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# MISSED NOVA AQUILAE 1985 ON MOSCOW AND SONNEBERG PLATES

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In the course of the search for new variable stars on the plates of Moscow collection, an unknown star with outburst-type variability was discovered by one of the authors (S. Antipin). But only the common effort using both the Moscow and Sonneberg plate archives allowed us to investigate the new variable carefully and to classify the star as a missed nova.

The star was estimated by eye on the plates taken with the 40-cm astrograph in Crimea and on the Sonneberg Sky Patrol plates taken in two colours (*pg* and *pv*) with the 55/250-mm short-focus cameras. Unfortunately, only four plates with the newly discovered Nova Aql 1985 seen were obtained in Crimea between September 1984 and June 1986. So, the absolute majority of data were obtained thanks to Sonneberg Sky Patrol.

The results of our research are given in Table 1. The Sonneberg estimates are marked by "S", and the Moscow ones by "M" in the last column of the table. Uncertain and very uncertain estimates are labeled with a colon and with two colons respectively. In addition, CCD observations with the 60-cm reflector in Crimea were carried out to obtain $B$ and $V$ magnitudes of the comparison stars (Table 2). We used magnitudes of stars near V1343 Aql (Leibowitz and Mendelson, 1982) as a photoelectric standard. The last star in Table 2 is not included in the Guide Star Catalogue but it is in the USNO-A2.0 catalogue, at the coordinates $\alpha = 19^{\rm h}02^{\rm m}24\overset{\rm s}{.}27$, $\delta = +13^\circ09'54\overset{''}{.}1$ (J2000.0).

The light curve of the nova outburst in blue light is given in Fig. 1. The filled circles, open circles and triangles represent photographic observations, uncertain estimates and the upper limits (for negative observations) based upon Sonneberg plates, filled squares show the four Moscow estimates. The nova's maximum was reached on JD2446266 (July 19, 1985) and its brightness was 10.63*pg* and 9.65*pv* with an error of about ±0.10 mag. The rate of the brightness decrease shows that the star belongs to the fast novae (NA). The brightness level 3 magnitudes fainter that the maximum one was reached in about 80 days after the outburst.

We used possibilities of USNOFS Image and Catalogue Archive

`http://www.nofs.navy.mil/data/FchPix/`

to check the position of the nova on POSS I and II plates (Fig. 2). There is no star at the nova's position on POSS I red and blue plates (Fig. 2ab, epoch 1952.615). But

