronal arches as predicted. Above the western equator some tight coronal arches are predicted with overlying streamer configurations. The direction and position of the rays in the sketch of Waldmeier is consistent with those of the streamers in the prediction. The rays appearing to emanate from the limb of the sun as seen in the sketch may actually emanate from a configuration of closed loops (Pasachoff, private communication) as the prediction shows. Prof. Waldmeier (private communication) describes this region as "the second-brightest in the corona, but almost structureless". In the northwest quadrant, an open-rayed configuration at low latitudes and a streamer above a prominence chain at higher latitudes were predicted and observed. The high latitude streamer appears to have an open field line configuration suggesting somewhat hotter coronal temperatures. It is also possible that the streamer is closed with the open appearance being attributed to the orientation of the streamer base parallel to a meridian, as was the underlying prominence chain.

Thus many of the features seen in the eclipse (streamers, open-rayed configuration, and condensations) were in good qualitative agreement with

those predicted from the model. Comparisons of the exact shape of many features may lead to improvements in the model and to a better understanding of coronal processes.

I would like to thank Prof. M. Waldmeier for the sketch of the September 22, 1968 eclipse and his interpretation of coronal forms. I would also like to thank Dr. John Wilcox for helpful discussions.

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Reference

¹Schatten, K. H., Nature 220, 1211 (1968).

Figure Caption

Figure 1a. Sketch of the 22 September 1968 solar eclipse drawn by Prof. M. Waldmeier. The shaded areas represent streamers.

1b. Prediction of the coronal structure drawn on 20 September 1968.

SOLAR ECLIPSE
September 22, 1968

OBSERVATION
(Waldmeier)

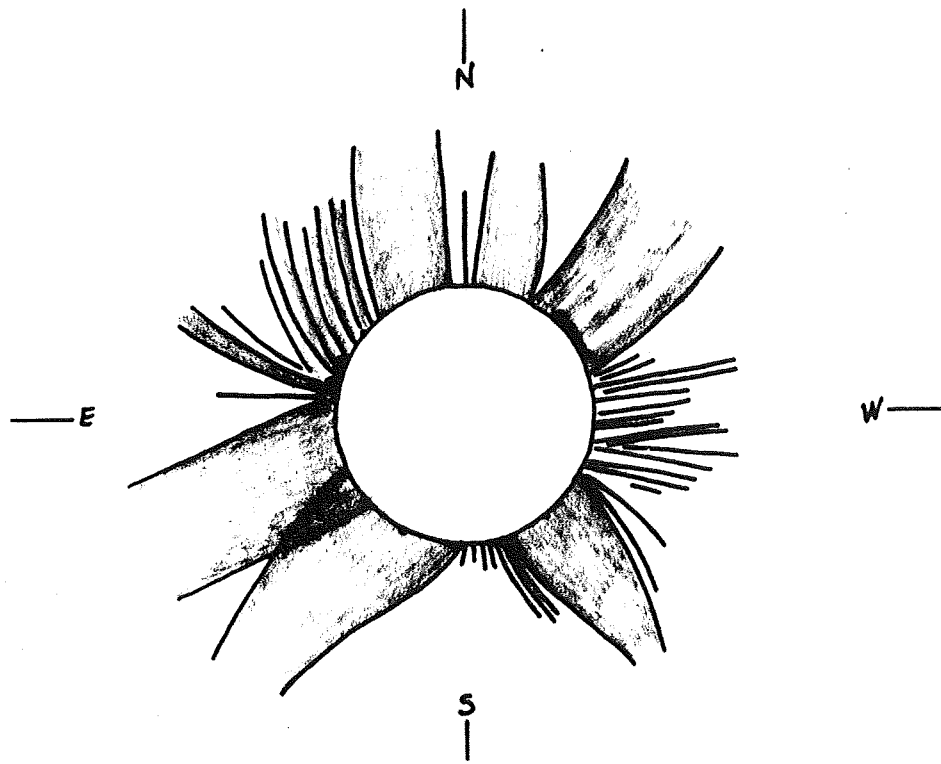


Figure 1a

PREDICTION

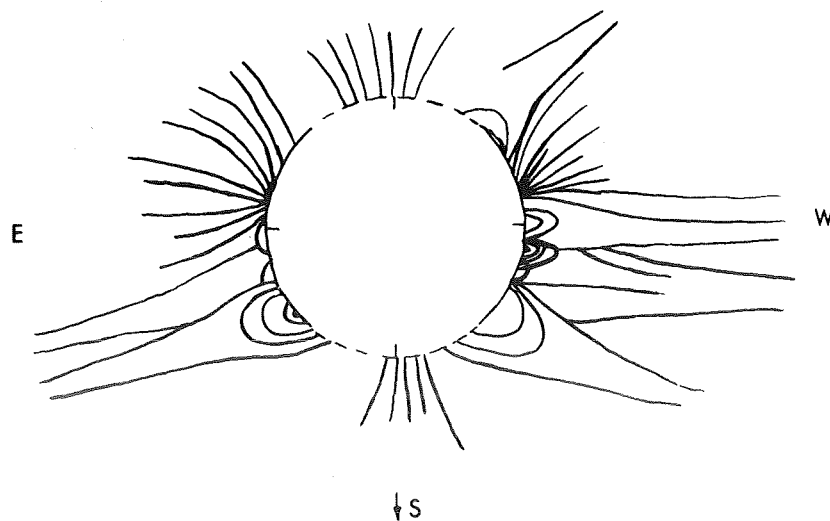


Figure 1b

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