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Investigating the past history of EXors: the cases of V1118 Ori, V1143 Ori, and NY Ori

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ABSTRACT

Context. EXor objects are young variables that show episodic variations of brightness commonly associated to enhanced accretion outbursts.
Aims. With the aim of investigating the long-term photometric behaviour of a few EXor sources, we present here data from the archival plates of the Asiago Observatory, showing the Orion field where the three EXors V1118, V1143, and NY are located.
Methods. A total of 484 plates were investigated, providing a total of more than 1000 magnitudes for the three stars, which cover a period of about 35 yrs between 1959 to 1993. We then compared our data with literature data.
Results. Apart from a newly discovered flare-up of V1118, we identify the same outbursts already known, but we provide two added values: (*i*) a long-term sampling of the quiescence phase; and (*ii*) repeated multi-colour observations (BVRI bands). The former allows us to give a reliable characterisation of the quiescence, which represents a unique reference for studies that will analyze future outbursts and the physical changes induced by these events. The latter is useful for confirming whether the intermittent increases of brightness are accretion-driven (as in the case of V1118), or extinction-driven (as in the case of V1143). Accordingly, doubts arise about the V1143 classification as a pure EXor object. Finally, although our plates do not separate NY Ori and the star very close to it, they indicate that this EXor did not undergo any major outbursts during our 40 yrs of monitoring.

Key words. Stars: pre-main sequence – Stars: variables – Astronomical Data Bases: catalogues – Stars: individual: NY Ori – Stars: individual: V1118 Ori – Stars: individual: V1143 Ori

1. Introduction

Among the low-mass protostars, the EXor-type objects (hereafter EXor - Herbig 1989) are considered a peculiar sub-class of the classical T Tauri stars (CTTS). These sources undergo episodic outbursts of brightness (typically of three to five magnitudes at optical wavelengths) caused by sudden variations of the mass accretion rate that obeys the magnetospheric accretion rules (Shu et al. 1994). At the moment, the known EXors are only few tens (Audard et al. 2014) usually discovered by chance. Indeed, all the long term photometric surveys carried out so far on CTTS samples confirm that they present, on average, small amplitude variations (typically $\lesssim$1 mag). These results tend to support a certain peculiarity of the EXors, but to what extent their accretion events are unfrequent manifestations of a common phenomenology (Lorenzetti et al 2012) is not firmly ascertained.

EXors present short outburst (months–one year) with a recurrence time of years, associated with accretion rates of the order of 10^{-6}-10^{-7} $M_\odot$ yr^{-1}, and characterised by emission-line spectra (e.g. Herbig 2008; Lorenzetti et al. 2009; Kóspál et al. 2011; Sicilia-Aguilar et al. 2012; Antoniucci et al. 2013, Antoniucci et al. 2014). Such features, and in particular the burst cadence, make EXors the ideal candidates for a long-term monitoring, which should be effective in comparing the properties of several subsequent events and evidence their similarities or differences. Following this observational approach, compelling constraints can be provided for the models currently available. Indeed, the EXors phenomenology has been so far interpreted by borrowing the theoretical approaches developed to study the FUor events (Hartmann & Kenyon 1985), but a detailed model of the disk structure and its evolution does not exist yet for EXors stars. D'Angelo & Spruit (2010) provided quantitative predictions for the episodic accretion of piled-up material at the inner edge of the disk that, however, are largely incompatible with the observations. Hence, the mechanism responsible for the onset of EXor accretion outbursts remains unknown to date. Two proposed scenarios involve essentially either disk instabilities (gravitational - e.g. Adams & Lin 1993, or thermal - e.g. Bell & Lin 1994) or perturbation by an external body (a close encounter in a binary system - e.g. Bonnell & Bastien 1992, or presence of a massive planet - e.g. Lodato & Clarke 2004).

The young star V1118 Ori, one of the classical EXor objects, represents a very suitable target for such a kind of long term monitoring. During its recent history V1118 Ori underwent six documented outbursts, each lasting a couple of years (1982-84, 1988-90, 1992-94, 1997-98, 2004-06, 2015-on going). Account for the first five events is given in Parsamian et al. (1993), García García & Parsamian (2000), Herbig (2008) and references therein, Audard et al. (2005, 2010), and Lorenzetti et al. (2006, 2007). The properties shown during the long quiescence period before the last eruption, firstly detected around Sept. 2015, are

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described in Lorenzetti et al. (2015), Giannini et al. (2016), and Giannini et al. (in preparation). In this latter paper, a comparison of all the recent outbursts is presented, with the aim of investigating if any periodicity is recognizable among the recurrent events. However, so far only a couple of outbursts have been sampled at an accuracy level that allows us to have some indication on this aspect. A firm ascertainment of the existence of a periodicity could speak in favour of a disk instability generated by an external body as the most likely mechanism for the mass accretion variations. To this end, we have investigated the optical plates collected by the Asiago (Italy) Schmidt telescopes during a timespan of about 40 years (1958-1998), which are able to provide the most accurate long-term light curve of V1118 Ori available before the advent of both CCD and near-IR arrays.

Beside V1118 Ori, two other EXors, namely V1143 Ori and NY Ori, are also located in the Orion Nebula Cluster (ONC), thus appearing in the same archival plates of the Asiago observatory. By analysing these large number of plates we have therefore the great advantage of investigating the past history of two additional systems with the same method and accuracy. V1143 is a very active variable (see Herbig 2008, and references therein) and presents ranges of photometric fluctuations of ∼19-14.3 mag and 16.7-13.5 mag in B/pg and V/vs bands, respectively. NY Ori (= Parenago 2119) is a young star located 5.5 arcsec SE of the much optically brighter source V566 Ori (= Parenago 2118). Its photometric history and variability is documented (Herbig 2008) by a series of plates collected during short periods (1905-19; 1948-49; 1973) with very sparse and occasional sampling, which provide a range of variability in the visual band between 13.3 and 16 mag. A previous plate analysis of V1118 Ori and V1143 Ori was presented by Paul et al. (1995), but the extremely low number of resulting photometric data points (less than ten in 40 years), hampers a proper time coverage.

In any case, the relevance of the plates analysis for studying the eruptive variables is irrefutable, as recently demonstrated for the EXor GM Cep (Xiao et al. 2010) and the FUor V960 Mon (Jurdana-Šepić & Munari, 2016). Noticeably, the chance of studying the historical light curves of EXors located in the Orion nebula is offered uniquely by the Asiago plates. Indeed, other remarkable archives (e.g. Harvard and Sonneberg) present some difficulties in this respect: firstly, they are not as much deep to investigate the quiescence phase; secondly, they cover almost exclusively the B or blue-unfiltered bands; thirdly, they have been obtained with short focal length astrographs that typically squeeze the plate scale making indistinguishable the stars inside the nebula. To our best knowledge, plate-based monitoring of other EXors as faint as V1118 Ori is not available in literature. The features mentioned above suggest that the Asiago archive might be a reference source for investigating the past history of both recently discovered EXors and those that will be discovered in the next future.

The present paper is organized as follows: the adopted method and the obtained BVRI photometry are presented in Sections 2 and 3. Section 4 gives the analysis and discussion of the obtained results, while our concluding remarks are given in Sect. 5.

2. Data acquisition

2.1. Archive plates

Two Schmidt telescopes are operated at the Asiago observatory. The smaller one (SP: 40/50 cm, 100 cm focal length) collected 20,417 plates between 1958 to 1992 (covering a circular area 5° in diameter), and the larger one (SG: 67/92 cm, 208 cm focal length) 18,811 plates from 1965 to 1998 (imaging a 5°×5° portion of the sky). The Asiago Schmidt plate collection thus span 40 years, covering in particular the *Menzel Gap* during which acquisition of photographic plates was temporarily halted at Harvard Observatory. Since the 1990s, large format CCD cameras have replaced photographic plates as detectors, with the plates preserved in controlled conditions.

The Asiago Schmidt plates have not been exposed over the whole sky but instead on selected targets (in particular star forming regions, clusters of galaxies, galaxies of the Local Group), for which therefore exist a long record of observations. The Orion nebula - around which our targets are located - has been a favoured hit. Nearly all plates from both telescopes go very deep, B∼18.5 and B∼17.8 mag being the typical limiting magnitude for blue sensitive plates exposed with the SG and SP telescope, respectively.

The majority of the plates were exposed as 103a-O + GG13, 103a-E + RG1 and IN + RG5 combinations of Kodak plates and Schott astronomical filters, matching the prescription for the Johnson-Cousins B, R_C and I_C photometric bands (Moro& Munari 2000), respectively. A large number of plates were exposed as unfiltered 103a-O, thus covering both the Johnson B and U bands thanks to the high ultraviolet transparency of the UBK-7 corrector plates at both Schmidt telescopes. For low temperature and/or reddened objects, especially if they were observed at large airmass, the amount of proper U-band photons collected by an unfiltered 103a-O plate is however minimal compared to those arriving through the B-band portion of the interval of sensitivity of 103a-O emulsion. In such conditions (and provided that the selected comparison stars are themselves of low temperature and/or high reddening), 103a-O + GG13 pairs and unfiltered 103a-O plates are almost equally well replicating the standard Johnson B band (Munari & Dallaporta 2014).

The plates in the proper Johnson V band obtained as 103 a-D + GG14 combination, are low in number, and equally infrequent are unfiltered panchromatic plates as 103 a-G, 103a-D, Tri-X and Pan-Roy. In the present paper, these unfiltered panchromatic plates have been treated as V-band plates (even if they lack the coupling to a high-pass filter such as GG11 or GG14) because of the low temperature and reddening of our targets and generally the high airmass (∼1.8) of the corresponding observations which prevent $U-$ and $B-$band photons to be collected in any significant number by unfiltered panchromatic plates.

2.2. Brightness measurement

To derive the brightness of our targets, we compared them at a high quality Zeiss microscope against a local photometric sequence established around each target. Such a sequence, composed of stars of roughly the same colour as the variable and widely distributed in magnitude so to cover both quiescence and outburst states, was extracted primarily from the APASS $BVg'r'i'$ all-sky survey (Henden et al. 2012, Henden & Munari 2014), with porting to Landolt R_C and I_C bands following Munari (2012) and Munari et al. (2014) prescriptions. To evaluate the measurement errors a number of plates were re-measured after several days when all memories had vanished from the observer, and independently by different observers. The typical error is 0.1 mag, comparable to that intrinsic to the photographic plate itself so that the observer adds little to it. When a larger error is reported, that is usually associated to presence of a fogged background, a trailed guiding, or poor seeing.

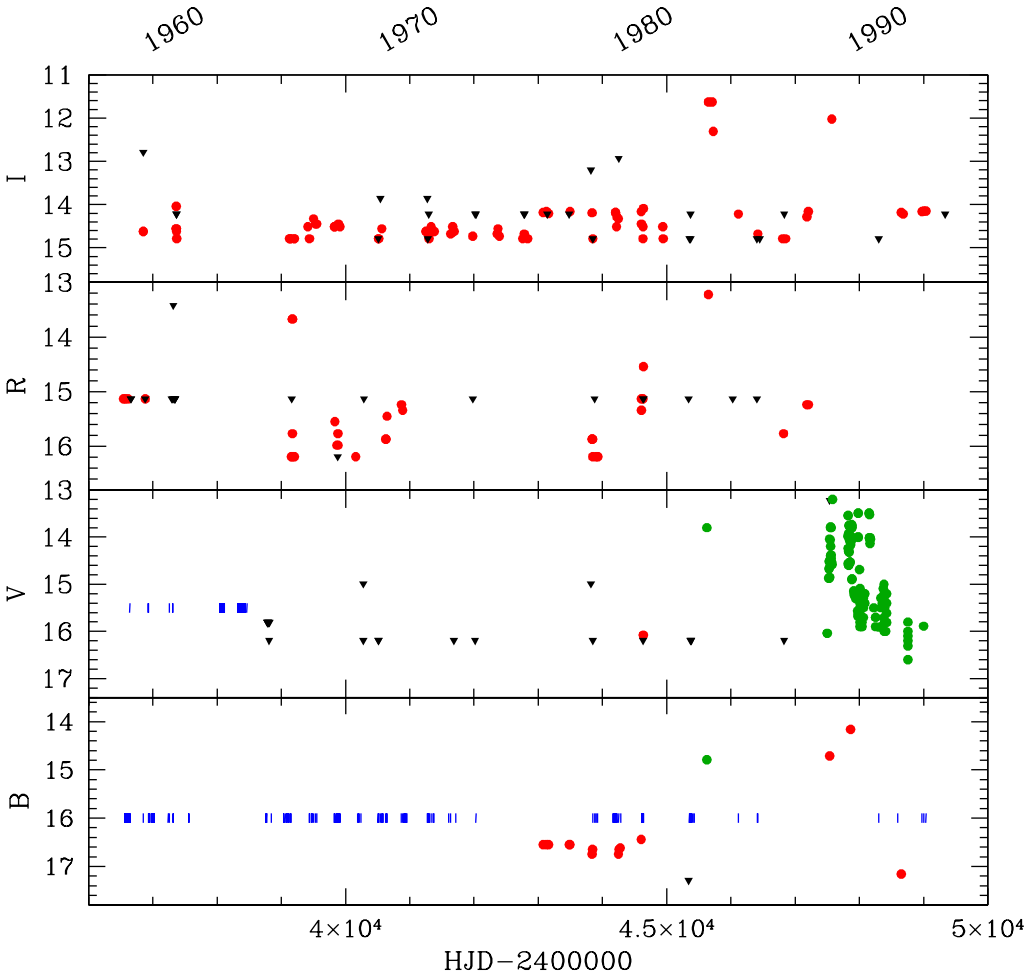

Fig. 1. *BVRI* light curves of V1118 Ori. Upper limits are given as solid black triangles. In the two bottom panels (*B* and *V*), blue vertical bars indicate the dates when the nebular background around V1118 Ori was too bright (see text Sect. 2.2). Green points refer to literature measurements reported by Parsamian et al. (1993) and García García & Parsamian (2000).

