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$UBVRIz$ Light Curves of 51 Type II Supernovae

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Abstract

We present a compilation of $UBVRIz$ light curves of 51 type II supernovae discovered during the course of four different surveys during 1986 to 2003: the Cerro Tololo Supernova Survey, the Calán/Tololo Supernova Program (C&T), the Supernova Optical and Infrared Survey (SOIRS), and the Carnegie Type II Supernova Survey (CATS). The photometry is based on template-subtracted images to eliminate any potential host galaxy light contamination, and calibrated from foreground stars. This work presents these photometric data, studies the color evolution using different bands, and explores the relation between the magnitude at maximum brightness and the brightness decline parameter (s) from maximum light through the end of the recombination phase. This parameter is found to be shallower for redder bands and appears to have the best correlation in the B band. In addition, it also correlates with the plateau duration, being thus shorter (longer) for larger (smaller) s values.

Subject headings: supernovae - photometry

1. Introduction

It is widely accepted that stars born with masses higher than ∼8 $M_{\odot}$ explode as core-collapse supernovae (CCSN) after some tens of millions of years of evolution. At the end of their lives stars born with ∼8-9 $M_{\odot}$ end up with oxygen-neon-magnesium core while higher mass stars end up forming an iron core. In both cases the core grows up to reach the Chandrasekhar mass near 1.4 $M_{\odot}$, and at this point the electron degeneracy pressure becomes insufficient to balance gravity and the core is bound to gravitational collapse. Collapse is stimulated by partial photo-disintegration of Fe-group nuclei into alpha particles, and by electron capture on protons emitting neutrinos. As a result there is a decrease of the electron density, and hence the pressure at the center of the star is reduced, accelerating the collapse. This sequence of events is followed by core bounce and subsequently the ejection of the star's envelope, presumably due to energy deposited by neutrinos created in the proto-neutron core (see Ivanov & Shulman 1990; Burrows 2000; Janka et al. 2007; Janka 2012 for reviews about the explosion mechanisms).

Early-time spectra of CCSN show great diversity (Filippenko 1997). While the Type II SN (hereafter SN II) group consists of spectra dominated by prevalent Balmer spectral features, the Type I class is characterized by the lack of conspicuous Balmer features. The Type I class is further subdivided according to the presence of He in the spectrum (SN Ib) or no He lines (SN Ic).

The spectral differences among CCSN are thought to be due to the relative ability of SN progenitors to retain their outermost envelopes of unprocessed Hydrogen (H) or Helium (He). In this scenario SN II events, which have the least massive progenitors, are those able to retain a significant fraction of their outer layers prior to explosion. On the other hand, SN Ib/c most likely originate from massive stars that lose their H envelope through stellar winds (Woosley et al. 1993), mass transfer to a companion star (Nomoto et al. 1995), enhanced mixing (Frey et al. 2013), or through a combination of these processes. Supporting evidence for this scenario is available from the detection of SN progenitors in nearby galaxies

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[†] Deceased.

(Smartt 2015) and statistical analysis of the proximity of CCSN to star forming regions in their host galaxies (Anderson et al. 2012; Galbany et al. 2014).

Historically, SN II have been sub-classified according to their photometric properties. The majority shows a phase of ∼80 days with a "plateau" of nearly constant luminosity (hence, historically referred as SN IIP), while a smaller fraction of "linear" SN II show a steep initial decline (SN IIL). Recent studies have questioned this subdivision and argue that nature provides a continuous sequence of objects, ranging from pure 'slow decliners' to 'fast decliners' (Anderson et al. 2014; Sanders et al. 2015). An even smaller fraction of SN II undergo interaction of their vastly expanding ejecta with circumstellar material, which can manifest as strong narrow H emission lines in the spectrum, and lead to significant photometric diversity (SN IIn, Schlegel 1990; Taddia et al. 2013).

SN are not only important in the chemical enrichment of the Universe and the shaping of galaxies, but also serve as accurate cosmological distance indicators. Over the past 25 years our group has been systematically studying and collecting photometric and spectroscopic data of all SN types over the course of the following surveys: 1) the Cerro Tololo Supernova Survey led by M.M.P. and N.B.S between 1986-1996, 2) the Calán/Tololo Supernova Program (C&T) led by M.H., J.M., M.M.P, and N.B.S between 1989-1993 (Hamuy et al. 1993), 3) the Supernova Optical and Infrared Survey (SOIRS) led by M.H. between 1999-2000 (Hamuy 2001), and 4) the Carnegie Type II Supernova Survey (CATS) led by M.H., M.M.P, and N.B.S. between 2002-2003.

The purpose of this paper is to report photometric observations of 51 SN II obtained by these four surveys (excluding SN 1987A's data that were published in great detail by Phillips et al. 1990 and Hamuy & Suntzeff 1990, and SN 1990E's photometry which was presented in Schmidt et al. 1993), in order to make this dataset available to the community. This dataset will undoubtedly contribute to an expanded understanding of SN II and improved methods for obtaining precise distances. Near-infrared photometry for the current sample will be presented in a separate paper. These data have been used previously for the study of specific objects (Schmidt et al. 1994a; Krisciunas et al. 2009; Hamuy et al. 2009; Mazzali et al. 2009; Bersten et al. 2011; Zampieri et al. 2003; Takáts et al. 2015). The subsample of SN IIP has been used for the determination of distances using the "Expanding Photosphere Method" (Schmidt et al. 1994b; Hamuy et al. 2001; Jones et al. 2009) and the "Standardized Candle Method" (Hamuy & Pinto 2002; Hamuy 2004; Olivares E. et al. 2010; Rodríguez et al. 2014), and for the determination of bolometric corrections (Bersten & Hamuy 2009). Other studies that have relied on some of the objects in this sample also include: (1) Hamuy (2003a) examined the observed and physical properties of SN II using both photometry and spectroscopy of a selection of 24 SN II; (2) Anderson et al. (2014) performed a characterization of the V-band light curves of an expanded sample of SN II; and (3) Gutiérrez et al. (2014) have correlated those properties with the Hα feature of their spectra.

This paper is organized as follows: § 2 summarizes our optical observations and describes the data reduction procedures; § 3 shows an analysis of the photometric properties of the SN II light-curves, including colors, absolute magnitudes, and the brightness decline parameter s. Finally, a summary and the final conclusions are presented in § 4.

