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# Near-infrared observations of nova Aquilae 1995

U.S. Kamath, N.M. Ashok and T. Chandrasekhar

*Astronomy and Astrophysics Division, Physical Research Laboratory, Ahmedabad 380 009, India*

**Abstract.** JHK photometry of the slow, Fe-II type nova- Nova Aquilae 1995 - obtained at the 1.2m Gurushikhar Infrared Telescope (GIRT) is presented here. Evidence for the presence of dust in the nova ejecta based on these observations is discussed.

## 1. Introduction

Nova Aquliae 1995 was discovered by K. Takamizawa (Nakano 1995) at a photographic magnitude of 8.1 on one of his discovery exposures dated Feb. 7.839 UT. The nova is located at $\alpha$ (2000.0) $19^h\ 05^m\ 27.0^3$ and $\delta$ (2000.0) –01° 42' 20". Subsequent spectroscopic reports (Wagner *et al* 1995; Ohshima *et al.* 1995; Ijima *et al.* 1995) revealed that the object was a slow Fe-II class nova in its post-maximum phase of development. We have taken Feb. 8, 1995 as day zero.

## 2. Observations

Nova Aquilae 1995 was monitored in its early decline phase at near-IR wavelengths with the 1.2 metre GIRT (Gurushikhar Infra Red Telescope) using a $LN_2$-cooled InSb photovoltaic detector. We have obtained JHK photometry for the nova using $\lambda$ Aquilae, wihich is located close to the nova, as the primary standard star. We present here observations for a total of 7 nights covering about 30 days after the outburst of the nova. Typical errors are ± 0.05 mag in all the bands.

## 3. Discussion

The observed fluxes in the J and H bands fall off approximately as $t^{-1}$ whereas the K band flux is seen to fall off slowly as $t^{-1/2}$ (See figure 1). A $t^{-1/2}$ decline rate has been noted in the K band data of PW Vul. Such decline rates imply continued mass-loss, clumpy ejecta or the presence of dust or strong emission lines. The observed colour indices, shown in figure 2b, are very red, becoming redder with time, and are strongly indicative of the presence of dust in the system. Similar IR colours were seen in the case of V 1668 Cyg, which formed an optically

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thin dust shell. Mason *et al.* (1995) reported the nova to have entered the dust phase on the basis of their IR observation on Mar. 23.6. They derived a dust temperature in the range 1000 to 1200 K from JKHLMN photometry. There are no other reported IR observations of the nova. There is no strong indication of the dust formation process such as a dip in the visual light curve or a rapid increase in the IR flux. However, our data indicate that the nova ejecta have some quantity of dust at an even early stage. The near-IR fluxes seem to be contaminated by dust emission right from the beginning of our observations as is evident from the observed colours. Such an effect has been seen earlier in the case of nova FH Ser. The grains must have formed early and therefore at a high temperature, as was the case with V838 Her, or the outburst must have occurred much earlier. The absence of a dip in the visual lightcurve of the nova implies that the dust is optically thin or that the dust is not formed in the line-of-sight.