A total of 484 plates imaging the Orion nebula were retrieved from the Asiago Schmidt plate archive. After inspection, 44 of them were rejected for various reasons (too short exposures, unsuitable emulsion or filter combinations, damages during development or storing, etc.), leaving a total of 440 plates ready for measurement, spanning the time interval from Dec 7, 1958 to Dec 12, 1993. The results are given in Table 1 where the columns provide date/UT/HJD of observation, photographic emulsions and filters, plate number and telescope, the estimated magnitude or plate limit, and the corresponding errors. When the variable is too faint to be detected, the limiting magnitude is listed as that of the faintest of the stars in the comparison sequence which is clearly visible.

The faint variables V1118 Ori and V1143 Ori are superimposed to the Orion nebula, which greatly disturbs their detection and measurement. All emission from the nebula come from few extremely intense emission lines, mainly [OIII] 4959, 5007 Å and the [NII]+Hα complex. A minimal variance in the transmission of the emulsion+filter combination at these wavelengths causes large changes in the brightness background. For this reason, in a significant number of plates the nebular background around V1118 Ori is so bright that it is impossible to estimate the brightness in quiescence of such a faint variable star. For these plates (identified in Table 1 and whose date of observation is depicted in Figure 1) it was only possible to exclude that the target was at that time going through a bright outburst. NY Ori is a member of a close optical pair with brighter 2MASS J05353579-0512205 (=V566 Ori) at 5 arcsec distance. On the Palomar Schmidt plates they can be percept as a heavily blended pair, with the two stars not measurable separately, while at the shorter focal length of the Asiago Schmidt telescopes the pair is merged into the image of a unresolved single star. Therefore the measurements of NY Ori reported in Table 1 refer to the combined pair of stars.

3. Historical light curves

The *BVRI* light curves of V1118, V1143, and NY Ori corresponding to their plate photometry given in Table 1, are given in Figures 1, 2, and 3, respectively. In Table 2 some statistics are provided for the three sources in each band, namely the number of observations, the median value, (basically the quiescence magnitude), together with the standard deviation of the data points, and the peak brightness. Notably, we provide one of the best sampled data set ever obtained of the quiescent phase of the investigated sources. Indeed, albeit observations are concen-

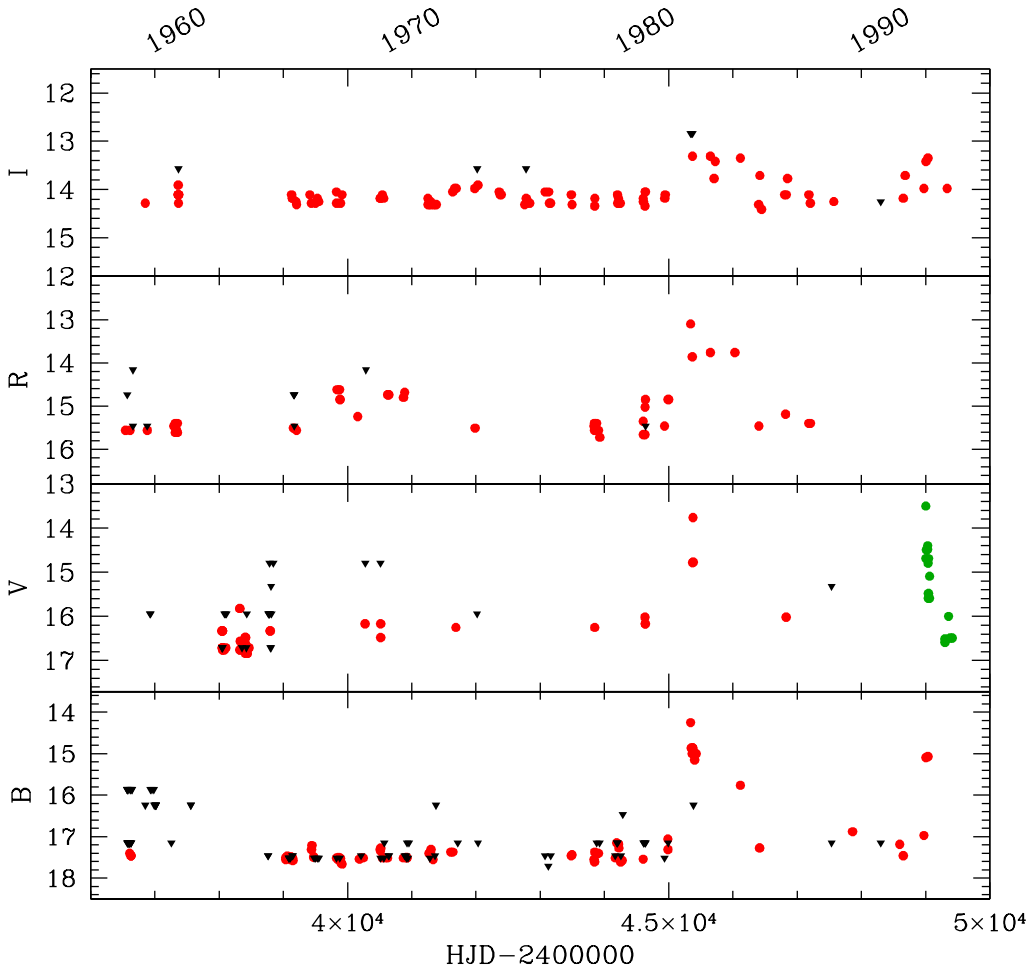

Fig. 2. *BVRI* light curves of V1143 Ori. Upper limits are given as solid black triangles. Green points are measurements taken from by Mampaso & Parsamian (1995).

trated within the seasonal periods of observability, their number is significantly high (between 50 and 100) in many cases, allowing us to infer meaningful averaged values for the quiescence level. Determining this level is fundamental to have a solid reference for future observations that will analyse new outbursts and investigate the physical changes induced on the system by these enhanced accretion events. Finally, we note how these sources (especially V1118 and V1143) present, in quiescence, a level of modest variability. This may be quantified by considering the standard deviation of the measurements (0.2-0.4 mag), which is comparable with that of the classical T Tauri (CTTS).

4. Analysis and discussion

4.1. V1118 Ori

Examining its light curve in *R* and *I* bands, depicted in Figure 1, three major ($\Delta m \gtrsim 2$ mag) flare-up events are recognizable: a first one in 1966 February (R band), a second one in 1983 November (*R*, *I* bands), and a third one in 1989 February (*B*, *R*, and *I* bands). This first event is mentioned here for the first time; however, as indicated in Table 1 (HJD 2439172), it was a sudden flaring more than an EXor typical outburst, since the *R* band brightness increased by 2.5 mag in 40 minutes, representing a very fast onset of a flare lasting less than one months (see *I* band values in the same Table). Similar episodes, usually associated with very active chromospheres and hence detected at higher energies, are not commonly observed in either this source or other EXors, but, unfortunately, this episode has been sampled only in the *R* band, thus preventing any colour analysis (see below).

However, it apparently marks the beginning of a long quiescence period from 1966 to 1981, as testified by the subsequent monitoring in the *I* band, whose temporal coverage suggests the absence of potential outbursts lasting more than 1 yr. Two observational gaps, slightly longer than 1 yr, indeed exist in 1973-74 and 1975-76 (see Table 1), so we cannot exclude that an outburst might have occurred during one or both these observational gaps. Remarkably, this quiescence period (about 15 yrs) would be the longest known so far (Lorenzetti et al. 2015), thus its relevance is twofold: firstly, it poses a compelling constraint on the existence of a recurrent interval between two bursts; secondly, it allows us to define a reliable quiescent value of $I = 14.6$ mag (see Table 2). The second and third events are already mentioned in the literature by Parsamian et al. (1993), García García & Parsamian (2000), who gave only the B and V magnitudes: our photometry is in agreement with their values, but provides, for the first time, the *R* and *I* magnitudes, as well. In particular for the third

Table 1. *BVRI* plate photometry of NY, V1143, V1118 in Orion. Columns provide: date and central UT of any exposure, plate emulsion, the adopted filter, the telescope, the plate number, and the magnitude derived for the three sources with the estimated error (see text for further details). For V1118 Ori, the asterisks indicate plates for which it was only possible to rule out that the source was going through a bright outburst.