2. Observations

A list of the SN II used in this study is presented in Table 1. The table includes the following information: the SN designation and its host-galaxy names; the host-galaxy type; the SN equatorial coordinates; the heliocentric redshift of the host galaxy; the Galactic extinction, $E(B-V)_{MW}$, from the Schlafly & Finkbeiner (2011) dust maps; the distance modulus (see § 3.3); and the survey under which the SN was observed. Besides the objects discovered over the course of the C&T and SOIRS programs using photographic plates (with the Cerro Tololo Curtis-Schmidt Camera and the Cerro El Roble Maksutov Camera of the University of Chile), we also include in the list of follow-up targets SN discovered by others and reported to the IAU Circulars. Discovery and classification references for the 51 SN II are listed in Table 2. They are all nearby objects ($z \lesssim 0.08$, see Figure 1), selected for our follow-up based on their relatively high apparent brightness and convenient location in the sky (declination $\lesssim 25°$ North).

As soon as we were notified of a discovery, and whenever we had telescope time allocated to us, detailed follow-up observations were initiated using various telescopes located at the Cerro Tololo Inter-American Observatory (CTIO), the University of Arizona's Steward Observatory (SO), the Las Campanas Observatory (LCO) of the Carnegie Institution of Science, and the European Southern Observatory (ESO) at La Silla and Paranal.

2.1. Photometry

The first object in our list is SN 1986L and it is the only SN observed with photoelectric techniques (by M.M.P and S.K., using the CTIO 0.9m equipped with a photometer and B and V filters). The remaining SN were observed using a variety of telescopes equipped with CCD detectors and $UBV(RI)_{KC}z$ filters, as indicated in Table 3. The observational techniques employed by the C&T project are presented by Hamuy et al. (1993), and the photometric reductions in Hamuy et al. (1996). The observations and data reduction during the SOIRS project are explained in Hamuy (2001), whereas the techniques employed during the CATS project can be found in Hamuy et al. (2009). We also refer the reader to Hamuy et al. (2006), which describes the observational procedures of the *Carnegie Supernova Project* (CSP), which are nearly identical to those of CATS. In fact, CATS was a precursor to the CSP initiated in 2004 with the aim to study SN of all types. One main difference between CATS and the original format of the CSP is the latter uses SDSS *ugri* filters in addition to Johnson B and V filters for optical imaging (Stritzinger et al. 2011).

All photometric reductions were performed with customized IRAF[1] scripts. In brief, the photometric reductions begin by subtracting host-galaxy template images from the SN+galaxy images. The templates are high signal-to-noise images (in each filter) of the SN field obtained under good seeing conditions after the SN has faded from detection. As a result of this procedure the SN generally end up lying on a smooth background, allowing us to reliably measure the SN flux with no contamination from the host-galaxy background. The next step is to compute differential photometry of the SN with respect to a local sequence of stars, calibrated relative to standard star observations obtained over multiple photometric nights. For this, we measured instrumental magnitudes of the SN and the local sequence stars via PSF fitting when the SN was faint, or simple aperture photometry when the object was bright. The transformation of the instrumental magnitudes to the standard $UBV(RI)_{KC}z$ system assume a linear term in magnitude, a color term, and a photometric zeropoint,

$$X = x + CT_X + ZP_X \tag{1}$$

where X represents the standard system magnitude, x the instrumental magnitude, the color term CT_X is an average measured over many photometric nights for each telescope/CCD/filter combination, and the zeropoint ZP_X is a fitting parameter determined from all the local standards. Note that there is no atmospheric extinction term because it is absorbed by the zeropoint when doing differential photometry.

The photometric sequences for the 51 SN II are identified in the finding charts in Figure 2 and their magnitudes are listed in Table 4 along with the standard error of the mean (in units of mmag) and the number of nights on which each star was observed. In every case, these sequences were derived from observations of Landolt standards (see Appendix D in Hamuy et al. 2001 for the definition of the z band and Stritzinger et al. 2002 for the description of the z-band standards). Table 5 lists the resulting $UBVRIz$ magnitudes for the 51 SN. The uncertainties are shown in parentheses and the telescope is indicated for each observation.

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[1] IRAF is distributed by the National Optical Astronomy Observatories, which are operated by the Association of Universities for Research in Astronomy, Inc., under cooperative agreement with the National Science Foundation.

The uncertainties correspond to the photon Poisson statistics, adopting a minimum error of 0.015 mag, which is typical for a single observation of the Landolt standards with CCD detectors. In total, we provide a dataset with 2,516 photometric points.

2.2. Spectroscopy

In addition to broad-band photometry, several epochs of visual-wavelength spectra were obtained for this SN set, which are used here to aid in the determination of the explosion epoch (See § 3.1). The number of epochs per object ranges between 1 and 27, with ∼7 spectra being obtained per object on average. Spectral epochs are shown in Figure 3 with short vertical brown solid lines. All optical spectral sequences, with their reduction and analysis, will be presented in a future publication (Gutiérrez et al. in prep.).

3. Analysis

Based on their spectral features and/or light curve morphologies, a handful of SN in our sample have been classified as SN IIb or SN II peculiar. This includes: SN 2000cb which shows similar photometric behavior to SN 1987A; SN 2003bg has been classified as SN IIb and studied by Hamuy et al. (2009); SN 2003cv is similar to 2003bg and has also been classified as SN IIb; SN 2003bj showed signs of SN+CSM interaction in their spectra and has been classified as SN IIn. They are all plotted using different symbols and sometimes excluded in the following analysis.

3.1. Individual multi-band light curves

Multi-band light curves showing their cadence and quality are presented in Figure 3, all referenced to their explosion epoch, which has been determined in a similar fashion as in Anderson et al. (2014). When non-detections are available the intermediate epoch between the last non-detection and the first detection is taken as an approximation of the explosion day, and its error is assumed to be half of this duration. In cases with no non-detections available or when the last non-detection is older than 20 days, the explosion epoch has been determined by matching spectral templates to our optical spectra using SNID (Blondin & Tonry 2007) and averaging the epoch of the best fits. For this, the spectra of SN with well-constrained explosion epoch from non-detections have been incorporated as new templates to SNID (exact details will be given in Gutiérrez et al. in prep.).