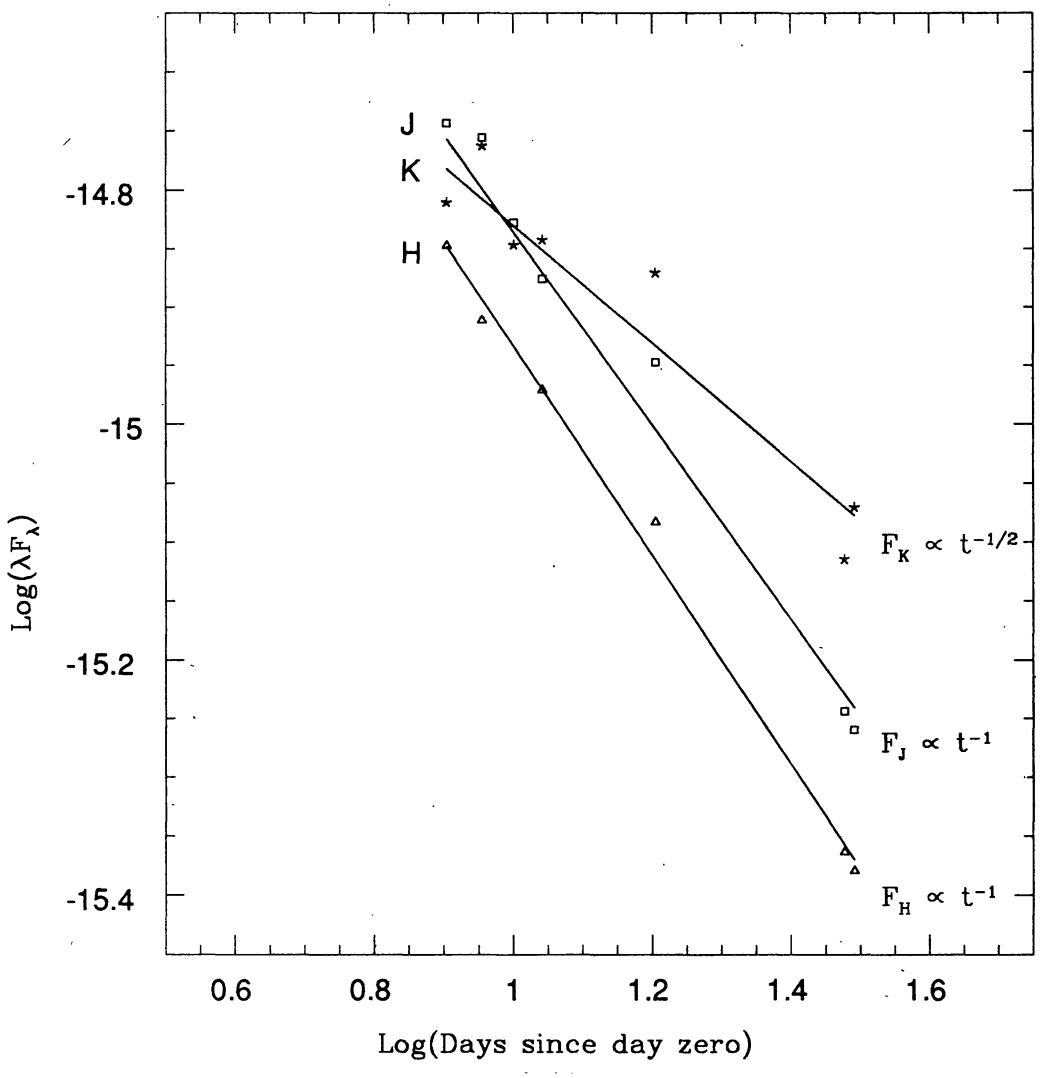


**Fig. 1.** Observed fluxes in the J, H, K filter bands. Power laws of $F_\lambda \sim t^{-1}$ and $\sim t^{-1/2}$ are superimposed on the data points. Feb. 8, 1995 is taken as day zero. Fl is in units of W / cm$^2$ / m.

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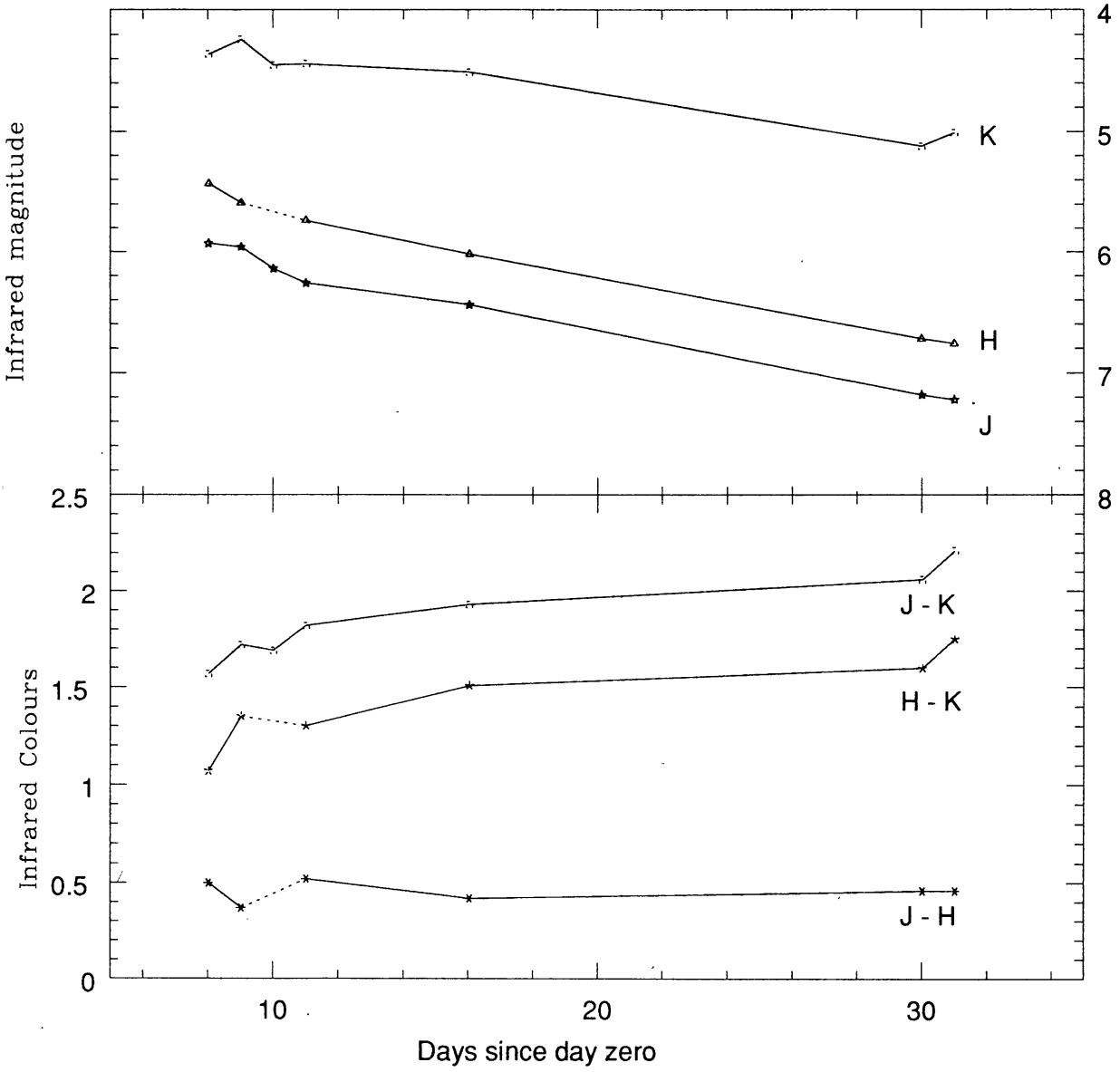


**Fig. 2a.** (Upper) Infrared magnitudes as a function of time.
**Fig. 2b.** (Lower) Observed colour indices. Note the gradual reddening of the colours with time.

## 4. Conclusions

Our observations are among the earliest for this nova. Our data strongly indicates the presence of dust in the system at an early stage. However, we cannot comment on when the dust was exactly formed. The presence of dust in the ejecta of this slow nova may be unique in this respect.

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