							NY Ori		V1143 Ori		V1118 Ori	
HJD	date	UT	emulsion	filter	tel	plate	mag	error	mag	error	mag	error
2436545.43698	1958-12-07	22:22	103 a-E	RG 1	SP	59	$R = 10.12$	0.10	$R = 15.56$	0.10	$R = 15.13$	0.20
2436567.31360	1958-12-29	19:25	103 a-O	...	SP	66	$B = 10.97$	0.10	$B > 15.86$	0.10	*	
2436570.29404	1959-01-01	18:57	103 a-O	...	SP	70	$B = 10.83$	0.10	$B > 15.86$	0.10	*	
2436570.36626	1959-01-01	20:41	103 a-E	RG 1	SP	73	$R = 10.12$	0.10	$R > 14.74$	0.10	$R = 15.13$	0.20
2436572.31340	1959-01-03	19:25	103 a-O	...	SP	78	$B = 10.90$	0.10	$B > 15.86$	0.10	*	
2436573.34808	1959-01-04	20:15	103 a-O	...	SP	81	$B = 10.90$	0.10	$B > 17.15$	0.10	*	
2436578.30825	1959-01-09	19:18	103 a-O	...	SP	92	$B = 10.90$	0.10	$B > 17.15$	0.10	*	
2436579.32278	1959-01-10	19:39	103 a-O	...	SP	99	$B = 10.90$	0.10	$B > 17.15$	0.10	*	
2436581.30115	1959-01-12	19:08	103 a-O	...	SP	113	$B = 10.90$	0.10	$B > 17.15$	0.10	*	
2436582.38858	1959-01-13	21:14	103 a-O	...	SP	127	$B = 10.90$	0.10	$B > 17.15$	0.10	*	
2436585.40993	1959-01-16	21:45	103 a-O	...	SP	133	$B = 10.90$	0.10	$B > 15.86$	0.10	*	
2436586.45987	1959-01-17	22:57	103 a-O	...	SP	142	$B = 10.90$	0.10	$B > 17.15$	0.10	*	
2436595.25789	1959-01-26	18:07	103 a-O	...	SP	146	$B = 10.90$	0.10	$B > 17.15$	0.10	*	
2436596.30574	1959-01-27	19:16	103 a-O	...	SP	151	$B = 10.97$	0.10	$B > 17.15$	0.10	*	
2436597.33691	1959-01-28	20:01	103 a-O	...	SP	156	$B = 10.97$	0.10	$B > 17.15$	0.10	*	
2436598.29448	1959-01-29	19:00	103 a-O	...	SP	159			$B > 17.15$	0.10	*	
2436599.29232	1959-01-30	18:57	103 a-O	...	SP	166	$B = 11.01$	0.10	$B > 17.15$	0.10	*	
2436600.29919	1959-01-31	19:07	103 a-O	...	SP	174	$B = 10.90$	0.10			*	
2436608.33120	1959-02-08	19:54	103 a-O	...	SP	205	$B = 11.05$	0.10	$B = 17.40$	0.10	*	
2436608.37217	1959-02-08	20:53	103 a-O	...	SP	207	$B = 10.90$	0.10	$B > 17.15$	0.10	*	
2436609.32834	1959-02-09	19:50	103 a-O	...	SP	212	$B = 11.01$	0.10	$B > 17.15$	0.10	*	
2436610.30326	1959-02-10	19:14	103 a-O	...	SP	219	$B = 11.01$	0.10	$B > 17.15$	0.10	*	
2436611.31498	1959-02-11	19:31	103 a-O	...	SP	226	$B = 11.10$	0.10	$B > 17.15$	0.10	*	
2436613.36620	1959-02-13	20:45	103 a-O	...	SP	240	$B = 10.90$	0.10	$B > 15.86$	0.10	*	
2436614.37653	1959-02-14	21:00	103 a-E	RG 1	SP	244	$R = 10.12$	0.10	$R = 15.56$	0.10	$R = 15.13$	0.20
2436625.28184	1959-02-25	18:45	103 a-O	...	SP	248	$B = 10.90$	0.10	$B > 15.86$	0.10	*	
2436626.28383	1959-02-26	18:48	103 a-O	...	SP	251	$B = 11.01$	0.10	$B > 17.15$	0.10	*	
2436627.27888	1959-02-27	18:41	103 a-O	...	SP	257	$B = 10.97$	0.10	$B > 17.15$	0.10	*	
2436628.27810	1959-02-28	18:40	103 a-O	...	SP	264	$B = 10.97$	0.10	$B > 17.15$	0.10	*	
2436628.31421	1959-02-28	19:32	103 a-O	...	SP	266	$B = 11.01$	0.10	$B = 17.46$	0.10	*	
2436629.27662	1959-03-01	18:38	103 a-O	...	SP	271	$B = 10.97$	0.10	$B = 17.46$	0.10	*	
2436630.27098	1959-03-02	18:30	103 a-O	...	SP	278	$B = 10.90$	0.10	$B = 17.46$	0.10	*	
2436641.31236	1959-03-13	19:31	103 a-D	...	SP	284	$B = 10.90$	0.10	$B > 15.86$	0.10	*	
2436642.32061	1959-03-14	19:43	103 a-O	...	SP	287	$B = 10.90$	0.10	$B > 15.86$	0.10	*	
2436642.35811	1959-03-14	20:37	103 a-O	...	SP	289	$B = 10.83$	0.10			*	
2436660.30383	1959-04-01	19:21	103 a-E	RG 1	SP	293	$R = 9.89$	0.10	$R > 15.46$	0.10	$R > 15.13$	0.10
2436661.28431	1959-04-02	18:53	103 a-E	RG 1	SP	297	$R = 10.12$	0.10	$R > 14.16$	0.10	$R > 15.13$	0.10
2436851.52152	1959-10-10	00:27	103 a-O	...	SP	532	$B = 10.83$	0.10	$B > 16.24$	0.10	*	
2436851.54861	1959-10-10	01:06	IN Sen	RG 5	SP	533	$I = 9.56$	0.10	$I = 14.28$	0.10	$I = 14.62$	0.10
2436853.52722	1959-10-12	00:35	103 a-O	...	SP	538	$B = 10.83$	0.10				
2436853.54320	1959-10-12	00:58	IN Sen	RG 5	SP	539	$I = 9.56$	0.10			$I > 12.79$	0.10
2436881.67812	1959-11-09	04:10	103 a-E	RG 1	SP	591	$R = 10.12$	0.10	$R > 15.46$	0.10	$R > 15.13$	0.10
2436882.58857	1959-11-10	02:01	103 a-E	RG 1	SP	594	$R = 10.12$	0.10	$R = 15.56$	0.10	$R = 15.13$	0.20
2436925.35133	1959-12-22	20:19	103 a-G	...	SP	633	$V = 10.45$	0.10	$V > 15.94$	0.10	*	
2436931.38656	1959-12-28	21:10	103 a-G	...	SP	644	$V = 10.45$	0.10	$V > 15.94$	0.10	*	
2436933.36219	1959-12-30	20:35	103 a-O	...	SP	652	$B = 10.90$	0.10	$B > 15.86$	0.10	*	
2436937.39119	1960-01-03	21:17	103 a-O	...	SP	667	$B = 10.69$	0.10			*	
2436938.42031	1960-01-04	21:59	103 a-O	...	SP	671	$B = 10.83$	0.10			*	
2436940.49521	1960-01-06	23:47	103 a-O	...	SP	678	$B = 10.83$	0.10			*	
2436950.29954	1960-01-16	19:06	103 a-O	...	SP	686	$B = 10.83$	0.10			*	
2436954.39442	1960-01-20	21:23	103 a-O	...	SP	699	$B = 10.83$	0.10	$B > 15.86$	0.10	*	
2436981.25278	1960-02-16	18:02	103 a-O	...	SP	734	$B = 10.83$	0.10	$B > 15.86$	0.10	*	
2436993.27812	1960-02-28	18:40	103 a-O	...	SP	761	$B = 10.83$	0.10			*	
2436993.30590	1960-02-28	19:20	103 a-O	...	SP	763	$B = 10.83$	0.10	$B > 16.24$	0.10	*	
2437012.29520	1960-03-18	19:07	103 a-O	...	SP	782	$B = 10.83$	0.10	$B > 16.24$	0.10	*	
2437013.30136	1960-03-19	19:16	103 a-O	...	SP	784	$B = 10.83$	0.10	$B > 16.24$	0.10	*	
2437013.31595	1960-03-19	19:37	103 a-O	...	SP	785	$B = 10.83$	0.10	$B > 16.24$	0.10	*	
2437017.29200	1960-03-23	19:03	103 a-O	...	SP	800	$B = 10.83$	0.10	$B > 16.24$	0.10	*	
2437238.65414	1960-10-31	03:36	103 a-O	Liq	SP	1138	$B = 10.76$	0.20			*	
2437255.49507	1960-11-16	23:46	103 a-O	Liq	SP	1170	$B = 10.76$	0.20				
2437256.57358	1960-11-18	01:39	103 a-G	Liq	SP	1181	$V = 10.35$	0.20			*	
2437259.56531	1960-11-21	01:27	103 a-O	...	SP	1198	$B = 11.05$	0.10	$B > 17.15$	0.10	*	
2437293.39153	1960-12-24	21:17	103 a-E	RG 1	SP	1235	$R = 10.12$	0.10	$R = 15.46$	0.10	$R > 15.13$	0.10
2437307.37846	1961-01-07	20:59	103 a-E	RG 1	SP	1263	$R = 10.12$	0.10	$R = 15.46$	0.10	$R > 15.13$	0.10
2437309.34017	1961-01-09	20:04	103 a-G	Liq	SP	1268	$V = 10.45$	0.20			*	
2437309.35544	1961-01-09	20:26	103 a-G	Liq	SP	1269	$V = 10.42$	0.20			*	
2437316.30227	1961-01-16	19:10	103 a-O	Liq	SP	1284	$B = 10.76$	0.20				
2437316.35088	1961-01-16	20:20	103 a-O	Liq	SP	1285	$B = 10.69$	0.20				
2437317.41748	1961-01-17	21:56	103 a-E	RG 1	SP	1297	$R = 10.14$	0.10	$R = 15.40$	0.10	$R > 15.13$	0.10

Table 1. Continued.

							NY Ori		V1143 Ori		V1118 Ori	
HJD	date	UT	emulsion	filter	tel	plate	mag	error	mag	error	mag	error
2437319.31944	1961-01-19	19:35	103 a-O	Liq	SP	1316	B = 10.69	0.20			*	
2437319.39444	1961-01-19	21:23	103 a-O	Liq	SP	1318	B = 10.69	0.20			*	
2437319.44582	1961-01-19	22:37	103 a-E	RG 1	SP	1319	R = 10.15	0.10	R = 15.61	0.10	R >13.42	0.20
2437336.32237	1961-02-05	19:41	103 a-E	RG 1	SP	1354	R = 10.15	0.10	R = 15.56	0.10	R >15.13	0.10
2437339.32144	1961-02-08	19:40	103 a-E	RG 1	SP	1372	R = 10.15	0.10	R = 15.56	0.10	R >15.13	0.10
2437342.30452	1961-02-11	19:16	103 a-E	RG 1	SP	1397	R = 10.15	0.10	R = 15.61	0.10	R >15.13	0.10
2437347.29230	1961-02-16	18:59	103 a-E	RG 1	SP	1445	R = 10.15	0.10	R = 15.61	0.10	R >15.13	0.10
2437349.28240	1961-02-18	18:45	103 a-E	RG 1	SP	1466	R = 10.15	0.10	R = 15.40	0.10	R >15.13	0.10
2437363.27909	1961-03-04	18:42	IN Sen	RG 5	SP	1505	I = 9.74	0.10	I = 13.91	0.10	I = 14.56	0.10
2437364.31650	1961-03-05	19:36	IN Sen	RG 5	SP	1507	I = 9.74	0.10	I = 14.11	0.10	I = 14.56	0.10
2437365.27544	1961-03-06	18:37	IN Sen	RG 5	SP	1511	I = 9.74	0.10	I = 14.11	0.10	I = 14.04	0.10
2437366.29063	1961-03-07	18:59	IN Sen	RG 5	SP	1516	I = 9.56	0.10	I = 14.11	0.10	I >14.22	0.10
2437367.27943	1961-03-08	18:43	IN Sen	RG 5	SP	1522	I = 9.56	0.10	I = 14.28	0.10	I = 14.62	0.10
2437369.27925	1961-03-10	18:43	IN Sen	RG 5	SP	1538	I = 9.74	0.10	I >13.57	0.10	I >14.22	0.10
2437371.27838	1961-03-12	18:42	IN Sen	RG 5	SP	1558	I = 9.74	0.10	I = 14.11	0.10	I = 14.79	0.10
2437561.58239	1961-09-19	01:57	103 a-O	...	SP	2090	B = 10.76	0.10	B >16.24	0.10	*	
2437563.61242	1961-09-21	02:40	103 a-O	...	SP	2108	B = 10.76	0.10	B >16.24	0.10	*	
2438015.36744	1962-12-16	20:42	103 a-O	Liq	SP	3455	B = 10.76	0.20				
2438044.29200	1963-01-14	18:55	PAN.ROY	...	SP	3566	V = 10.38	0.10	V = 16.33	0.10	*	
2438045.29333	1963-01-15	18:57	PAN.ROY	...	SP	3575	V = 10.49	0.10	V >16.71	0.10	*	
2438046.30369	1963-01-16	19:12	PAN.ROY	...	SP	3586	V = 10.42	0.10			*	
2438049.38961	1963-01-19	21:16	PAN.ROY	...	SP	3593	V = 10.52	0.10	V = 16.33	0.10	*	
2438049.50765	1963-01-20	00:06	PAN.ROY	...	SP	3599	V = 10.45	0.10	V = 16.71	0.10	*	
2438050.30205	1963-01-20	19:10	PAN.ROY	...	SP	3607	V = 10.45	0.10	V = 16.33	0.10	*	
2438050.48120	1963-01-20	23:28	PAN.ROY	...	SP	3613	V = 10.45	0.10	V >16.71	0.10	*	
2438052.29636	1963-01-22	19:02	PAN.ROY	...	SP	3621	V = 10.45	0.10	V = 16.71	0.10	*	
2438054.29206	1963-01-24	18:56	PAN.ROY	...	SP	3649	V = 10.52	0.10	V = 16.76	0.10	*	
2438055.28782	1963-01-25	18:50	PAN.ROY	...	SP	3666	V = 10.52	0.10	V = 16.76	0.10	*	
2438055.46836	1963-01-25	23:10	PAN.ROY	...	SP	3674	V = 10.42	0.10	V = 16.33	0.10	*	
2438057.29254	1963-01-27	18:57	PAN.ROY	...	SP	3696	V = 10.45	0.10	V >16.71	0.10	*	
2438058.27372	1963-01-28	18:30	PAN.ROY	...	SP	3711	V = 10.45	0.10	V = 16.71	0.10	*	
2438058.44454	1963-01-28	22:36	PAN.ROY	...	SP	3717	V = 10.45	0.10				
2438071.25187	1963-02-10	18:00	PAN.ROY	...	SP	3728	V = 10.42	0.10				
2438081.33782	1963-02-20	20:05	PAN.ROY	...	SP	3735	V = 10.52	0.10	V = 16.76	0.10	*	
2438086.27489	1963-02-25	18:35	PAN.ROY	...	SP	3768	V = 10.49	0.10	V >15.94	0.10	*	
2438101.27773	1963-03-12	18:41	PAN.ROY	...	SP	3851	V = 10.45	0.10	V >15.94	0.10	*	
2438106.29813	1963-03-17	19:11	PAN.ROY	...	SP	3861	V = 10.42	0.10	V = 16.71	0.10	*	
2438113.28642	1963-03-24	18:55	PAN.ROY	...	SP	3871	V = 10.42	0.10	V >15.94	0.10	*	
2438321.53951	1963-10-19	00:52	PAN.ROY	...	SP	4155	V = 10.42	0.10	V = 16.76	0.10	*	
2438321.57215	1963-10-19	01:39	PAN.ROY	...	SP	4157	V = 10.42	0.10	V = 15.82	0.10	*	
2438324.57303	1963-10-22	01:40	PAN.ROY	...	SP	4185	V = 10.45	0.10	V = 15.82	0.10	*	
2438328.61703	1963-10-26	02:43	PAN.ROY	...	SP	4208	V = 10.45	0.10	V = 16.76	0.10	*	
2438331.58386	1963-10-29	01:55	PAN.ROY	...	SP	4214	V = 10.52	0.10	V = 16.56	0.10	*	
2438352.59372	1963-11-19	02:08	PAN.ROY	...	SP	4265	V = 10.45	0.10	V = 16.71	0.10	*	
2438357.51883	1963-11-24	00:20	PAN.ROY	...	SP	4290	V = 10.45	0.10	V >16.71	0.10	*	
2438376.40986	1963-12-12	21:43	PAN.ROY	...	SP	4317	V = 10.45	0.10	V = 16.76	0.10	*	
2438376.43902	1963-12-12	22:25	PAN.ROY	...	SP	4319	V = 10.45	0.10	V = 16.76	0.10	*	
2438381.41395	1963-12-17	21:49	PAN.ROY	...	SP	4337	V = 10.45	0.10	V = 16.71	0.10	*	
2438387.46658	1963-12-23	23:05	PAN.ROY	...	SP	4363	V = 10.45	0.10	V = 16.71	0.10	*	
2438398.30508	1964-01-03	19:13	PAN.ROY	...	SP	4380	V = 10.42	0.10	V = 16.71	0.10	*	
2438401.32091	1964-01-06	19:36	PAN.ROY	...	SP	4416	V = 10.49	0.10	V = 16.71	0.10	*	
2438403.32915	1964-01-08	19:48	PAN.ROY	...	SP	4431	V = 10.45	0.10	V = 16.71	0.10	*	
2438404.37493	1964-01-09	20:54	PAN.ROY	...	SP	4453	V = 10.52	0.10	V = 16.48	0.10	*	
2438407.42615	1964-01-12	22:08	PAN.ROY	...	SP	4465	V = 10.52	0.10	V = 16.48	0.10	*	
2438409.41562	1964-01-14	21:53	PAN.ROY	...	SP	4485	V = 10.45	0.10	V = 16.71	0.10	*	
2438412.33489	1964-01-17	19:57	PAN.ROY	...	SP	4491	V = 10.49	0.10	V = 16.71	0.10	*	
2438412.37239	1964-01-17	20:51	PAN.ROY	...	SP	4494	V = 10.52	0.10	V = 16.48	0.10	*	
2438413.34524	1964-01-18	20:12	PAN.ROY	...	SP	4513	V = 10.45	0.10	V = 16.84	0.10	*	
2438415.46941	1964-01-20	23:11	PAN.ROY	...	SP	4540	V = 10.45	0.10	V = 16.63	0.10	*	
2438416.47907	1964-01-21	23:25	PAN.ROY	...	SP	4542	V = 10.52	0.10	V = 16.71	0.10	*	
2438427.28594	1964-02-01	18:48	PAN.ROY	...	SP	4557	V = 10.45	0.10	V >16.71	0.10	*	
2438427.31233	1964-02-01	19:26	PAN.ROY	...	SP	4559	V = 10.45	0.10			*	
2438428.31156	1964-02-02	19:25	PAN.ROY	...	SP	4568	V = 10.45	0.10	V >15.94	0.10	*	
2438430.33223	1964-02-04	19:55	PAN.ROY	...	SP	4579	V = 10.45	0.10	V = 16.84	0.10	*	
2438433.41671	1964-02-07	21:57	PAN.ROY	...	SP	4618	V = 10.49	0.10	V = 16.76	0.10	*	
2438434.33538	1964-02-08	20:00	PAN.ROY	...	SP	4624	V = 10.49	0.10	V = 16.76	0.10	*	
2438436.30814	1964-02-10	19:21	PAN.ROY	...	SP	4636	V = 10.49	0.10	V = 16.76	0.10	*	
2438436.32064	1964-02-10	19:39	PAN.ROY	...	SP	4637	V = 10.45	0.10	V = 16.84	0.10	*	
2438436.34633	1964-02-10	20:16	PAN.ROY	...	SP	4639	V = 10.52	0.10	V = 16.84	0.10	*	
2438464.29182	1964-03-09	19:01	PAN.ROY	...	SP	4691	V = 10.52	0.10	V = 16.71	0.10	*	
2438760.38507	1964-12-30	21:08	103 a-O	...	SP	5143	B = 11.01	0.10	B >17.46	0.10	*	
2438761.31698	1964-12-31	19:30	103 a-O	...	SP	5157	B = 10.90	0.10	B >17.46	0.10	*	
2438767.37851	1965-01-06	20:59	103 a-O	...	SP	5201	V = 10.45	0.10	V >15.94	0.10	*	