All photometric measurements have been corrected for Galactic extinction using dust maps from Schlafly & Finkbeiner (2011) assuming an R_V=3.1 and a Cardelli et al. (1989) law. No correction for SN host galaxy extinction is applied to the data, and neither S- nor K-corrections have been considered due to the similar bands used in the observations and the low redshift range of our data (Sanders et al. 2015 and de Jaeger et al. in prep. showed that the K terms are lower than 0.2 mag at redshifts lower than 0.1). In addition, the temporal scale of all light-curves has been corrected for time dilation. All further analysis presented in the following sections starts with these corrections applied.

In Figure 4 we show the temporal coverage of our objects sorted by the first (left panel) and last photometric epoch (right panel), all with respect to the estimated explosion date. For the vast majority of objects, the first observation was performed within 20 days from explosion ($\langle t_{\rm first} \rangle = 14.7 \pm 11.1$ days) and on average the light curves extend through 158.2 $\pm$ 98.7 days, covering the whole recombination phase.

3.2. Color curves

Our multi-band light curves allow for the study of the color characteristics and its temporal evolution. In Figure 5 the behavior of the $(U-B), (B-V), (B-R), (B-I), (V-R), (V-I)$ and $(R-I)$ colors is presented. In the top panel, average values of the color curves binned in 30 days intervals are overplotted, where the horizontal error represents the width of the bin and the vertical error the standard deviation for the objects in each bin. The bottom panels show each color separately.

All colors increase steadily at early times during the first few weeks due to the drop in temperature, which shifts the peak of the spectral energy distribution to redder wavelengths. This initial slope is more pronounced in colors containing bluer bands or with greater wavelength baselines, because bluer bands are more sensitive to the temperature decline and the increasingly strong line blocking affecting this initial phase (Dessart et al. 2013). In the subsequent weeks the increase is less pronounced because the temperature conditions at the photosphere remain similar due to the recombination of H happening during this phase (Chieffi et al. 2003). During the radioactive phase ($\gtrsim$ 100-150 days after the explosion) the color curves become flatter, in part because in this phase the SN II photometric evolution, which depends on the ^{56}Co decay, is approximately the same in all bands. At later epochs when approaching the nebular phase ($\lesssim$200 days) all curves start to decrease, the spectrum shows weak continuum and the emission lines start to dominate.

The range spanned by a given color index decreases in the following order: $(B-I), (B-$

$R), (B-V), (V-I), (V-R)$, and $(R-I)$. The same sequence is also seen in the scatter for a color index at a given epoch. It has already been shown that scatter in SN II intrinsic color evolution exists, rendering it difficult to determine dust absorption for an individual SN (Dessart et al. 2013; Pejcha & Prieto 2015b). Keeping this caveat in mind, and assuming that those objects with the bluest colors suffer little to no reddening, one can interpret the color excess as an indication of the amount of extinction (Schmidt et al. 1992). This assumption agrees with the fact that the color excesses decrease in the redder bands, implying lower extinction with increasing wavelength. Further analysis on host galaxy extinction is beyond the scope of this paper, and will be presented in de Jaeger et al. (in prep.).

For the few objects with U and B photometry available we also show in Figure 5 the $(U-B)$ color with blue open squares. It is clearly seen how at early epochs it takes negative values showing that right after explosion, SN II emit more intensely in shorter wavelengths than in the optical. In the days following the explosion SN II spectra are characterized by a blue and featureless continuum. On the following weeks, in addition to the temperature decrease, line blanketing affects the UV part of the spectrum making the UV brightness decline steeper than the blue, and producing a rapid $(U-B)$ increase.

In general all objects show similar behavior in all colors, with some special cases. We find a few objects further than 2 sigma from the average color curve. The three objects with the reddest colors are SN 2003fb, 2003hg and 2003ho. SN 2003hl is intermediate between these three and the rest of the sample. These objects probably suffer important levels of extinction. On the other hand, SN 1999em (together with SN 1991al, 1993K, 2002ew, 2003B, 2003bn, and 2003ib) is located at the bottom of the curves, which can be interpreted as having little host-galaxy reddening. Also shown in solid lines is the color evolution of the four objects that were classified as 1987A-like, SN IIb, or SN IIn. SN 2003cv is also located at the redder end in the color curve evolution at early epochs, while SN 2003bg (also a SN IIb) follows the average evolution, but is bluer than all other SN II 50 days after explosion.

Although we did not differentiate our sample into SN IIP and SN IIL subtypes, we do not see two distinct color behaviors in any of the color curves, therefore confirming that SNII form a continuous class.

3.3. Absolute magnitudes

We calculated absolute magnitudes of all our photometric measurements to study the global behavior of SN II light curves in different bands. For that, a measurement of the distance to the SN is needed. Distances to SN host galaxies with CMB-corrected recession velocities lower than 3000 km s^{-1} are collected from NED and averaged, using only distances based on the Tully-Fisher and Cepheid methods. For SN with host galaxy velocities higher than 3000 km s^{-1} the distance is measured using the luminosity-distance expression, assuming a Hubble constant, H_0, of 68 km s^{-1} Mpc^{-1} and cosmological density parameters Ω_M = 0.30 and Ω_Λ = 0.70 (Planck Collaboration et al. 2015). Distance errors are added to the photometric errors in the absolute magnitude error budget. Figure 6 shows all the available MW extinction-corrected absolute magnitude light curves for each of the six bands presented here in separated panels, smoothed using a 3rd order spline polynomial. All panels show wide ranges in both absolute magnitudes and light-curve morphologies of the SN presented here.

Absolute magnitudes at maximum brightness in all light curves were measured by fitting a second-order polynomial to the early epochs when: (i) at least four points were available, and (ii) the second measurement was brighter than the first (indicating that the first was still part of the rise). Otherwise the first photometric point was considered the maximum brightness of the SN.

The average MW extinction-corrected peak absolute magnitudes of all SN in our sample (excluding 87A-like, IIb, and IIn) are the following: $\langle U_{max}\rangle$=–16.06 mag (σ=1.74, 6 SN); $\langle B_{max}\rangle$=–16.43 mag (σ=1.19, 47 SN); $\langle V_{max}\rangle$=–16.89 mag (σ=0.98, 45 SN); $\langle R_{max}\rangle$=–16.96 mag (σ=1.03, 24 SN); $\langle I_{max}\rangle$=–17.38 mag (σ=0.95, 46 SN) ($\langle z_{max}\rangle$ is not reported since there are not enough data to do statistics). The average absolute magnitude increases by 1.3 mag from U to I. We added a horizontal line and a strip in Figure 6 representing the average absolute peak magnitude and its 1σ scatter, respectively. Light curves in our sample fill the strip at peak epochs showing a continuum of peak absolute magnitudes. Similarly to Faran et al. (2014a,b), our average magnitudes are slightly lower ($\sim$0.7 mag) than those previously published, but still consistent within the uncertainties. While only a few objects peak at magnitudes brighter than the range covered by the 1σ strip (including SN 2003bg), a higher number with low-luminosity appear below the strip. The range of magnitudes at peak span $\sim$4.5 mag in all bands, from SN 1999br being the faintest and SN 2003eg the brightest. While the broad-line Type IIb SN 2003bg is one of the brightest objects in all bands with data near maximum (B, V, I), the other SN IIn and 1987A-like objects have brightness around the average.