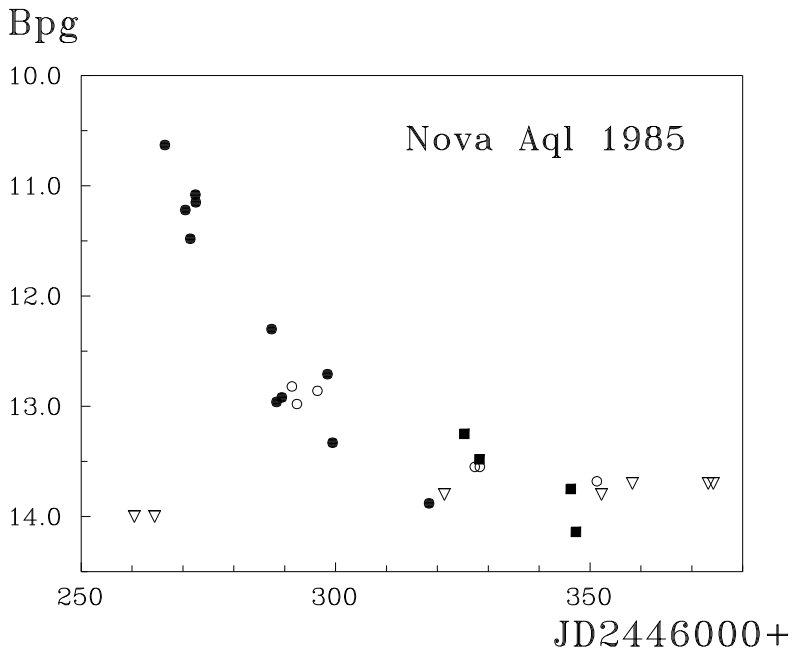


**Figure 1.** The photographic light curve of the nova outburst. See the text for explanations of the symbols.

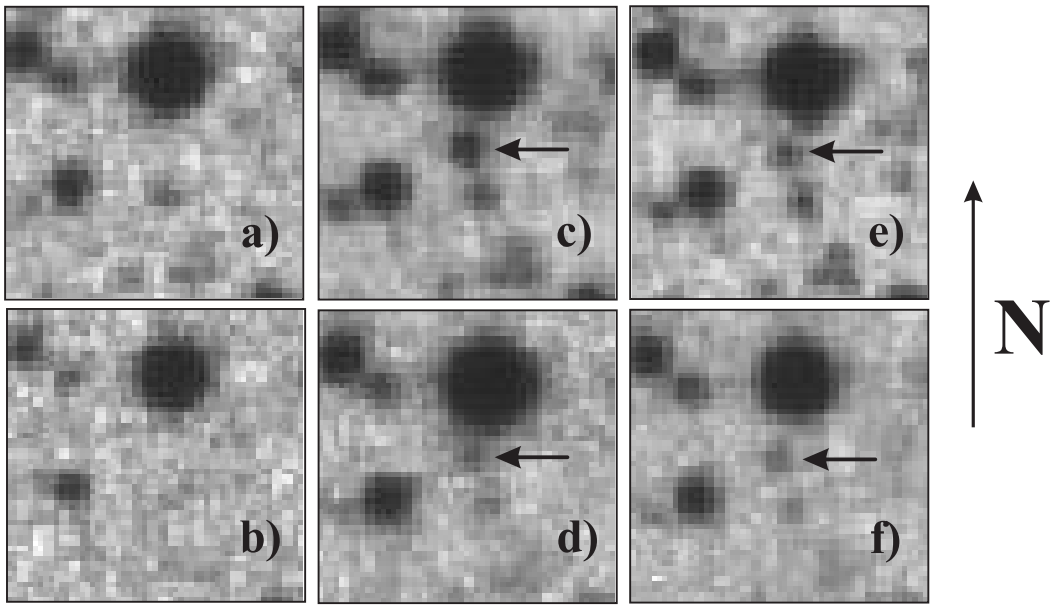


**Figure 2.** The field of Nova Aql 1985 on POSS images. The size of charts is 0.′5 × 0.′5. a) POSS I red, epoch 1952.615. b) POSS I blue, epoch 1952.615. c) POSS II red, epoch 1987.410. d) POSS II blue, epoch 1990.474. e) POSS II red, epoch 1990.627. f) POSS II blue, epoch 1990.539. The post-nova is marked by arrow.

Table 1: Observations of Nova Aql 1985

| JD 2 446 000+ | *pg* | | *pv* | | Obs. | JD 2 446 000+ | *pg* | | *pv* | | Obs. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 200.521 | [13.8 | | – | | S | 318.370 | 13.88 | | 12.38 | | S |
| 260.456 | [14.0 | | – | | S | 320.331 | [13.0 | | – | | S |
| 264.433 | [14.0 | | – | | S | 321.381 | [13.8 | | – | | S |
| 266.457 | 10.63 | | 9.65 | | S | 325.281 | 13.25 | | – | | M |
| 270.467 | 11.22 | | 9.85 | | S | 327.346 | 13.55 | : | 12.36 | : | S |
| 271.429 | 11.48 | | – | | S | 328.253 | 13.48 | | – | | M |
| 272.463 | 11.08 | | 9.67 | | S | 328.345 | 13.55 | : | 12.31 | : | S |
| 272.503 | 11.15 | | – | | S | 346.236 | 13.75 | | – | | M |
| 287.426 | 12.30 | | – | | S | 347.244 | 14.14 | | – | | M |
| 288.404 | 12.96 | | 12.22 | | S | 351.335 | 13.68 | : | 12.33 | : | S |
| 289.399 | 12.92 | | – | | S | 352.279 | [13.8 | | – | | S |
| 291.407 | 12.82 | : | 12.31 | :: | S | 358.319 | [13.7 | | – | | S |
| 292.402 | 12.98 | : | 12.27 | : | S | 373.229 | [13.7 | | – | | S |
| 296.434 | 12.86 | :: | – | | S | 374.240 | [13.7 | | – | | S |
| 298.409 | 12.71 | | – | | S | 385.240 | [13.7 | | – | | S |
| 299.420 | 13.33 | | 12.32 | : | S | 386.227 | [13.7 | | – | | S |