Table 1. Continued.

							NY Ori		V1143 Ori		V1118 Ori	
HJD	date	UT	emulsion	filter	tel	plate	mag	error	mag	error	mag	error
2438769.39855	1965-01-08	21:28	103 a-O	...	SP	5207	$V = 10.45$	0.10	$V > 15.94$	0.10	*	
2438771.49705	1965-01-10	23:50	103 a-O	...	SP	5214	$V = 10.45$	0.10			*	
2438782.33389	1965-01-21	19:56	103 a-O	...	SP	5227	$V = 10.45$	0.10	$V > 15.94$	0.10	$V > 15.81$	0.10
2438784.38236	1965-01-23	21:06	103 a-O	...	SP	5235	$V = 10.45$	0.10	$V > 15.94$	0.10	$V > 15.81$	0.10
2438785.40660	1965-01-24	21:41	103 a-O	...	SP	5251	$V = 10.45$	0.10	$V > 15.94$	0.10	$V > 15.81$	0.10
2438786.36000	1965-01-25	20:34	103 a-O	...	SP	5260	$V = 10.45$	0.10	$V > 14.79$	0.10	$V > 15.81$	0.10
2438794.30386	1965-02-02	19:14	PAN.ROY	...	SP	5279	$V = 10.45$	0.10	$V = 16.33$	0.10	$V > 15.81$	0.10
2438797.37445	1965-02-05	20:56	PAN.ROY	...	SP	5308	$V = 10.52$	0.10	$V = 16.33$	0.10	$V > 15.81$	0.10
2438797.38834	1965-02-05	21:16	PAN.ROY	...	SP	5309	$V = 10.45$	0.10	$V > 16.71$	0.10	$V > 15.81$	0.10
2438810.28865	1965-02-18	18:54	PAN.ROY	...	SP	5329	$V = 10.45$	0.10	$V > 16.71$	0.10	$V > 15.81$	0.10
2438811.29412	1965-02-19	19:02	PAN.ROY	...	SP	5335	$V = 10.45$	0.10	$V > 15.32$	0.10	$V > 16.19$	0.10
2438814.30358	1965-02-22	19:16	103 a-O	...	SP	5351	$V = 10.45$	0.10	$V > 15.94$	0.10	$V > 15.81$	0.10
2438844.28291	1965-03-24	18:50	103 a-O	...	SP	5364	$V = 10.45$	0.10				
2438847.28960	1965-03-27	19:00	103 a-O	...	SP	5397	$V = 10.45$	0.10	$V > 14.79$	0.10	*	
2439037.56487	1965-10-04	01:30	103 a-O	...	SG	5	$B = 11.10$	0.10	$B = 17.50$	0.10	*	
2439038.57605	1965-10-05	01:46	103 a-O	...	SG	9	$B = 10.90$	0.10	$B = 17.55$	0.10	*	
2439062.59430	1965-10-29	02:10	103 a-O	...	SG	24	$B = 11.01$	0.10	$B = 17.47$	0.10	*	
2439084.51667	1965-11-20	00:17	103 a-O	...	SG	33	$B = 11.05$	0.10	$B > 17.51$	0.10	*	
2439086.45908	1965-11-21	22:54	103 a-O	...	SG	40	$B = 11.05$	0.10	$B > 17.51$	0.10	*	
2439089.44802	1965-11-24	22:38	103 a-O	...	SG	47	$B = 10.97$	0.20	$B > 17.51$	0.10		
2439093.47446	1965-11-28	23:16	103 a-O	...	SG	55			$B = 17.50$	0.20		
2439109.36052	1965-12-14	20:32	103 a-O	...	SG	67	$B = 11.05$	0.10	$B = 17.55$	0.10		
2439110.39106	1965-12-15	21:16	103 a-O	...	SG	74	$B = 11.01$	0.10	$B > 17.51$	0.10	*	
2439117.42840	1965-12-22	22:10	103 a-O	...	SG	79	$B = 11.10$	0.10	$B = 17.49$	0.10	*	
2439121.42064	1965-12-26	21:59	103 a-O	...	SG	87	$B = 11.10$	0.10	$B = 17.49$	0.10		
2439128.47106	1966-01-02	23:12	IN Sen	RG 5	SG	93	$I = 9.74$	0.10	$I = 14.11$	0.10	$I = 14.79$	0.10
2439141.30998	1966-01-15	19:21	IN Sen	RG 5	SG	97	$I = 9.74$	0.10	$I = 14.18$	0.10	$I = 14.79$	0.10
2439141.35442	1966-01-15	20:25	IN Sen	RG 5	SG	98	$I = 9.56$	0.10	$I = 14.18$	0.10	$I = 14.79$	0.10
2439141.49053	1966-01-15	23:41	103 a-O	...	SG	104	$B = 10.90$	0.10	$B > 17.46$	0.10	*	
2439144.47784	1966-01-18	23:23	103 a-O	...	SG	110	$B = 11.01$	0.10	$B > 17.46$	0.10	*	
2439146.33536	1966-01-20	19:58	103 a-O	...	SG	126	$B = 11.01$	0.10	$B = 17.51$	0.10		
2439149.33099	1966-01-23	19:52	103 a-O	...	SG	138	$B = 11.10$	0.20	$B = 17.57$	0.20	*	
2439154.46258	1966-01-28	23:02	103 a-E	RG 1	SG	168	$R = 10.12$	0.10	$R = 15.51$	0.10	$R = 16.19$	0.10
2439164.26807	1966-02-07	18:23	103 a-O	RG 1	SG	175	$R = 10.09$	0.10	$R > 14.74$	0.10	$R > 15.13$	0.10
2439172.30976	1966-02-15	19:24	103 a-E	RG 1	SG	187	$R = 10.11$	0.10	$R = 15.51$	0.10	$R = 16.19$	0.10
2439172.32226	1966-02-15	19:42	103 a-E	RG 1	SG	188	$R = 10.08$	0.20	$R > 15.46$	0.20	$R = 15.77$	0.20
2439172.33059	1966-02-15	19:54	103 a-E	RG 1	SG	189	$R = 10.06$	0.10	$R > 14.74$	0.10	$R = 13.67$	0.10
2439172.33754	1966-02-15	20:04	103 a-E	RG 1	SG	190	$R = 10.06$	0.10	$R > 14.74$	0.10	$R = 13.67$	0.10
2439199.29697	1966-03-14	19:09	IN Sen	RG 5	SG	224	$I = 9.56$	0.10	$I = 14.25$	0.10	$I = 14.79$	0.10
2439205.32493	1966-03-20	19:50	103 a-E	RG 1	SG	240	$R = 10.08$	0.10	$R = 15.56$	0.10	$R = 16.19$	0.10
2439206.29429	1966-03-21	19:06	IN Sen	RG 5	SG	248	$I = 9.56$	0.10	$I = 14.31$	0.10	$I = 14.79$	0.10
2439206.32137	1966-03-21	19:45	103 a-E	RG 1	SG	249	$R = 10.08$	0.20				
2439206.63662	1966-03-22	03:19	103 a-E	RG 1	SG	258	$R = 10.09$	0.20				
2439412.61003	1966-10-14	02:34	IN Sen	RG 5	SG	364	$I = 9.56$	0.10	$I = 14.11$	0.10	$I = 14.51$	0.10
2439437.51628	1966-11-08	00:17	103 a-O	...	SG	384	$B = 10.83$	0.10	$B = 17.31$	0.10	*	
2439437.58087	1966-11-08	01:50	IN Sen	RG 5	SG	386	$I = 9.56$	0.10	$I = 14.28$	0.10	$I = 14.79$	0.10
2439444.58806	1966-11-15	02:00	103 a-O	...	SG	398	$B = 10.83$	0.10	$B = 17.21$	0.10	*	
2439473.39595	1966-12-13	21:23	103 a-O	...	SG	459	$B = 10.83$	0.10	$B = 17.48$	0.10	*	
2439475.45426	1966-12-15	22:47	103 a-O	...	SG	467	$B = 10.97$	0.10	$B = 17.50$	0.10	*	
2439476.38549	1966-12-16	21:08	103 a-O	...	SG	477	$B = 10.83$	0.10	$B > 17.51$	0.10	*	
2439502.40536	1967-01-11	21:38	IN Sen	RG 5	SG	546	$I = 9.74$	0.10	$I = 14.28$	0.10	$I = 14.33$	0.10
2439502.43036	1967-01-11	22:14	103 a-O	...	SG	547	$B = 10.97$	0.10	$B > 17.51$	0.10	*	
2439530.40063	1967-02-08	21:34	103 a-O	...	SG	577	$B = 10.90$	0.10	$B > 17.51$	0.10	*	
2439531.36236	1967-02-09	20:39	IN Sen	RG 5	SG	584	$I = 9.56$	0.10	$I = 14.18$	0.10	$I = 14.45$	0.10
2439553.30283	1967-03-03	19:16	103 a-O	...	SG	608	$B = 11.01$	0.20	$B > 17.51$	0.10	*	
2439553.34032	1967-03-03	20:10	IN Sen	RG 5	SG	609	$I = 9.74$	0.10	$I = 14.25$	0.10	$I = 14.45$	0.10
2439823.52306	1967-11-29	00:26	IN Sen	RG 5	SG	1083	$I = 9.56$	0.10				
2439826.48003	1967-12-01	23:24	IN Sen	RG 5	SG	1094	$I = 9.74$	0.10	$I = 14.05$	0.10	$I = 14.51$	0.10
2439826.54045	1967-12-02	00:51	103 a-O	...	SG	1096	$B = 10.97$	0.10	$B = 17.51$	0.20	*	
2439829.50226	1967-12-04	23:56	103 a-O	...	SG	1131	$B = 10.76$	0.10	$B > 17.51$	0.10	*	
2439830.44740	1967-12-05	22:37	IN Sen	RG 5	SG	1138	$I = 9.74$	0.10	$I = 14.28$	0.10	$I = 14.51$	0.10
2439832.44670	1967-12-07	22:36	IN Sen	RG 5	SG	1185	$R = 9.89$	0.10	$R = 14.62$	0.10	$R = 15.55$	0.10
2439852.54840	1967-12-28	01:03	103 a-O	...	SG	1226	$B = 10.83$	0.10	$B = 17.55$	0.10	*	
2439859.46687	1968-01-03	23:06	103 a-O	...	SG	1262	$B = 10.90$	0.10	$B = 17.50$	0.10	*	
2439862.42924	1968-01-06	22:12	IN Sen	RG 5	SG	1283	$R = 9.89$	0.10	$R = 14.62$	0.10	$R = 15.98$	0.10
2439877.36102	1968-01-21	20:35	IN Sen	RG 5	SG	1323	$R = 9.66$	0.10	$R = 14.62$	0.10	$R > 16.19$	0.10
2439881.35519	1968-01-25	20:27	IN Sen	RG 5	SG	1351	$R = 9.66$	0.10	$R = 14.85$	0.10	$R = 15.77$	0.10
2439881.37255	1968-01-25	20:52	103 a-O	...	SG	1352	$B = 11.05$	0.10	$B > 17.51$	0.10	*	
2439886.31178	1968-01-30	19:25	IN Sen	RG 5	SG	1374	$R = 10.12$	0.10	$R = 14.85$	0.10	$R = 15.98$	0.10
2439886.33261	1968-01-30	19:55	103 a-O	...	SG	1375	$B = 11.05$	0.10	$B = 17.51$	0.10	*	
2439888.30469	1968-02-01	19:15	IN Sen	RG 5	SG	1410	$I = 9.56$	0.10	$I = 14.28$	0.10	$I = 14.45$	0.10
2439888.32552	1968-02-01	19:45	103 a-O	...	SG	1411	$B = 10.90$	0.10	$B = 17.53$	0.10	*	
2439905.28802	1968-02-18	18:53	103 a-O	GG 13	SG	1432	$B = 10.83$	0.10	$B = 17.64$	0.10	*	