In Figure 7 we show the $BVRI$-band light curves referenced to the epoch of maximum brightness and normalized to peak magnitude. Once the differences in maximum brightness among SN II are removed, these panels show how other light-curve parameters compare, such as the duration of the plateau, the post-maximum brightness decline, or the slope of the radioactive tail. As pointed out by Anderson et al. (2014), with the V-band light curves of the CSP sample, and the sample recently published by Sanders et al. (2015), we do not distinguish two separate groups among the diversity of light-curves. On the other hand, our findings rather show a continuum in all the parameters listed above, and in all the optical bands presented here.

3.4. Brightness decline

We measure the brightness decline parameter, s, defined as the decline rate in magnitudes per 100 days of the post-maximum light-curve until the end of the plateau. This is similar to the $s1$ and $s2$ parameters defined by Anderson et al. (2014). For the reddest bands, the first phase of brightness decline after maximum right before entering into the recombination phase, $s1$, is not clearly seen. Therefore, s is adopted instead of the $s2$ parameter in order to compare multi-band observations in a systematic way. The exact details of this parameter and its behavior in different bands will be a matter of future work.

To measure s, it was first necessary to define the epoch at which the plateau ends for each band separately. Similarly to Anderson et al. (2014), we set this as the epoch at the latest phases of the plateau at which the brightness deviates more than 0.1 mag from the linear fits. We stress that (i) for a single SN, this epoch is statistically the same in all bands, and (ii) their distribution is similar for all bands (although the average increases slightly for redder bands) and peaks at 77.5 ($\pm$26.3) days after the explosion epoch. Photometric decline rates are all measured by fitting a straight line to the defined phase, taking into account photometric errors. For those objects for which the end of the plateau in the U band cannot be defined, we take that epoch from other bands.

The average values for the decline rates for all SN II in our sample where the measurement can be confidently performed are: $\langle s_U \rangle$= 8.06 mag 100d^{-1} (σ=1.87, 6 SN); $\langle s_B \rangle$= 3.17 mag 100d^{-1}(σ=1.29, 45 SN); $\langle s_V \rangle$= 1.53 mag 100d^{-1} (σ=0.91, 45 SN); $\langle s_R \rangle$= 0.92 mag 100d^{-1} (σ=0.76, 22 SN); $\langle s_I \rangle$= 0.65 mag 100d^{-1} (σ=1.01, 43 SN) ($\langle s_z \rangle$ is not reported since there are not enough data to do statistics). Similarly to the absolute magnitude distributions discussed above, SN decline steeper in the blue bands and the decline gets shallower in the redder bands.

Peculiar SN, IIn and IIb SN have not been considered in the measurement of the average values since their light-curves present different morphologies that are not best described by this characterization.

3.5. Peak magnitude and brightness decline relation

In this section we study the relation between the two parameters measured in the previous sections: the peak absolute magnitude and the brightness decline rate. This correlation holds promise for the standardization of the SN II absolute peak magnitudes and may enable their use as distance indicators for cosmology (Anderson et al. 2014), in a similar way to the luminosity decline-rate relation used for type Ia SN (Phillips 1993b).

Here we exclude from our sample of 51 SN I the four IIb, IIn and SN 1987A-like events. To improve the statistics and the significance of the results presented below we expand our sample of 47 SN II to 114 by including 67 SN II for which photometry is available in the literature, as listed in Table 6.

Figure 8 presents histograms of the distributions of decline rates, s, in each band together with their median values for the complete sample. The same trends described in §3.4 are recovered: bluer bands show higher s values, and the median values (represented in dashed vertical lines in the Figure) are lower for redder bands.

In the left panel of Figure 9, M_{max} is plotted vs. s. Filled circles are SN presented in this paper and empty circles are objects from the literature. These parameters show a trend in the sense that lower luminosity SN decline more slowly, while more luminous events decline more rapidly. This behavior was previously reported in the V band (Anderson et al. 2014), and it is presented here for the first time for the $UBVRI$-band light curves. We performed linear fits to the data in each band and we found that the one showing the best correlation is the B band (r=–0.59, N=97). This is contradictory to the insignificant correlation found by Pejcha & Prieto (2015a), but their result can be due to the small size of their sample.

For those objects for which the measurement of the plateau duration is possible, we show in the right panel of Figure 9 its relation with the s parameter. Plateau durations cover a range from ∼20 to ∼80 days in all bands, with some SN having shorter plateaus in the bluer bands, and some with higher values for redder bands. SN with deeper declines (higher s) are found also to have shorter plateaus, and SN which decline in brightness more slowly (lower s) have longer plateaus. Linear fits to the $BVRI$ data separately give similar slopes of -0.03 (mag 100 d^{-1} per day), with increasing correlation factors from -0.6 to -0.8 for bluer to redder bands.

Both the luminosity and the plateau duration are related to s, in a way that SN declining faster have shorter plateaus and brighter magnitudes (see Figure 9). According to Kasen & Woosley (2009) models, these two parameters basically depend on the kinetic energy of the explosion and the mass of the ejecta (see also Popov 1993)[3]. For larger and/or denser H layers, a higher fraction of energy is lost in the diffusion of the radiation through the envelope, the radiation is trapped for a longer time (thus longer duration plateau phases), and less energy/radiation escapes and contributes to the luminosity (Blinnikov & Bartunov 1993). The observed relations between luminosity, plateau duration and decline rate (s) indicate that SNe exploding with higher kinetic energies are those resulting from progenitors with smaller and/or less dense H envelope masses at the explosion. This is in agreement with the current view of massive star evolution, where the progenitors of core collapse SN with reduced H envelopes are stars with larger zero-age main sequence (ZAMS) masses that have experienced a higher degree of mass-loss prior to explosion (Heger et al. 2003).

