RESULTS OF ASTRONOMICAL AND ECOLOGICAL OBSERVATIONS DURING THE TOTAL SOLAR ECLIPSE AUGUST 11, 1999

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We present some results of astronomical and ecological observations during the total solar eclipse Aug. 11, 1999.

The solar corona Aug. 11, 1999 was observed close to the maximum phase of the 11-year solar activity (SA) cycle and had the maximum shape. It consists of the numerous powerful and thin rays with mainly radial orientation, as well as of a considerable number of big and bright prominences (Fig. 1). It is necessary to note that the angle of divergence of the East-fan of rays is bigger than that of the West-fan. There is an evidence of a significant E/W asymmetry of the solar corona. The brightness distribution shows the solar corona near the spherical-symmetrical shape. Only near the South pole there is a less bright region, where the polar coronal hole occurs. This fact and some others circumstances point to the noticeable N/S asymmetry of the solar corona. The high-latitude rays of the N–hemisphere (especially in the NE sector) are inclined in the direction of the N–pole and

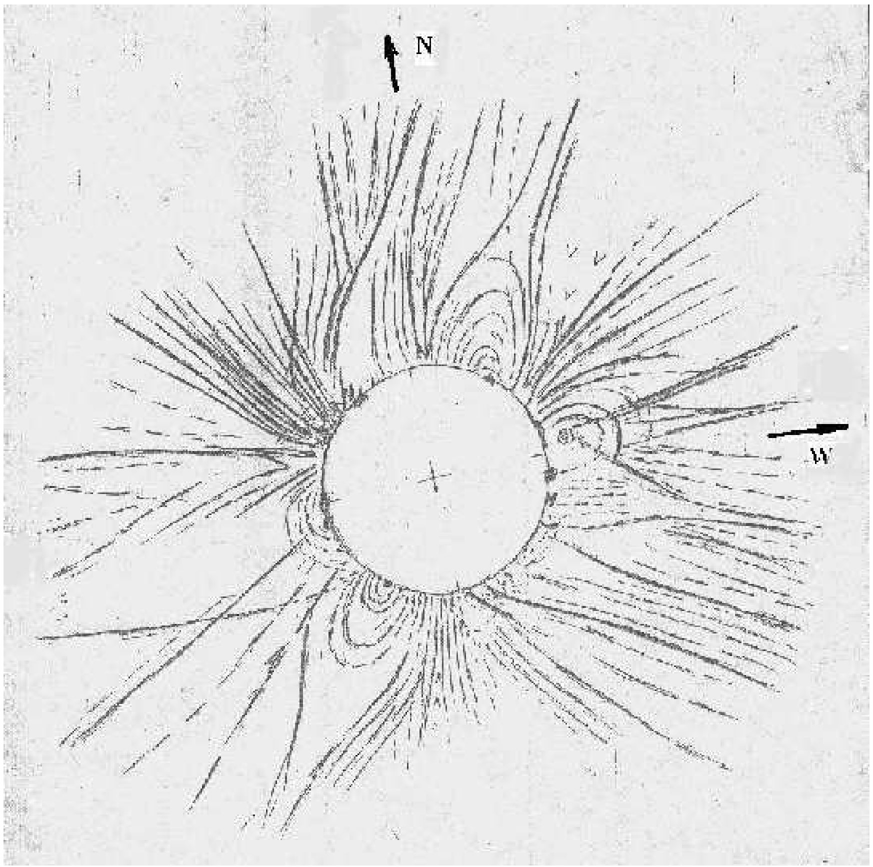

Figure 1: The structural drawing of the solar corona Aug. 11, 1999

the high-latitude rays in the SW–sector of the South hemisphere are inclined in the direction of the solar equator. All this shows that the N–hemisphere is more active than the S–hemisphere. It means that the N–hemisphere has developed its maximum shape. We note that the sunspot activity in the N–hemisphere for all the branch of rise of SA including 1999 $\Sigma W_N/\Sigma W_S = 1.15$ is considerably higher than for the S–hemisphere. According to our forecast [1] the 23rd cycle must be characterized by domination of the spot activity and threefold polarity reversing for the S–hemisphere. It follows that the maximum of the present 23rd cycle of SA will take place in the N–hemisphere in the middle of 2000 and in the S–hemisphere the maximum of SA will take place probably in the middle of 2001. A rather interesting peculiarity of the solar corona Aug. 11, 1999 is the existence of a sabre-like thin double ray on the NE–limb (at PA = 50°). It is close to the peculiar center of "repulsion" for the fan of rays of the E–limb. Similar rays also existed in certain coronas over the outburst active regions of the Sun and were connected with the phenomena of the transient of the coronal plasma of the "ray-type". Therefore, probably both this ray and the sharp divergence of the rays on the E corona are connected with the existence of the transient ejection. In the region of the NW–quadrant and near the W–equator on the best mages of the corona a rather sharp transequatorial arc is detected. We think that it is tied with development of the coronal mass ejection (CME) detected by the cosmic coronograph C2 of Lasco SOHO Aug. 11/12, 1999. The CME velocity in the inner corona was very low (12 km/s) and in the outer corona the CME velocity was moderate ($170 - 200$ km/s). Comparison of the Aug. 11, 1999 solar corona structure with the model of the corona magnetic field shows their good similarity *to the Micic–Linker model.*

Ecological observations (Bulgaria, Mount Charakman) show that the behaviour of birds began to change 24 min before the second contact T_2. 4 min before T_2 all swallows flew to their nesting-places and 2 min before T_2 the sound activity of insects began to decrease and at the time of T_2 ceased.

With some delay the rate of fall of the air temperature reflected decreasing illumination. After the third contact it was $6° - 7°$ C. 4 min after T_3 (11:42 UT) the first sounds of insects were heard and 11 min after T_3 the first swallows appeared. Full restoration of the sound ground of insects took place 20 min later T_3 and a usual distribution of birds for the locality took place 60 min after T_3. Change of birds and insects activity which was close to the total eclipse phase is mainly determined by the illumination factor (coefficients of correlation are 0.93 and 0.66). Probably, the behaviour of animals is determined by breach of the normal photoperiod and awareness of a sudden danger in the eclipse conditions [2].

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