Table 1. Continued.

							NY Ori		V1143 Ori		V1118 Ori	
HJD	date	UT	emulsion	filter	tel	plate	mag	error	mag	error	mag	error
2439915.28576	1968-02-28	18:51	IN Sen	RG 5	SG	1447	I = 9.56	0.10	I = 14.11	0.10	I = 14.51	0.10
2439915.30450	1968-02-28	19:18	103 a-O	GG 13	SG	1448	B = 10.83	0.10	B = 17.66	0.10	*	
2440157.66927	1968-10-28	03:58	103 a-E	RG 1	SG	1946	R = 10.12	0.10	R = 15.24	0.10	R = 16.19	0.10
2440185.61886	1968-11-25	02:44	103 a-O	...	SG	1980	B = 10.90	0.10	B = 17.54	0.10	*	
2440203.46749	1968-12-12	23:06	103 a-O	...	SG	2036	B = 10.83	0.10	B = 17.51	0.10	*	
2440208.57365	1968-12-17	25:39	103 a-O	...	SG	2056	B = 10.83	0.10	B >17.46	0.10	*	
2440242.48394	1969-01-20	23:32	103 a-O	...	SG	2146	B = 10.90	0.10	B = 17.51	0.10	*	
2440274.31616	1969-02-21	19:34	103 a-E	RG645	SG	2238	R = 10.06	0.10			*	
2440274.39046	1969-02-21	21:21	103 a-D	OG515	SG	2242	V = 10.38	0.10	V = 16.17	0.10	V >16.19	0.10
2440274.40227	1969-02-21	21:38	103 a-D	OG515	SG	2243	V = 10.38	0.10	V >14.79	0.10	V >14.99	0.10
2440287.28099	1969-03-06	18:45	103 a-E	RG645	SG	2254	R = 10.06	0.10	R >14.16	0.10	R >15.13	0.10
2440287.30321	1969-03-06	19:17	103 a-E	RG645	SG	2255	R = 10.08	0.10				
2440287.34418	1969-03-06	20:16	103 a-D	OG515	SG	2258	V = 10.42	0.10				
2440509.62817	1969-10-15	03:00	IN Sen	RG 5	SG	2665	I = 9.56	0.10	I = 14.18	0.10	I >14.79	0.10
2440509.65804	1969-10-15	03:43	103 a-O	GG 13	SG	2666	B = 10.83	0.10	B = 17.31	0.10	*	
2440511.62692	1969-10-17	02:58	IN Sen	RG 5	SG	2687	I = 9.74	0.10	I = 14.18	0.10	I = 14.79	0.10
2440511.64706	1969-10-17	03:27	103 a-O	...	SG	2688	B = 10.83	0.10	B = 17.34	0.10	*	
2440513.60274	1969-10-19	02:23	103 a-J	OG515	SG	2702	V = 10.42	0.10				
2440513.61316	1969-10-19	02:38	103 a-J	OG515	SG	2703	V = 10.42	0.10				
2440514.59447	1969-10-20	02:11	103 a-O	...	SG	2709	B = 10.83	0.10	B >17.51	0.10	*	
2440514.62573	1969-10-20	02:56	103 a-D	OG515	SG	2710	V = 10.38	0.10	V = 16.17	0.10	V >16.19	0.10
2440514.65628	1969-10-20	03:40	103 a-D	OG515	SG	2711	V = 10.38	0.20	V = 16.48	0.20	V >16.19	0.20
2440514.66670	1969-10-20	03:55	103 a-D	OG515	SG	2712	V = 10.38	0.10	V >14.79	0.10		
2440514.67295	1969-10-20	04:04	103 a-D	OG515	SG	2713	V = 10.38	0.20				
2440515.62926	1969-10-21	03:01	103 a-O	...	SG	2717	B = 10.90	0.10	B = 17.27	0.10	*	
2440515.64940	1969-10-21	03:30	IN Sen	RG 5	SG	2718	I = 9.74	0.10	I = 14.18	0.10	I = 14.79	0.10
2440542.63813	1969-11-17	03:12	103 a-O	...	SG	2798	B = 10.76	0.10	B = 17.51	0.10	*	
2440542.66174	1969-11-17	03:46	IN Sen	RG 5	SG	2799	I = 9.56	0.10	I = 14.11	0.10	I >13.86	0.10
2440563.55642	1969-12-08	01:14	IN Sen	RG 5	SG	2875	I = 9.74	0.10	I = 14.18	0.10	I = 14.56	0.10
2440563.58628	1969-12-08	01:57	103 a-O	GG 13	SG	2876	B = 10.76	0.10	B >17.51	0.10	*	
2440572.57715	1969-12-17	01:44	103 a-O	...	SG	2943	B = 10.76	0.10	B >17.15	0.10	*	
2440589.53078	1970-01-03	00:38	103 a-O	...	SG	2987	B = 10.76	0.10	B = 17.51	0.10	*	
2440624.38480	1970-02-06	21:11	103 a-O	...	SG	3088	B = 10.76	0.10	B = 17.51	0.10	*	
2440626.36937	1970-02-08	20:49	IN Sen	RG 5	SG	3112	R = 9.89	0.10	R = 14.74	0.10	R = 15.87	0.10
2440629.43786	1970-02-11	22:28	IN Sen	RG 5	SG	3122	R = 10.12	0.10	R = 14.74	0.10	R = 15.87	0.10
2440641.31184	1970-02-23	19:28	103 a-O	...	SG	3132	B = 10.76	0.10	B >17.46	0.10	*	
2440645.31010	1970-02-27	19:26	103 a-O	...	SG	3145	B = 10.76	0.10	B >17.46	0.10	*	
2440646.26071	1970-02-28	18:15	IN Sen	RG 5	SG	3150	R = 9.66	0.10	R = 14.74	0.10	R = 15.45	0.10
2440870.63482	1970-10-11	03:10	103 a-O	...	SG	3732	B = 10.83	0.10	B = 17.51	0.10	*	
2440870.65496	1970-10-11	03:39	IN Sen	RG 5	SG	3733	R = 10.12	0.10	R = 14.80	0.10	R = 15.24	0.10
2440886.60043	1970-10-27	02:19	103 a-O	...	SG	3801	B = 10.83	0.10	B >17.46	0.10	*	
2440888.65124	1970-10-29	03:32	IN Sen	RG 5	SG	3833	R = 10.09	0.10	R = 14.68	0.10	R = 15.34	0.10
2440913.52506	1970-11-23	00:29	103 a-O	...	SG	3883	B = 10.83	0.10	B >17.46	0.10	*	
2440915.60427	1970-11-25	02:23	103 a-O	...	SG	3916	B = 10.83	0.10	B = 17.50	0.10	*	
2440917.65638	1970-11-27	03:38	103 a-O	...	SG	3950	B = 10.76	0.10	B >17.51	0.10	*	
2440919.55779	1970-11-29	01:16	103 a-O	...	SG	3975	B = 10.83	0.10	B = 17.51	0.10	*	
2440922.61962	1970-12-02	02:45	103 a-O	...	SG	4002	B = 10.76	0.10	B = 17.50	0.10	*	
2440924.60573	1970-12-04	02:25	103 a-O	...	SG	4031	B = 10.83	0.10	B = 17.51	0.10	*	
2440927.59809	1970-12-07	02:14	103 a-O	...	SG	4048	B = 10.83	0.20	B >17.15	0.20	*	
2440941.49512	1970-12-20	23:46	103 a-O	...	SG	4094	B = 10.76	0.10	B >17.51	0.10	*	
2440955.54603	1971-01-04	01:00	103 a-O	...	SG	4143	B = 10.83	0.10	B >17.15	0.10	*	
2441249.62044	1971-10-25	02:48	IN Sen	RG 5	SG	4854	I = 9.38	0.10	I = 14.18	0.10	I = 14.62	0.10
2441253.63039	1971-10-29	03:02	IN Sen	RG 5	SG	4888	I = 9.74	0.10	I = 14.31	0.10	I = 14.62	0.10
2441271.63184	1971-11-16	03:03	IN Sen	RG 5	SG	4924	I = 9.56	0.10	I = 14.31	0.10	I >13.86	0.10
2441271.65128	1971-11-16	03:31	103 a-O	...	SG	4925	B = 10.83	0.10	B = 17.40	0.10	*	
2441281.61747	1971-11-26	02:42	103 a-O	...	SG	4986	B = 10.76	0.10	B >17.51	0.10	*	
2441281.63553	1971-11-26	03:08	IN Sen	RG 5	SG	4987	I = 9.56	0.10	I = 14.28	0.10	I >14.79	0.10
2441295.46961	1971-12-09	23:09	103 a-O	...	SG	5034	B = 10.83	0.10	B = 17.40	0.10	*	
2441295.48836	1971-12-09	23:36	IN Sen	RG 5	SG	5035	I = 9.74	0.20	I = 14.25	0.20	I >14.22	0.20
2441300.58552	1971-12-15	01:56	Ia-O	...	SG	5094	B = 10.76	0.20	B = 17.31	0.20	*	
2441300.60497	1971-12-15	02:24	IN Sen	RG 5	SG	5095	I = 9.74	0.10	I = 14.31	0.10	I = 14.79	0.10
2441331.44895	1972-01-14	22:41	103 a-O	...	SG	5197	B = 10.83	0.10	B = 17.55	0.10	*	
2441331.46770	1972-01-14	23:08	IN Sen	RG 5	SG	5198	I = 9.56	0.10	I = 14.31	0.10	I = 14.51	0.10
2441362.40154	1972-02-14	21:36	103 a-O	...	SG	5219	B = 10.83	0.10	B >17.46	0.10	*	
2441362.42099	1972-02-14	22:04	IN Sen	RG 5	SG	5220	I = 9.56	0.10	I = 14.31	0.10	I = 14.62	0.10
2441379.26743	1972-03-02	18:25	IN Sen	RG 5	SG	5257	I = 9.56	0.10	I = 14.31	0.10	I = 14.62	0.10
2441379.28618	1972-03-02	18:52	103 a-O	...	SG	5258	B = 10.76	0.10	B >16.24	0.10	*	
2441607.63458	1972-10-17	03:09	103 a-O	...	SG	5699	B = 10.76	0.10	B = 17.37	0.10	*	
2441637.50616	1972-11-16	00:02	IN Sen	RG 5	SG	5884	I = 9.38	0.10	I = 14.05	0.10	I = 14.68	0.10
2441637.52422	1972-11-16	00:28	103 a-O	GG 13	SG	5885	B = 10.69	0.10	B = 17.37	0.10	*	
2441668.49103	1972-12-16	23:40	IN Sen	RG 5	SG	5965	I = 9.38	0.10	I = 13.98	0.10	I = 14.51	0.10
2441688.37856	1973-01-05	20:59	103 a-D	GG 14	SG	6053	V = 10.42	0.10	V = 16.25	0.10	V >16.19	0.10
2441689.37990	1973-01-06	21:01	IN Sen	RG 5	SG	6073	I = 9.38	0.10	I = 13.98	0.10	I = 14.62	0.10

Table 1. Continued.