Finally, the wide range of plateau durations, decline rates, and peak luminosities can also be interpreted as a clear indication of a continuity in the SN II class.

4. Summary and Conclusions

This paper presents a sample of multi-band, visual-wavelength light curves of 51 SN II observed from 1986 to 2003 in the course of four different surveys: the Cerro Tololo Supernova Survey, the Calán/Tololo Supernova Program (C&T), the Supernova Optical and Infrared Survey (SOIRS), and the Carnegie Type II Supernova Survey (CATS). Near-infrared photometry and optical spectroscopy of this set of SN II will be published in two companion papers.

After determining their explosion dates and correcting all photometry for Galactic extinction and time dilation, we investigated their color behavior in different bands, measured their peak absolute magnitudes, and the brightness decline in the recombination phase in all bands. No evidence of two separate families (SN IIP and SN IIL) can be seen in our results, confirming previous reports that there is a continuity in SN II characteristics.

All color curves grow steadily redder during the first few weeks due to a decrease in surface temperature, and reach a maximum around ∼100-150 days followed by a shallow color decrease. $(U-B)$ colors are found to begin with negative values around maximum followed by a rapid increase to redder colors owing to the temperature decline (cooling) and the increasingly higher line blanketing toward shorter wavelengths.

[3] Note that the mass of radioactive ^{56}Ni synthesized in the explosion extends the plateau in time by a few percent (Kasen & Woosley 2009). It also powers the luminosity after the recombinations phase, and its total mass has been shown to correlate well also with the plateau luminosity (Hamuy 2003a; Pejcha & Prieto 2015a)

For a given color index, the scatter among different SN increases for color indices involving bluer bands, supporting the idea that the color diversity could be caused by host-galaxy dust extinction. Going a step further and assuming that all SN have similar intrinsic color curves, we note that SN with higher excess in one color index also have higher excess in other color indices, whereas the bluest SN appear blue in all color indices, lending support to the idea that the color excess is an indication of host-galaxy dust extinction. However, it is possible that part of the color diversity could be due to intrinsic effects. The low luminosity SN 1999br is a clear example of an intrinsically red SN. In a future paper (de Jaeger et al.) we will address this issue.

With all the available MW extinction-corrected absolute magnitude light-curves we find a wide range of magnitudes and light curve morphologies in all $UBVRIz$ bands. We measured absolute peak magnitudes finding the following mean values: $\langle U_{max} \rangle$=–16.06 ± 1.74; $\langle B_{max} \rangle$=–16.43 ± 1.19; $\langle V_{max} \rangle$=–16.89 ± 0.98; $\langle R_{max} \rangle$=–16.96 ± 1.03; $\langle I_{max} \rangle$=–17.38 ± 0.95. Only a few outliers with peak magnitudes brighter and fainter than 1σ of the distribution are found.

We defined the s parameter, which measures the brightness decline rate from maximum light through the end of the recombination phase, and found that this decline parameter is steeper in the blue bands than redder bands.

We added a set of 67 low-z SN II with publicly available photometry to study the absolute magnitude vs. brightness decline parameter s relation. From a total sample of 114 SN II, we found a clear correlation in all bands, with the following characteristics: (1) more luminous SN have steeper light curves; (2) the slope of the correlation decreases with increasing wavelength; (3) the correlation is higher in the B band. Finally, we also found a correlation between the s parameter and the plateau duration, being the latter shorter (longer) for larger (smaller) s values.

The complete set of photometry is available electronically[4] or can be requested from the authors. Each SN folder in the tarball includes an info file containing its name, subtype, redshift, coordinates, host galaxy name, morphology and MW extinction from Schlafly & Finkbeiner (2011).

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[4] https://github.com/lgalbany/51_SNII_LC

