

SURFING THE HARVARD PLATE COLLECTION: HISTORICAL OUTBURSTS OF V725 AQUILAE

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Abstract

A search of the Harvard College Observatory plate collection has revealed four previously unknown outbursts of the cataclysmic variable V725 Aquilae, as well as a confirmation of an outburst observed on Sonneberg Observatory plates. Four additional possible outbursts, at plate limit, were also seen. The true position of V725 Aql is some 10–15 arcsec south of that shown in recently published finding charts.

1. Introduction

There is a lot of current interest in SU UMa-type cataclysmic variables, and especially in those with very large amplitude outbursts. One rapidly discovers that very few of them have much, if anything, known about their history of light variation. Searching for historical outbursts in the Harvard College Observatory photographic plate collection is proving to be a very fruitful enterprise. A recent excursion through the plates has revealed several previous outbursts of the cataclysmic variable V725 Aql (R.A. $19^{\text{h}}54^{\text{m}}21^{\text{s}}$, Decl. $+10^{\circ}41'3$ [1950]; see Figure 1, below).

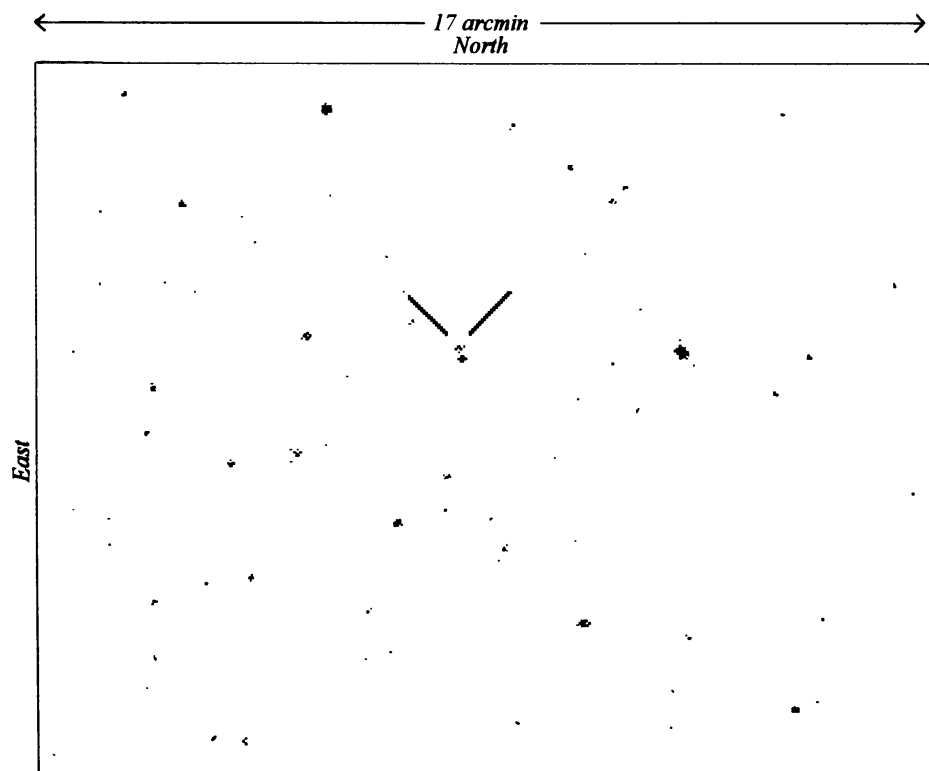


Figure 1. Finding chart for V725 Aql (marked), electronically adapted from a print of a plate taken with the 0.4-meter Metcalf doublet at Harvard College Observatory on August 8, 1936.

2. V725 Aquilae

Rohlfs (1949) discovered V725 Aql on plates at the Sonneberg Observatory in Germany. A finding chart with rather poor scale was published by Hoffmeister (1957). From this chart, Vogt and Bateson (1982) identified a faint blue star on the Palomar Observatory Sky Survey that they labeled V725 Aql; the same identification appears in the atlas of Downes and Shara (1993). In 1995, the Japanese variable star team under Nogami observed the eruption of a star very near, but not at, the Vogt and Bateson position for V725 Aql. They questioned whether this was indeed Rohlfs' variable, or yet another erupting star. In order to help solve this dilemma, and also to contribute historical data concerning V725 Aql (probably the 1995 variable also), a search of the Harvard plate collection was undertaken.

3. Searching the plates

For the initial examination of the plates, a comparison sequence is not really necessary. One can set up an arbitrarily-ordered sequence of nearby stars for which photographic magnitudes can later be determined. In the case of large amplitude cataclysmic variables, experience has shown that they are either bright, i.e., at or near maximum light, or not visible at all on the plates. The number of plates on which the star is visible is likely to be rather small, so reviewing them later for more accurate magnitudes is a simple process.

For stars expected to peak at brighter than photographic magnitude 14–15, one can start the search with the Ross Camera “patrol” plates. These are relatively wide-angle (13 degree field) and are filed by region in the sky, making access relatively simple. Normally one finds 100–200 plates, 1930–1955, reaching to photographic magnitude 14 or fainter. For stars peaking at magnitude 10–12, a less deep patrol series covering a wider angle (20 degree field) reaches back to the 1890s. In addition, there is a “modern” patrol series, reaching to magnitude 14–15, and dating from the 1960s through 1989.

The “series” plates are the next to tackle. Because these are filed by plate number (date), they are accessed via card catalogues that are sorted by position on the sky. From this group, one can usually find from a few dozen to several hundred plates reaching photographic magnitude 15 or better (the deepest go to about 17.5–18), and dating from the 1890s to 1950s.

For V725 Aql, looking at more than two hundred patrol plates revealed two historical outbursts, one on 27 Aug 1935 (JD 2428042), and the second on 18 Jul 1950 (2433481), the outburst reported by Rohlfs (1949). Searching 47 reasonably deep series plates produced three more observations of maxima—8 Aug 1936 (2428389), 14 Dec 1943 (2431043), and 22 Jul 1949 (2433120). The latter image is about 1 magnitude fainter than the four others. Possible outbursts, near or at plate limit, were seen on 8 Aug 1932 (2426928), 26 Aug 1933 (2427311), 31 Jul 1940 (2429842), and 17 Sep 1946 (2432081).

The images of these outbursts indicate that the star labeled as V725 Aql by Vogt and Bateson (1982) is some 10–15 arcsec north of the true position of the variable. The position observed on the Harvard plates coincides with that observed by the Japanese variable star team, and thus their observations are undoubtedly of the real V725 Aql.

4. Other stars

Stars for possible historical searches appear every week on the Internet electronic communications network vsnet in Japan. Among ones that have seemed of interest are AL Com, GW Lib, V592 Her, etc. The list seems to grow faster than the time available to search!

References

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