							NY Ori		V1143 Ori		V1118 Ori	
HJD	date	UT	emulsion	filter	tel	plate	mag	error	mag	error	mag	error
2441713.38255	1973-01-30	21:07	103 a-O	GG 13	SG	6185	$B = 10.83$	0.10	$B > 17.15$	0.10	*	
2441713.39991	1973-01-30	21:32	IN Sen	RG 5	SG	6186	$I = 9.56$	0.10				
2441980.61214	1973-10-25	02:36	IN Sen	RG 5	SG	6773	$I = 9.38$	0.10	$I = 13.98$	0.10	$I = 14.73$	0.10
2441984.47277	1973-10-28	23:15	103 a-E	RG 1	SG	6817	$R = 10.09$	0.20	$R = 15.51$	0.20	$R > 15.13$	0.20
2442015.58626	1973-11-29	01:57	103 a-D	GG 14	SG	6887	$V = 10.42$	0.10	$V > 15.94$	0.10	$V > 16.19$	0.10
2442019.50851	1973-12-03	00:05	IN Sen	RG 5	SG	6915	$I = 9.74$	0.10	$I > 13.57$	0.10	$I > 14.22$	0.10
2442030.32095	1973-12-13	19:35	103 a-O	GG 13	SG	6929	$B = 10.56$	0.10	$B > 17.15$	0.10	*	
2442030.34734	1973-12-13	20:13	IN Sen	RG 5	SG	6930	$I = 9.38$	0.10	$I = 13.91$	0.10	$I > 14.22$	0.10
2442360.53091	1974-11-09	00:38	IN Sen	RG 66	SG	7576	$I = 9.20$	0.10	$I = 14.05$	0.10	$I = 14.68$	0.10
2442373.53616	1974-11-22	00:45	IN Sen	RG 66	SG	7617	$I = 9.38$	0.10	$I = 14.11$	0.10	$I = 14.56$	0.10
2442396.52024	1974-12-15	00:22	IN Sen	RG 66	SG	7687	$I = 9.56$	0.10	$I = 14.11$	0.10	$I = 14.73$	0.10
2442757.50432	1975-12-10	23:59	IN Sen	RG 5	SG	8252	$I = 9.38$	0.10	$I = 14.31$	0.10	$I = 14.79$	0.10
2442781.40021	1976-01-03	21:30	IN Sen	RG 5	SG	8269	$I = 9.38$	0.10	$I = 14.18$	0.10	$I = 14.68$	0.10
2442781.41896	1976-01-03	21:57	IN Sen	RG 5	SG	8270	$I = 9.56$	0.10	$I > 13.57$	0.10	$I > 14.22$	0.10
2442787.40339	1976-01-09	21:35	IN Sen	RG 5	SG	8302	$I = 9.38$	0.10	$I = 14.28$	0.10	$I > 14.22$	0.10
2442835.30676	1976-02-26	19:21	IN Sen	RG 5	SG	8409	$I = 9.56$	0.10	$I = 14.28$	0.10	$I = 14.79$	0.10
2443074.51134	1976-10-23	00:11	103 a-O	GG 13	SG	8732	$B = 10.76$	0.10	$B > 17.46$	0.10	$B = 16.55$	0.10
2443074.53148	1976-10-23	00:40	IN Sen	RG 5	SG	8733	$I = 9.38$	0.10	$I = 14.05$	0.10	$I = 14.18$	0.10
2443128.50008	1976-12-15	23:53	103 a-O	GG 13	SG	8812	$B = 10.83$	0.10	$B > 17.71$	0.10	$B = 16.55$	0.10
2443128.51675	1976-12-16	00:17	IN Sen	RG 5	SG	8813	$I = 9.74$	0.10	$I = 14.05$	0.10	$I = 14.16$	0.10
2443140.41504	1976-12-27	21:51	IN Sen	RG 5	SG	8847	$I = 9.56$	0.10	$I = 14.28$	0.10	$I > 14.22$	0.10
2443161.50774	1977-01-18	00:06	103 a-O	GG 13	SG	8885	$B = 10.83$	0.10	$B > 17.46$	0.10	$B = 16.55$	0.10
2443161.53066	1977-01-18	00:39	IN Sen	RG 5	SG	8886	$I = 9.56$	0.10	$I = 14.28$	0.10	$I = 14.21$	0.10
2443483.45782	1977-12-05	22:52	IN Sen	RG 5	SG	9367	$I = 9.74$	0.10	$I = 14.11$	0.10	$I > 14.22$	0.10
2443483.47379	1977-12-05	23:15	103 a-O	GG 13	SG	9368	$B = 10.83$	0.10	$B = 17.46$	0.10	$B = 16.55$	0.10
2443494.37298	1977-12-16	20:50	IN Sen	RG 5	SG	9388	$I = 9.56$	0.10	$I = 14.31$	0.10	$I = 14.16$	0.10
2443494.46395	1977-12-16	23:01	103 a-O	GG 13	SG	9391	$B = 10.83$	0.10	$B = 17.43$	0.10	$B = 16.55$	0.10
2443818.51481	1978-11-06	00:15	IN Sen	RG 5	SG	9741	$I = 9.74$	0.10			$I > 13.20$	0.10
2443818.54954	1978-11-06	01:05	103 a-D	GG 14	SG	9742	$V = 10.42$	0.10	$V = 15.82$	0.10	$V > 14.99$	0.10
2443837.42093	1978-11-24	21:59	103 a-O	GG 13	SG	9798	$B = 10.76$	0.10	$B = 17.55$	0.10	$B = 16.75$	0.10
2443837.43760	1978-11-24	22:23	103 a-E	RG 1	SG	9799	$R = 9.89$	0.10	$R = 15.46$	0.10	$R = 15.87$	0.10
2443837.45913	1978-11-24	22:54	IN Sen	RG 5	SG	9800	$I = 9.74$	0.10			$I = 14.19$	0.10
2443842.52863	1978-11-30	00:34	103 a-E	RG 1	SG	9811	$R = 10.09$	0.10	$R = 15.40$	0.10	$R = 15.87$	0.10
2443844.46614	1978-12-01	23:04	103 a-O	GG 13	SG	9820	$B = 10.83$	0.10	$B = 17.61$	0.10	$B = 16.65$	0.10
2443844.52101	1978-12-02	00:23	103 a-E	RG 1	SG	9822	$R = 10.12$	0.20	$R = 15.56$	0.20	$R = 15.87$	0.20
2443848.37865	1978-12-05	20:58	IN Sen	RG 5	SG	9846	$I = 9.74$	0.10	$I = 14.34$	0.10	$I > 14.79$	0.10
2443848.40573	1978-12-05	21:37	103 a-E	RG 1	SG	9847	$R = 10.08$	0.20	$R = 15.40$	0.20	$R = 16.19$	0.20
2443848.42796	1978-12-05	22:09	103 a-D	GG 14	SG	9848	$V = 10.38$	0.10	$V = 16.25$	0.10	$V > 16.19$	0.10
2443848.44601	1978-12-05	22:35	103 a-O	GG 13	SG	9849	$B = 10.76$	0.10	$B = 17.37$	0.10	*	
2443850.40851	1978-12-07	21:41	IN Sen	RG 5	SG	9857	$I = 9.38$	0.10	$I = 14.18$	0.10	$I = 14.79$	0.10
2443876.44329	1979-01-02	22:32	103 a-O	GG 13	SG	9873	$B = 10.69$	0.10	$B > 17.15$	0.10	*	
2443876.46690	1979-01-02	23:06	103 a-E	RG 1	SG	9874	$R = 10.11$	0.10	$R = 15.40$	0.10	$R > 15.13$	0.10
2443893.37988	1979-01-19	21:02	103 a-O	GG 13	SG	9892	$B = 10.83$	0.10				
2443893.40140	1979-01-19	21:33	103 a-E	RG 1	SG	9893	$R = 10.09$	0.10				
2443903.41391	1979-01-29	21:52	103 a-O	GG 13	SG	9897	$B = 10.76$	0.10	$B = 17.40$	0.10	*	
2443903.43543	1979-01-29	22:23	103 a-E	RG 1	SG	9898	$R = 10.09$	0.10	$R = 15.56$	0.10	$R = 16.19$	0.10
2443926.31967	1979-02-21	19:39	103 a-O	GG 13	SG	9913	$B = 10.69$	0.10	$B > 17.15$	0.10	*	
2443926.33703	1979-02-21	20:04	103 a-E	RG 1	SG	9914	$R = 10.09$	0.10	$R = 15.72$	0.10	$R = 16.19$	0.10
2444167.51951	1979-10-21	00:23	103 a-O	GG 13	SG	10230	$B = 10.76$	0.10	$B > 17.46$	0.10	*	
2444170.55997	1979-10-24	01:21	103 a-O	GG 13	SG	10236	$B = 10.83$	0.10	$B = 17.51$	0.10	*	
2444190.45327	1979-11-12	22:46	103 a-O	...	SG	10255	$B = 10.83$	0.10	$B = 17.15$	0.10	*	
2444195.42703	1979-11-17	22:08	103 a-O	...	SG	10257	$B = 10.76$	0.10	$B > 17.15$	0.10	*	
2444199.46671	1979-11-21	23:05	103 a-O	GG 13	SG	10268	$B = 10.76$	0.10	$B > 17.15$	0.10	*	
2444202.45704	1979-11-24	22:51	103 a-O	GG 13	SG	10291	$B = 10.76$	0.10	$B > 17.15$	0.10	*	
2444202.48343	1979-11-24	23:29	IN Sen	RG 5	SG	10292	$I = 9.56$	0.10	$I = 14.11$	0.10	$I = 14.18$	0.10
2444203.41122	1979-11-25	21:45	IN Sen	RG 5	SG	10296	$I = 9.74$	0.10	$I = 14.28$	0.10	$I = 14.18$	0.10
2444219.49667	1979-12-11	23:48	IN Sen	RG 5	SG	10310	$I = 9.74$	0.10	$I = 14.18$	0.10	$I = 14.51$	0.10
2444220.41125	1979-12-12	21:45	103 a-O	...	SG	10315	$B = 10.83$	0.10	$B = 17.18$	0.10	*	
2444224.41396	1979-12-16	21:49	103 a-O	...	SG	10327	$B = 10.83$	0.10	$B = 17.27$	0.10	*	
2444224.43966	1979-12-16	22:26	IN Sen	RG 5	SG	10328	$I = 9.74$	0.10	$I = 14.28$	0.10	$I = 14.28$	0.10
2444247.39372	1980-01-08	21:21	103 a-O	GG 13	SG	10354	$B = 10.69$	0.10	$B = 17.57$	0.10	$B = 16.75$	0.10
2444247.41941	1980-01-08	21:58	IN Sen	RG 5	SG	10355	$I = 9.56$	0.10	$I = 14.28$	0.10	$I = 14.33$	0.10
2444252.33026	1980-01-13	19:50	103 a-O	...	SG	10371	$B = 10.69$	0.10	$B = 17.61$	0.10	*	
2444252.43789	1980-01-13	22:25	IN Sen	RG 5	SG	10375	$I = 9.75$	0.10			$I > 12.93$	0.10
2444257.37510	1980-01-18	20:55	103 a-O	...	SG	10381	$B = 10.76$	0.10	$B > 17.46$	0.10	$B = 16.65$	0.10
2444277.33337	1980-02-07	19:57	103 a-O	...	SG	10397	$B = 10.76$	0.10	$B = 17.57$	0.10	$B = 16.62$	0.10
2444284.40084	1980-02-14	21:35	103 a-O	...	SG	10414	$B = 10.83$	0.10	$B > 16.46$	0.10	*	
2444587.53969	1980-12-14	00:50	103 a-E	RG 1	SG	10728	$R = 10.09$	0.10				
2444603.38649	1980-12-29	21:10	103 a-O	...	SG	10738	$B = 11.10$	0.10	$B = 17.54$	0.10	$B = 16.44$	0.10
2444603.43024	1980-12-29	22:13	103 a-E	RG 1	SG	10739	$R = 10.12$	0.10	$R = 15.35$	0.10	$R = 15.13$	0.20
2444603.45385	1980-12-29	22:47	IN Sen	RG 5	SG	10740	$I = 9.38$	0.10	$I = 14.18$	0.10	$I = 14.16$	0.10
2444607.43216	1981-01-02	22:16	IN Sen	RG 5	SG	10756	$I = 9.74$	0.10	$I = 14.25$	0.10	$I = 14.45$	0.10
2444607.45716	1981-01-02	22:52	103 a-O	GG 13	SG	10757	$B = 10.83$	0.10	$B > 17.15$	0.10	*	

Table 1. Continued.