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Table 1. Type II Supernovae

SN name	Host Galaxy	Host type[a]	RA(J2000)	DEC(J2000)	z_{helio}[b]	$E(B-V)$	DM	Survey
1986L	NGC 1559	SB(s)cd	04 17 31.2	–62 47 07	0.00435	0.030	30.72(0.34)[d]	1
1991al	2MASX J19422191–5506275	S	19 42 24.0	–55 06 23	0.01525*	0.051	34.12(0.14)	2
1992T	2MASX J13425875–3153105	SB	13 43 01.5	–31 53 36	0.03898*	0.048	36.30(0.05)	2
1992U	ESO 074– G 004	SBc	20 40 46.5	–70 41 33	0.01086*	0.051	33.39(0.06)	2
1992ad	NGC 4411B	SAB(s)cd	12 26 49.6	+08 52 39	0.00424	0.030	31.13(0.80)[d]	2
1992af	ESO 340– G 038	Sc	20 30 40.2	–42 18 35	0.01847	0.052	34.52(0.01)	2
1992am	MCG –01–04–039	S	01 25 02.7	–04 39 01	0.04799*	0.049	36.66(0.05)	2
1992ba	NGC 2082	SB(r)b	05 41 47.1	–64 18 01	0.00395	0.058	30.41(0.80)[d]	2
1993A	2MASX J07391822–6203095	–	07 39 17.3	–62 03 14	0.02930*	0.173	35.65(0.01)	2
1993K	NGC 2223	SAB(r)b	06 24 37.8	–22 49 51	0.00908	0.064	33.15(0.40)[d]	2
1993S	2MASX J22522390-4018432	S	22 52 23.4	–40 18 37	0.03301	0.016	35.82(0.03)	2
1999br[g]	NGC 4900	SB(rs)c	13 00 41.8	+02 29 46	0.00320	0.024	31.19(0.40)[d]	3
1999ca	NGC 3120	SAB(s)bc?	10 05 22.9	–34 12 41	0.00931	0.109	33.32(0.02)	3
1999cr	ESO 576– G 034	S/Irr	13 20 18.3	–20 08 50	0.02023*	0.098	34.90(0.01)	3
1999eg	IC 1861	SA0ˆ0	02 53 08.4	+25 29 24	0.02236	0.117	34.94(0.01)	3
1999em	NGC 1637	SAB(rs)c	04 41 27.1	–02 51 46	0.00239	0.040	30.56(0.69)[d]	3
2000cb[g]	IC 1158	SAB(r)c?	16 01 32.1	+01 42 23	0.00643	0.112	32.51(0.59)[d]	3
2002ew	SDSS J205430.45-000820.9	–	20 54 30.5	–00 08 26	0.02994	0.102	35.58(0.06)	4
2002fa	GALEXASC J205221.54+020843.8	–	20 52 21.8	+02 08 42	0.06000	0.088	37.18(0.08)	4
200210	MCG +00–03–054	Sbc	01 01 16.8	–01 05 52	0.05140	0.036	36.82(0.03)	4
2002gd	NGC 7537	SAbc?	23 14 37.0	+04 30 06	0.00892	0.067	32.88(0.26)[d]	4
2002gw	NGC 0922	SB(s)cd	02 25 03.0	–24 47 51	0.01028	0.020	33.42(0.37)[e]	4
2002hj	NPM1G +04.0097	–	02 58 09.3	+04 41 04	0.02360	0.115	35.07(0.03)	4
2002hx	2MASX J08273975–1446551	SB(r)b?	08 27 39.4	–14 47 16	0.03100	0.054	35.80(0.02)	4
2002ig	SDSS J013637.22+005524.9	–	01 36 36.7	+05 55 26	0.07700	0.034	37.75(0.15)	4
2003B	NGC 1097	SB(s)b	02 46 13.8	–30 13 45	0.00424	0.027	31.03(0.26)[d]	4
2003E	ESO 485– G 004	Sc?	04 39 10.9	–24 10 37	0.01490*	0.048	34.10(0.04)	4
2003T	UGC 04864	SA(r)ab	09 14 11.0	+16 44 48	0.02791	0.031	35.58(0.01)	4
2003bg[h]	ESO 420– G 009	SB(s)c	04 10 59.4	–31 24 50	0.00456	0.022	33.18(0.23)[f]	4
2003bj	IC 4219	SB(rs)b	13 18 29.1	–31 37 38	0.01219	0.065	33.85(0.04)	4
2003bl	NGC 5374	SB(r)bc?	13 57 30.6	+06 05 36	0.01459*	0.027	34.20(0.02)	4
2003bn	2MASX J10023529–2110531	–	10 02 35.5	–21 10 55	0.01277	0.065	33.97(0.02)	4
2003ci	UGC 06212	Sb	11 10 23.8	+04 49 36	0.03037	0.060	35.78(0.06)	4
2003cn	IC 0849	SAB(rs)cd	13 07 37.0	–00 56 50	0.01811*	0.021	34.68(0.03)	4
2003cv[g]	SDSS J111748.37+190905.3	–	11 17 48.3	+19 09 08	0.02888	0.021	35.66(0.07)	4
2003cx	NEAT J135706.53–170220.0	–	13 57 06.4	–17 02 23	0.03700	0.094	36.18(0.03)	4
2003dq	SDSS J110445.44+152650.4	–	11 04 45.4	+15 26 49	0.04600	0.019	36.67(0.15)	4
2003ef	NGC 4708	SA(r)ab	12 49 42.2	–11 05 30	0.01480*	0.046	34.27(0.04)	4
2003eg	NGC 4727	SAB(r)bc	12 50 58.3	–14 20 01	0.02500	0.053	35.36(0.15)	4
2003ej	UGC 07820	SAB(s)cd?	12 39 11.1	+00 43 30	0.01698	0.019	34.55(0.02)	4
2003fb	UGC 11522	Sbc	20 11 50.3	+05 45 38	0.01754*	0.183	34.36(0.01)	4
2003gd	NGC 0628	SA(s)c	01 36 42.6	+15 44 20	0.00219	0.069	29.93(0.40)[d]	4
2003hd	ESO 543– G 017	Sb	01 49 46.3	–21 54 38	0.03950	0.013	36.23(0.01)	4
2003hg	NGC 7771	SB(s)a	23 51 24.1	+20 06 38	0.01427	0.074	33.83(0.01)	4
2003hk	NGC 1085	SA(s)bc?	02 46 25.7	+03 36 32	0.02265	0.037	34.97(0.02)	4
2003hl	NGC 0772	SA(s)b	01 59 21.3	+19 00 15	0.00825	0.073	32.60(0.18)[d]	4

Table 1—Continued

SN name	Host Galaxy	Host type[a]	RA(J2000)	DEC(J2000)	z_{helio}[b]	$E(B-V)$	DM	Survey[c]
2003hn	NGC 1448	SAcd?	03 44 36.1	–44 37 49	0.00390	0.014	31.13(0.25)[d]	4
2003ho	ESO 235– G 058	SB(rs)d	21 06 30.5	–48 07 30	0.01438	0.039	33.95(0.04)	4
2003ib	ESO 528– G 018	(R)S(r)b?	20 33 31.0	–24 37 15	0.02482	0.048	35.17(0.01)	4
2003ip	UGC 00327	Sbc	00 33 16.7	+07 54 20	0.01801	0.066	34.39(0.01)	4
2003iq	NGC 0772	SA(s)b	01 59 19.9	+18 59 42	0.00825	0.073	32.60(0.18)[d]	4

[a]From NASA/IPAC Extragalactic Database (NED).

[b]From NED except those marked with * which have been measured here.

[c](1) Cerro Tololo Supernova Survey; (2) Calán/Tololo Supernova Program (C&T); (3) Supernova Optical and Infrared Survey (SOIRS); (4) Carnegie Type II Supernovae Survey (CATS).

[d]From NED using only Tully-Fisher measurements. Errors are standard deviation of the mean.

[e]No Tully-Fisher measurements available. DM measured used SN II data.

[f]Although its redshift is lower than 0.01, it has been measured using Tully-Fisher measurements.

[g]Peculiar 1987A-like SN.

[h]Type IIb SN.