the post-nova is clearly present on POSS II red (Fig. 2ce, epochs 1987.410 and 1990.627) and blue (Fig. 2df, epochs 1990.474 and 1990.539) images taken several years after the outburst. Brightness of Nova Aql 1985 were measured on POSS II red (Fig. 2e) and blue (Fig. 2d) plates using red and blue magnitudes of neighbouring stars from the USNO-A2.0 catalogue for comparison. The resulting magnitudes are:

$$r = 18.6 \pm 0.2, \text{ JD2448121}; \quad b = 20.0 \pm 0.2, \text{ JD2448065}.$$

Using the positions of stars from the USNO-A2.0 catalogue, we derived the accurate coordinates of the nova from the plate of Moscow archive (taken on JD2446325.281) and from the POSS II images. They are the following:
$\alpha = 19^{\rm h}02^{\rm m}14\overset{\rm s}{.}45\,(\pm 0\overset{\rm s}{.}04)$, $\delta = +13^\circ 03' 04\overset{''}{.}4\,(\pm 0\overset{''}{.}6)$, (J2000.0), on Moscow plate;
$\alpha = 19^{\rm h}02^{\rm m}14\overset{\rm s}{.}50\,(\pm 0\overset{\rm s}{.}01)$, $\delta = +13^\circ 03' 03\overset{''}{.}9\,(\pm 0\overset{''}{.}2)$, (J2000.0), average of POSS II images taken in 1990. So, the position of nova in outburst is in good agreement with coordinates of the star that we identified as a post-nova.

Finally, note that the post-nova can be found in the GSC 2.2.01 as a $17.24 \pm 0.44$ (red magnitude) object at the coordinates $\alpha = 19^{\rm h}02^{\rm m}14\overset{\rm s}{.}484\,(\pm 0\overset{''}{.}4)$, $\delta = +13^\circ 03' 03\overset{''}{.}22\,(\pm 0\overset{''}{.}4)$, (J2000.0), epoch 1987.412. Small deviation in the coordinates of the nova measured by us and those from the GSC 2.2 could be explained by different astrometrical systems of the GSC 2.2 and the USNO-A2.0 catalogues.

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Table 2: Comparison stars

| GSC | $B$ | $V$ |
|---|---|---|
| 1048.1691 | 10.07 | 9.71 |
| 1048.1465 | 10.75 | 10.30 |
| 1048.1591 | 11.10 | 9.55 |
| 1047.0749 | 11.35 | 10.77 |
| 1052.1026 | 11.71 | 11.12 |
| 1048.0076 | 12.26 | 11.13 |
| 1048.0106 | 12.86 | 12.24 |
| 1048.1625 | 12.94 | 12.31 |
| 1048.1775 | 13.02 | 12.38 |
| 1048.0223 | 13.68 | 12.94 |
| 1052.0042 | 14.05 | 13.30 |
| USNO-A2.0 0975.13938259 | 14.62 | 13.55 |

Reference:

Leibowitz, E.M., Mendelson, H., 1982, *PASP*, **94**, 977.