							NY Ori		V1143 Ori		V1118 Ori	
HJD	date	UT	emulsion	filter	tel	plate	mag	error	mag	error	mag	error
2444607.48216	1981-01-02	23:28	103 a-E	RG 1	SG	10758	$R = 9.89$	0.10	$R = 15.66$	0.10	$R = 15.34$	0.10
2444609.39457	1981-01-04	21:22	103 a-O	GG 13	SG	10770	$B = 10.83$	0.10	$B > 17.15$	0.10	*	
2444630.40444	1981-01-25	21:38	103 a-O	GG 13	SG	10818	$B = 10.83$	0.10	$B > 17.15$	0.10	*	
2444630.42180	1981-01-25	22:03	103 a-D	GG 14	SG	10819	$V = 10.38$	0.10	$V = 16.02$	0.10	$V > 16.19$	0.10
2444630.44263	1981-01-25	22:33	103 a-E	RG 1	SG	10820	$R = 9.89$	0.10	$R = 15.66$	0.10	$R > 15.13$	0.10
2444630.46832	1981-01-25	23:10	IN Sen	RG 5	SG	10821	$I = 9.56$	0.10	$I = 14.34$	0.10	$I = 14.79$	0.10
2444633.32784	1981-01-28	19:48	103 a-O	GG 13	SG	10837	$B = 10.76$	0.10	$B > 17.15$	0.10	*	
2444633.35353	1981-01-28	20:25	103 a-D	GG 14	SG	10838	$V = 10.38$	0.10	$V = 16.17$	0.10	$V = 16.08$	0.10
2444633.37575	1981-01-28	20:57	103 a-E	RG 1	SG	10839	$R = 10.09$	0.10	$R = 15.02$	0.10	$R = 15.13$	0.20
2444633.40214	1981-01-28	21:35	IN Sen	RG 5	SG	10840	$I = 9.38$	0.10	$I = 14.05$	0.10	$I = 14.51$	0.10
2444638.37259	1981-02-02	20:53	103 a-D	GG 14	SG	10878	$V = 10.38$	0.10	$V = 16.17$	0.10	$V = 16.08$	0.10
2444638.39343	1981-02-02	21:23	IN Sen	RG 5	SG	10879	$I = 9.38$	0.10	$I = 14.05$	0.10	$I = 14.09$	0.10
2444638.41703	1981-02-02	21:57	103 a-E	RG 1	SG	10880	$R = 10.09$	0.10	$R = 14.85$	0.10	$R = 14.54$	0.10
2444642.41533	1981-02-06	21:55	103 a-O	GG 13	SG	10902	$B = 10.83$	0.10	$B > 17.15$	0.10	*	
2444642.44102	1981-02-06	22:32	103 a-E	RG 1	SG	10903	$R = 10.09$	0.10	$R > 15.46$	0.10	$R > 15.13$	0.10
2444934.55429	1981-11-26	01:11	103 a-E	RG 1	SG	11248	$R = 10.14$	0.20	$R = 15.46$	0.20		
2444934.57929	1981-11-26	01:47	103 a-O	GG 13	SG	11249	$B = 10.83$	0.10	$B > 17.51$	0.10		
2444940.52517	1981-12-02	00:29	IN Sen	RG 5	SG	11271	$I = 9.38$	0.10	$I = 14.18$	0.10	$I = 14.51$	0.10
2444944.44879	1981-12-05	22:39	IN Sen	RG 5	SG	11276	$I = 9.74$	0.10	$I = 14.11$	0.10	$I = 14.79$	0.10
2444973.51476	1982-01-04	00:15	103 a-E	RG 1	SG	11310	$R = 10.09$	0.20				
2444986.38560	1982-01-16	21:10	103 a-O	GG 13	SG	11313	$B = 10.83$	0.20	$B = 17.06$	0.20		
2444988.42367	1982-01-18	22:05	103 a-O	...	SG	11327			$B = 17.31$	0.20		
2444990.42146	1982-01-20	22:02	103 a-E	RG 1	SG	11342			$R = 14.85$	0.10		
2444990.44715	1982-01-20	22:39	103 a-O	...	SG	11343			$B > 17.15$	0.20		
2445001.44845	1982-01-31	22:42	103 a-E	RG 1	SG	11379			$R = 14.85$	0.10		
2445340.38622	1983-01-05	21:10	103 a-O	...	SG	11834	$B = 10.97$	0.10	$B = 14.25$	0.10	$B > 17.29$	0.10
2445340.42371	1983-01-05	22:04	103 a-E	RG 1	SG	11835	$R = 10.09$	0.10	$R = 13.10$	0.10	$R > 15.13$	0.10
2445341.42436	1983-01-06	22:05	IN Sen	RG 5	SG	11840	$I = 9.38$	0.20	$I > 12.84$	0.20		
2445351.35437	1983-01-16	20:25	103 a-E	RG 1	SG	11889	$R = 10.09$	0.10				
2445352.41264	1983-01-17	21:49	103 a-O	...	SG	11892	$B = 10.83$	0.10	$B = 14.86$	0.10	*	
2445352.44180	1983-01-17	22:31	IN Sen	RG 5	SG	11893	$I = 9.38$	0.10	$I > 12.84$	0.20	$I > 14.79$	0.10
2445368.30319	1983-02-02	19:13	103 a-O	GG 13	SG	11916	$B = 10.83$	0.10	$B = 15.00$	0.10	*	
2445368.32888	1983-02- 2	19:50	103 a-E	RG 1	SG	11917			$R = 13.86$	0.10		
2445369.28853	1983-02-03	18:52	103 a-O	GG 13	SG	11923	$B = 10.83$	0.10	$B = 14.86$	0.10	*	
2445369.31700	1983-02-03	19:33	IN Sen	RG 5	SG	11924	$I = 9.38$	0.10	$I > 12.84$	0.10	$I > 14.79$	0.10
2445370.35581	1983-02-04	20:29	IN Sen	RG 5	SG	11978	$I = 9.74$	0.10	$I = 13.31$	0.10	$I > 14.22$	0.10
2445370.36345	1983-02-04	20:40	103 a-O	GG 13	SG	11931	$B = 10.83$	0.10	$B = 14.86$	0.10	*	
2445370.38914	1983-02-04	21:17	103 a-D	GG 14	SG	11932	$V = 10.38$	0.10	$V = 14.78$	0.10	$V > 16.19$	0.10
2445378.40099	1983-02-12	21:35	103 a-O	GG 13	SG	11940	$B = 10.83$	0.10	$B = 14.86$	0.10	*	
2445378.44612	1983-02-12	22:40	103 a-D	GG 14	SG	11941	$V = 10.38$	0.10	$V = 13.76$	0.10	$V > 16.19$	0.10
2445382.41107	1983-02-16	21:50	103 a-O	GG 13	SG	11946	$B = 10.83$	0.10	$B = 15.00$	0.10	*	
2445382.43884	1983-02-16	22:30	103 a-D	GG 14	SG	11947	$V = 10.42$	0.10	$V = 14.77$	0.10	$V > 16.19$	0.10
2445383.44570	1983-02-17	22:40	103 a-O	...	SG	11953	$B = 10.83$	0.20	$B > 16.24$	0.20	*	
2445404.33206	1983-03-10	19:59	103 a-O	...	SG	12017	$B = 10.83$	0.10	$B = 15.15$	0.10	*	
2445430.30976	1983-04-05	19:30	103 a-O	GG 13	SG	12041	$B = 10.83$	0.10	$B = 15.00$	0.10	*	
2445649.49625	1983-11-10	23:48	IN Sen	RG 5	SG	12317	$I = 9.74$	0.10	$I = 13.31$	0.10	$I = 11.63$	0.10
2445649.52889	1983-11-11	00:35	103 a-E	RG 1	SG	12318	$R = 10.11$	0.10	$R = 13.76$	0.10	$R = 13.22$	0.10
2445705.41470	1984-01-05	21:51	IN Sen	RG 5	SG	12398	$I = 9.74$	0.10	$I = 13.77$	0.10	$I = 11.63$	0.10
2445724.41983	1984-01-24	22:00	IN Sen	RG 5	SG	12421	$I = 9.38$	0.10	$I = 13.42$	0.10	$I = 12.31$	0.10
2446029.48414	1984-11-24	23:30	103 a-E	RG 1	SG	12676	$R = 10.09$	0.10	$R = 13.76$	0.10	$R > 15.13$	0.10
2446117.36207	1985-02-20	20:40	IN Sen	RG 5	SG	12785	$I = 9.74$	0.10	$I = 13.35$	0.10	$I = 14.22$	0.10
2446117.40373	1985-02-20	21:40	103 a-O	GG 13	SG	12786	$B = 10.83$	0.10	$B = 15.76$	0.10	*	
2446402.45504	1985-12-02	22:48	IN Sen	RG 5	SG	13150	$I = 9.38$	0.10	$I = 14.31$	0.10	$I > 14.79$	0.10
2446403.42379	1985-12-03	22:03	103 a-E	RG 1	SG	13156	$R = 10.09$	0.10	$R = 15.46$	0.10	$R > 15.13$	0.10
2446411.48417	1985-12-11	23:30	103 a-O	GG 13	SG	13164	$B = 10.83$	0.10	$B = 17.27$	0.10		
2446418.46114	1985-12-18	22:57	IN Sen	RG 5	SG	13201	$I = 9.74$	0.10	$I = 13.71$	0.10	$I = 14.68$	0.10
2446418.49100	1985-12-18	23:40	103 a-O	GG 13	SG	13202	$B = 10.83$	0.10	$B = 17.27$	0.10	*	
2446446.41552	1986-01-15	21:53	IN Sen	RG 5	SG	13258	$I = 9.56$	0.10	$I = 14.41$	0.10	$I > 14.79$	0.10
2446803.43473	1987-01-07	22:20	IN Sen	RG 5	SG	13669	$I = 9.38$	0.10	$I = 14.11$	0.10	$I = 14.79$	0.10
2446819.35808	1987-01-23	20:31	103 a-E	RG 1	SG	13679	$R = 10.09$	0.10	$R = 15.19$	0.10	$R = 15.77$	0.10
2446828.35187	1987-02-01	20:23	103 a-D	GG 14	SG	13705	$V = 10.42$	0.10	$V = 16.02$	0.10	$V > 16.19$	0.10
2446829.41568	1987-02-02	21:55	IN Sen	RG 5	SG	13711	$I = 9.56$	0.10	$I = 14.11$	0.10	$I > 14.22$	0.10
2446849.35430	1987-02-22	20:29	IN Sen	RG 5	SG	13725	$I = 9.56$	0.10	$I = 13.77$	0.10	$I = 14.79$	0.10
2447178.47168	1988-01-17	23:14	103 a-E	RG 1	SG	13992	$R = 10.11$	0.10	$R = 15.40$	0.10	$R = 15.24$	0.10
2447184.28588	1988-01-23	18:47	IN Sen	RG 5	SG	13995	$I = 9.38$	0.10	$I = 14.11$	0.10	$I = 14.28$	0.10
2447205.32385	1988-02-13	19:44	103 a-E	RG 1	SG	14003	$R = 10.11$	0.10	$R = 15.40$	0.10	$R = 15.24$	0.10
2447206.33140	1988-02-14	19:55	IN Sen	RG 5	SG	14009	$I = 9.56$	0.10	$I = 14.28$	0.10	$I = 14.16$	0.10
2447537.38593	1989-01-10	21:10	Tri-X	...	SP	17844	$V = 10.49$	0.10	$V > 15.32$	0.10	$V > 13.22$	0.10
2447537.39635	1989-01-10	21:25	103 a-O	...	SP	17845	$B = 11.01$	0.10	$B > 17.15$	0.10	$B = 14.71$	0.10
2447569.40380	1989-02-11	21:39	IN Sen	RG 5	SG	14473	$I = 9.38$	0.10	$I = 14.25$	0.10	$I = 12.02$	0.10
2447863.49393	1989-12-02	23:44	103 a-O	GG 13	SG	14747	$B = 10.76$	0.10	$B = 16.88$	0.10	$B = 14.16$	0.10
2448299.36843	1991-02-11	20:48	103 a-O	GG 13	SG	14998	$B = 10.76$	0.10	$B > 17.15$	0.10	*	
2448299.40037	1991-02-11	21:34	IN Sen	RG 5	SG	14999	$I = 9.56$	0.10	$I > 14.25$	0.10	$I > 14.79$	0.10