Table 2. Discovery and classification references for the 51 Type II Supernovae

SN name	Discovery	Classification
1986L	Evans et al. (1986)	Lloyd Evans et al. (1986)
1991al	Wells et al. (1991)	Bouchet et al. (1991)
1992T	Maza et al. (1992b)	—[a]
1992U	Maza et al. (1992a)	Phillips (1992)
1992ad	McNaught et al. (1992)	McNaught et al. (1992)
1992af	Wells et al. (1992)	della Valle & Bianchini (1992)
1992am	Phillips et al. (1992)	Phillips et al. (1992)
1992ba	Evans & Phillips (1992)	Evans & Phillips (1992)
1993A	Maza et al. (1993b)	Phillips (1993a)
1993K	Williams et al. (1993)	Hamuy (1993a)
1993S	Maza et al. (1993a)	Hamuy (1993b)
1999br	King (1999)	Garnavich et al. (1999)
1999ca	Woodings et al. (1999)	Patat et al. (1999)
1999cr	Maza et al. (1999)	Maza et al. (1999)
1999eg	Hurst et al. (1999)	Jha et al. (1999b)
1999em	Li (1999)	Jha et al. (1999a)
2000cb	Papenkova & Li (2000)	Papenkova & Li (2000)
2002ew	Hutchings et al. (2002)	Filippenko & Chornock (2002)
2002fa	Wood-Vasey et al. (2002b)	Hamuy (2002b)
200210	—[b]	—[b]
2002gd	Klotz et al. (2002)	Hamuy (2002a)
2002gw	Monard (2002)	Hamuy et al. (2002)
2002hj	Wood-Vasey et al. (2002a)	Chornock et al. (2002)
2002hx	Graham & Li (2002)	Matheson et al. (2002)
2002ig	Miknaitis et al. (2002)	Miknaitis et al. (2002)
2003B	Evans & Quirk (2003)	Kirshner & Silverman (2003)
2003E	Papenkova & Li (2003)	Hamuy (2003d)
2003T	Poznanski et al. (2003)	Foley et al. (2003)
2003bg	Wood-Vasey et al. (2003c)	Hamuy et al. (2003c)
2003bj	Chassagne (2003)	Swift et al. (2003)
2003bl	Swift et al. (2003)	Phillips et al. (2003)

Table 2—Continued

SN name	Discovery	Classification
2003bn	Wood-Vasey et al. (2003d)	Salvo et al. (2003b)
2003ci	Revnivtsev et al. (2003)	Salvo et al. (2003b)
2003cn	Wood-Vasey et al. (2003e)	Hamuy (2003b)
2003cv	Wood-Vasey et al. (2003b)	Hamuy et al. (2003a)
2003cx	Wood-Vasey et al. (2003a)	Hamuy (2003c)
2003dq	Puckett et al. (2003)	Phillips & Hamuy (2003)
2003ef	Weisz & Li (2003)	Ganeshalingam et al. (2003)
2003eg	Ganeshalingam & Li (2003a)	Matheson et al. (2003b)
2003ej	Ganeshalingam et al. (2003)	Matheson et al. (2003c)
2003fb	Papenkova et al. (2003)	Papenkova et al. (2003)
2003gd	Evans & McNaught (2003)	Garnavich & Bass (2003)
2003hd	Ganeshalingam & Li (2003b)	Hamuy et al. (2003b)
2003hg	Moore & Li (2003)	Elias-Rosa et al. (2003)
2003hk	Boles & Li (2003)	Filippenko et al. (2003)
2003hl	Moore et al. (2003)	Filippenko et al. (2003)
2003hn	Evans et al. (2003)	Salvo et al. (2003a)
2003ho	Monard (2003)	Hamuy & Roth (2003)
2003ib	Singer et al. (2003)	Morrell & Hamuy (2003)
2003ip	Li et al. (2003)	Filippenko & Foley (2003)
2003iq	Llapasset et al. (2003)	Matheson et al. (2003a)

[a]Not reported in the literature. Classification provided here for the first time.

[b]The CATS survey performed the follow up of SN 200210, which was discovered by the SN Factory (Wood-Vasey et al. 2004) and was never reported to the International Astronomical Union (IAU) to provide an official designation.

Table 3. Telescope and Instruments Employed for Photometry

Observatory	Telescope	Instrument
Cerro Tololo	0.9m	Photoelectric Photometer
Cerro Tololo	0.9m	CCD Camera
Cerro Tololo	1.0m	CCD Camera
Cerro Tololo	1.5m	CCD Camera
Cerro Tololo	Blanco 4m	CCD Camera
Las Campanas	Swope 1m	CCD Camera
Las Campanas	du Pont 2.5m	CCD Camera
Las Campanas	Baade 6.5m	CCD Camera
Las Campanas	Clay 6.5m	CCD Camera
La Silla	1.54m	CCD Camera
La Silla	NTT 3.5m	CCD Camera
Steward	2.3m	CCD Camera
Steward	1.6m	CCD Camera

Table 4. $UBVRIZ$ Photometric Sequences

Star	U	B	V	R	I	z	n
				SN 1986L			
1	···	13.530(020)	12.970(010)	···	···	···	12
2	···	15.710(050)	14.770(020)	···	···	···	12
3	···	17.930(050)	17.160(020)	···	···	···	12
4	···	16.360(050)	15.500(020)	···	···	···	12
5	···	13.970(020)	13.390(010)	···	···	···	12
				SN 1991al			
1	···	17.908(008)	17.036(012)	16.560(008)	16.074(010)	···	5
2	···	17.633(010)	16.770(006)	16.273(010)	15.808(008)	···	5
3	···	17.428(008)	16.619(011)	16.144(012)	15.710(009)	···	5
4	···	15.390(009)	14.427(010)	13.889(015)	13.391(009)	···	5
5	···	19.075(015)	18.358(007)	17.939(011)	17.522(016)	···	5
6	···	18.846(012)	18.365(006)	18.039(007)	17.676(012)	···	5
7	···	18.371(012)	17.332(016)	16.682(009)	16.098(009)	···	5
8	···	16.436(010)	15.558(010)	15.058(012)	14.572(013)	···	5
9	···	15.799(006)	14.965(007)	14.490(012)	14.026(005)	···	5
				SN 1992T			
1	···	13.971(016)	···	···	···	···	1
2	···	16.320(015)	15.383(009)	14.871(009)	14.386(008)	···	5
3	···	16.282(014)	15.417(013)	14.941(009)	14.482(008)	···	5
5	···	17.363(015)	16.527(009)	16.058(007)	15.610(006)	···	5
6	···	17.482(015)	16.714(011)	16.281(007)	15.852(009)	···	5
7	···	16.032(013)	15.353(011)	14.983(009)	14.615(008)	···	5
8	···	18.053(022)	17.225(015)	16.777(007)	16.296(006)	···	5
9	···	18.084(018)	17.406(010)	16.992(009)	16.563(006)	···	5