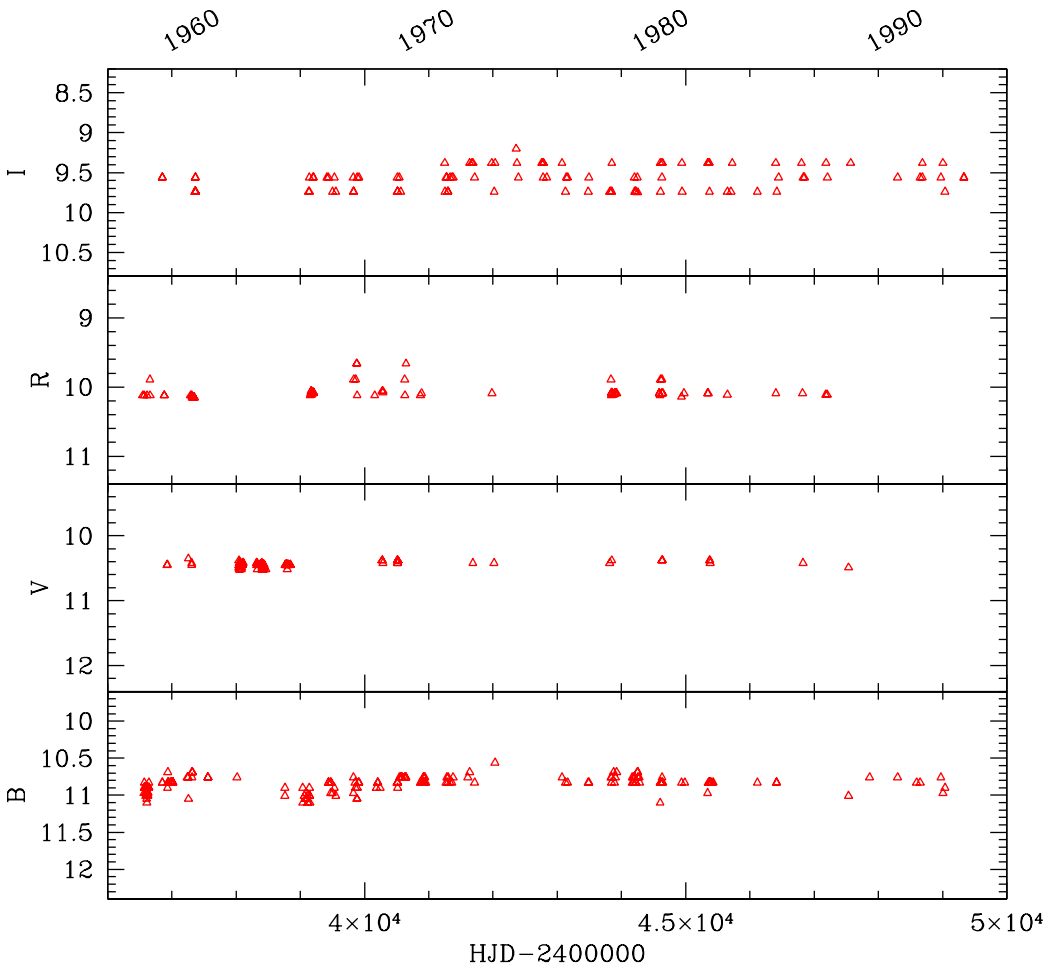

Fig. 3. *BVRI* light curves of NY Ori.

Table 1. Continued.

							NY Ori		V1143 Ori		V1118 Ori	
HJD	date	UT	emulsion	filter	tel	plate	mag	error	mag	error	mag	error
2448595.53490	1991-12-05	00:43	103 a-O	GG 13	SG	15099	B = 10.83	0.10	B = 17.18	0.10	*	
2448651.43058	1992-01-29	22:16	103 a-O	GG 13	SG	15153	B = 10.83	0.10	B = 17.46	0.10	B = 17.16	0.10
2448651.45489	1992-01-29	22:51	IN Sen	RG 5	SG	15154	I = 9.56	0.10	I = 14.18	0.10	I = 14.18	0.10
2448682.35092	1992-02-29	20:25	IN Sen	RG 5	SG	15218	I = 9.56	0.10	I = 13.71	0.10	I = 14.22	0.10
2448686.32349	1992-03-04	19:46	IN Sen	RG 5	SG	15236	I = 9.38	0.10				
2448974.47643	1992-12-17	23:19	103 a-O	GG 13	SG	15339	B = 10.76	0.10	B = 16.97	0.10	*	
2448974.51045	1992-12-18	00:08	IN Sen	RG 5	SG	15340	I = 9.56	0.10	I = 13.98	0.10	I = 14.16	0.10
2449004.42100	1993-01-16	22:01	103 a-O	GG 13	SG	15380	B = 10.97	0.10	B = 15.09	0.10	*	
2449004.44877	1993-01-16	22:41	IN Sen	RG 5	SG	15381	I = 9.38	0.10	I = 13.42	0.10	I = 14.15	0.10
2449036.38524	1993-02-17	21:13	IN Sen	RG 5	SG	15455	I = 9.74	0.10	I = 13.35	0.10	I = 14.15	0.10
2449036.41301	1993-02-17	21:53	103 a-O	GG 13	SG	15456	B = 10.90	0.10	B = 15.07	0.10	*	
2449328.42656	1993-12-06	22:07	IN Sen	RG 5	SG	15677	I = 9.56	0.10				
2449334.43763	1993-12-12	22:23	IN Sen	RG 5	SG	15699	I = 9.56	0.20	I = 13.98	0.20	I >14.22	0.20

event, by considering only the simultaneous plates (i.e. taken at a maximum temporal distance of one day), we are able to build a colour-magnitude plot B vs.$[B-I]$ practically unaffected by short time fluctuations and shown in the left panel of Figure 4. Still unpublished data (Giannini et al. in preparation), that we collected during the very recent 2015-2016 outburst (Giannini et al. 2016) are shown on the figure, as are data from the current plate study. In both cases, the source presents the very common behaviour to become bluer when brightening, but definitely not following the extinction law (depicted by the arrow). These colours provide a further confirmation that the increase of brightness of V1118 Ori is accretion- more than extinction-driven (Lorenzetti et al. 2015). Moreover, by considering the two distributions of open and solid data points, one could suspect that the different origin of the two data set (CCD and plates) has a role in determining the colour segregation, but this is not true as confirmed by the green data points relative to the 2005 outburst (Audard et al. 2005). The 2005 data perfectly overlap the plate photometry presented

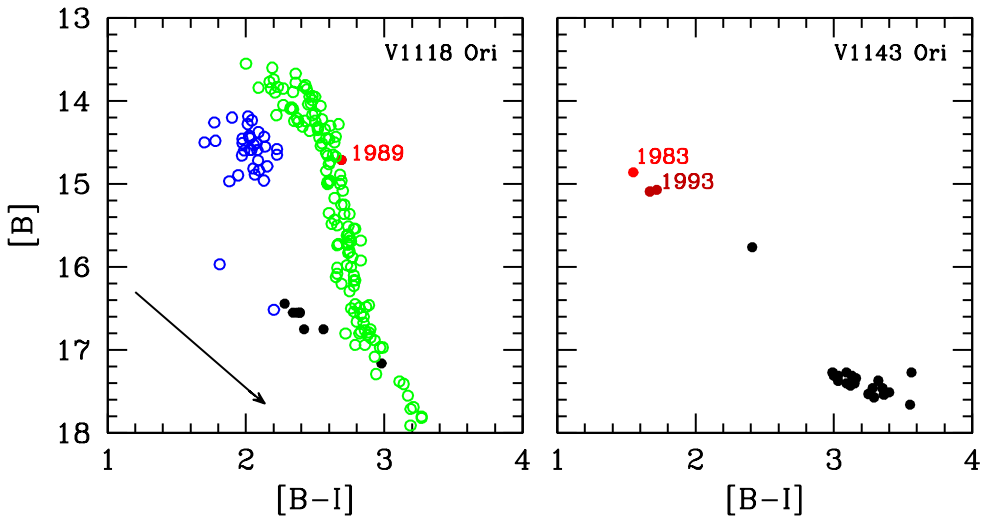

Fig. 4. B vs $[B-I]$ colour-magnitude plot of V1118 (left) and V1143 Ori (right). In the left panel open circles (in blue) refer to our data still unpublished (Giannini et al. in preparation). Solid circles (black and red) refer to the present data. Green circles are given for comparison purposes and refer to a recent outburst of V1118 monitored by Audard et al. (2005). In the lower-left corner the arrow indicates an extinction of $A_V = 1$ mag, according to the law by Rieke & Lebofsky (1985).

here, thus testifying on the one hand the reliability of the Asiago plates, on the second hand the fact that different bursts may have different colours and intensities.

4.2. V1143 Ori

Two bursts are recognizable in our light curves (see Figure 2 and also Table 1): the first appears as a steep rise up to a maximum in January 1983, followed by a slower declining; the second occurred in January 1993 and presents the same rapid increase (less than one month). Mention of both events was already given by Parsamian & Gasparian (1987) and Mampaso & Parsamian (1995), respectively, but quiescence data in the same bands are not provided, so preventing any comparative colour analysis. Our plate data, instead, allow this comparison, given in the right panel of Figure 4. This latter indicates the two bursts were practically identical in both B amplitude and $[B-I]$ colour, and, more importantly, that this two bursts follow exactly the extinction curve with a variation corresponding to $\Delta A_V = 2$ mag. This result, if confirmed by future observations, could indicate V1143 Ori is not a genuine EXor, since both its historical outbursts are severely contaminated by extinction effects. As for V1118, our data provide a good overall sampling of the quiescent phase, in fact the I-band photometry fills the temporal gap 1972-1977 uncovered in the BVR bands. Our quiescence photometry agrees with the sparse values listed so far in the literature (Herbig, 2008 and references therein).

4.3. NY Ori

As previously mentioned, the measurements of NY Ori (Table 1) actually refer to the combination of the EXor source and the close star V566 Ori. Optical light curves (Figure 3) seem dominated by the brighter V566 Ori in the bands BVR, while in the I band the EXor becomes to prevail. The shortest wavelength colours are compatible with an early type star (SpT A-F), whereas at longer wavelength colours become redder and are those typical of a late type source. A confirmation of that stems from the JHK near-infrared photometry carried out at our telescope at Campo Imperatore (D'Alessio et al. 2000). For V566 Ori, we obtained $J = 9.73$, $H = 9.70$, and $K = 9.70$, in agreement with 2MASS results ($J = 9.75$, $H = 9.74$, and $K = 9.73$); while our IR monitoring of the EXor NY Ori provided evidence of both redder colours and some variability: J (9.8 - 10.6), H (8.9 - 9.4), and K (8.1 - 8.5). At the same telescope, we obtained low-resolution ($\mathcal{R} \sim 200$) near-IR spectra (1-2.5 μm) of both sources. V566 Ori is characterised by strong HI absorption lines (Paschen and Brakett series), while the EXor appears as a typical emission-line object (Lorenzetti et al. 2009). Finally, we note in Figure 3 how the temporal coverage in V band fills the gap of I band observations in the period 1961-1967, so we can conclude that during our 40 yrs monitoring no major outburst occurred with a duration longer than six months. Such a conclusion is based on the analysis of the I ligthcurve, namely that in which both stars have a comparable brightness.

5. Concluding remarks

Archival plate analysis is a powerful tool to investigate the historical behaviour of EXor stars, and to infer on their nature.

We investigated the Asiago Schmidt plate collection for observations of the Orion Nebula Cluster where the three EXors sources V1118 Ori, V1143 Ori, and NY Ori are located. Observations of this region were repeatedly carried out at Asiago over a timespan of about 40 years since 1958 and the three sources were acquired on the same plates.

We provide one of the best-sampled photometric dataset ever obtained of the quiescent phase of the three targets. V1118 and V1143 present, in quiescence, a level of modest variability (0.2-0.4 mag) that is comparable with that of classical T Tauri stars.

For V1118 Ori, two already known outbursts are detected together with a newly discovered flare-up of 2.5 mag (R band),

Table 2. Ranges of photometric variability. For each source and each band, we list the number of observations (col.3), the median, which basically indicates the magnitude in quiescence (col.4), the standard deviation data point distribution (col.5), and the magnitude corresponding to the peak brightness (col.6).

Source	Band	N_{obs}	Median	σ (mag)	Peak
V1118 Ori	*B*	13	16.62	0.25	14.16
	V	2	16.02	...	...
	R	33	15.51	0.64	13.33
	I	69	14.56	0.24	11.63
V1143 Ori	*B*	67	17.49	0.25	14.35
	V	52	16.71	0.44	13.76
	R	47	15.40	0.41	13.10
	I	81	14.18	0.15	13.31
NY Ori	*B*	180	10.83	0.10	10.56
	V	93	10.45	0.04	10.35
	R	65	10.09	0.11	9.66
	I	102	9.56	0.14	9.20

which brightened up in only 40 min and lasted less than one month. Our data most likely ascertain the longest quiescence period known so far (about 15 yrs): this result on the one hand does not support the existence of a recurrent period between the outbursts, on the other hand allows us to define a reliable value of the quiescence brightness. The colour analysis confirms the robustness of the plate photometry and rules out the extinction as the main origin of the brightness variations.

For V1143 Ori, two outbursts already mentioned in the past literature are found, but the complete set of colours are given here for the first time. This is relevant, since the colour analysis demonstrates as both outbursts, at variance with those of V1118, can be accounted for with pure extinction variations, putting some doubts on the EXor nature of V1143.

As for NY Ori, this target and the close source V566 Ori cannot be resolved in our plates, so that the given photometry refers to the combined pair. Nevertheless, as the two objects have a similar brightness in the I band, we can conclude that the EXor source did not undergo any major outburst (> 2 mag) during the 40 yr monitoring.

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