Table 4—Continued

Star	U	B	V	R	I	z	n
10	···	16.728(020)	15.316(014)	14.375(012)	13.454(014)	···	5
11	···	18.567(017)	17.594(011)	17.011(009)	16.451(006)	···	5
12	···	16.536(016)	15.537(009)	14.946(009)	14.421(009)	···	5
13	···	18.757(025)	18.029(014)	17.609(008)	17.166(018)	···	5
SN 1992U							
1	···	15.330(013)	15.327(011)	···	15.290(011)	···	3
2	···	18.146(011)	16.740(011)	···	15.054(009)	···	3
3	···	17.089(003)	16.572(011)	···	15.886(011)	···	3
4	···	16.254(010)	15.586(009)	···	14.844(011)	···	3
5	···	16.551(010)	15.544(011)	···	14.433(011)	···	2
6	···	17.020(013)	16.335(009)	···	15.507(009)	···	3
7	···	18.358(011)	17.492(008)	···	16.491(016)	···	4
8	···	18.118(008)	17.566(008)	···	16.904(011)	···	4
9	···	17.144(009)	16.557(009)	···	15.846(009)	···	3
10	···	18.182(008)	17.554(008)	···	16.834(009)	···	4
11	···	18.505(009)	17.930(008)	···	17.253(011)	···	4
SN 1992ad							
1	···	13.829(014)	13.107(013)	12.712(014)	12.335(011)	···	5
2	···	15.787(011)	15.284(010)	14.967(011)	14.653(010)	···	3
3	···	18.659(011)	17.214(020)	16.265(011)	15.222(009)	···	3
4	···	17.184(009)	16.671(010)	16.350(011)	16.025(013)	···	4
5	···	16.305(009)	15.720(011)	15.378(010)	15.028(010)	···	4
6	···	18.577(014)	17.812(011)	17.406(010)	16.990(007)	···	4
7	···	13.797(013)	13.159(011)	12.791(014)	12.437(011)	···	4
8	···	19.727(025)	18.175(019)	17.204(009)	16.187(014)	···	4
9	···	17.981(025)	17.219(007)	16.731(007)	16.243(010)	···	5
10	···	18.065(022)	17.008(006)	16.338(007)	15.776(010)	···	5

Table 4—Continued

Star	U	B	V	R	I	z	n
11	···	17.263(010)	16.208(010)	15.535(007)	14.992(014)	···	5
12	···	19.068(018)	17.561(018)	16.560(011)	15.389(010)	···	3
SN 1992af							
1	···	16.873(010)	16.230(008)	15.855(015)	15.499(009)	···	4
2	···	18.338(010)	17.685(008)	17.312(015)	16.947(009)	···	4
3	···	16.452(009)	15.853(008)	15.498(015)	15.150(009)	···	4
4	···	16.503(008)	15.855(008)	15.478(015)	15.126(009)	···	4
5	···	19.570(043)	18.558(010)	17.861(015)	17.295(011)	···	4
6	···	14.772(009)	14.166(009)	13.816(015)	13.468(011)	···	3
7	···	15.613(009)	14.904(008)	14.516(015)	14.164(009)	···	4
8	···	18.745(012)	17.648(008)	16.954(015)	16.358(020)	···	4
SN 1992am							
1	···	17.730(008)	16.637(008)	···	15.408(009)	···	2
2	···	18.083(010)	16.927(009)	···	15.576(008)	···	4
3	···	15.302(011)	14.883(009)	···	14.345(011)	···	3
4	···	17.282(006)	16.531(006)	···	15.728(006)	···	5
5	···	18.577(006)	17.075(007)	···	14.995(007)	···	4
6	···	18.778(016)	18.208(008)	···	17.472(016)	···	3
SN 1992ba							
1	···	16.269(007)	15.543(006)	15.121(015)	14.702(006)	···	8
2	···	18.011(010)	16.902(007)	···	15.695(006)	···	7
3	···	17.252(019)	16.603(010)	16.212(015)	15.820(007)	···	8
4	···	18.256(015)	16.822(010)	16.080(015)	15.352(008)	···	8
5	···	17.879(026)	17.890(051)	17.924(070)	18.040(105)	···	7
6	···	18.288(008)	17.537(007)	17.085(018)	16.642(010)	···	8

Table 4—Continued

Star	U	B	V	R	I	z	n
7	···	18.802(014)	18.177(019)	17.923(042)	17.435(015)	···	7
8	···	16.448(012)	15.280(009)	···	13.908(010)	···	3
9	···	19.099(017)	18.105(012)	17.570(029)	17.027(009)	···	7
				SN 1993A			
1	···	18.121(012)	17.086(008)	···	15.951(007)	···	11
2	···	18.560(013)	17.526(008)	···	16.456(009)	···	11
3	···	17.922(012)	17.092(007)	···	16.188(006)	···	11
4	···	19.728(013)	18.823(007)	···	17.854(012)	···	11
5	···	17.595(010)	16.779(006)	···	15.821(007)	···	11
6	···	15.765(015)	14.671(015)	···	···	···	2
7	···	17.101(011)	15.925(008)	···	14.644(008)	···	10
8	···	17.836(014)	17.147(007)	···	16.349(009)	···	9
9	···	19.303(015)	17.768(007)	···	15.823(008)	···	9
10	···	17.221(012)	16.240(007)	···	15.190(007)	···	9
11	···	18.831(012)	17.674(009)	···	16.442(006)	···	9
				SN 1993K			
1	···	15.658(015)	14.718(015)	14.187(015)	13.687(015)	···	1
2	···	16.668(011)	16.356(008)	16.161(008)	15.938(008)	···	2
3	···	17.292(008)	16.759(008)	16.428(009)	16.089(008)	···	2
4	···	15.370(015)	14.784(015)	14.443(015)	14.123(015)	···	1
5	···	14.316(015)	13.883(015)	13.598(015)	13.329(015)	···	1
6	···	15.534(015)	14.966(015)	14.634(015)	14.310(015)	···	1
7	···	17.299(008)	16.803(008)	16.501(008)	16.167(008)	···	2
8	···	17.002(011)	16.611(008)	16.371(008)	16.097(008)	···	2
9	···	16.886(008)	16.526(008)	16.321(008)	16.083(009)	···	2
10	···	18.676(009)	17.990(008)	17.598(008)	17.198(008)	···	2

Table 4—Continued

Star	U	B	V	R	I	z	n
			SN 1993S				
1	···	14.126(008)	13.395(009)	···	12.806(015)	···	3
2	···	17.302(007)	16.490(006)	···	15.637(007)	···	5
3	···	16.062(009)	15.575(006)	···	14.912(014)	···	5
4	···	18.652(006)	17.946(006)	···	17.108(007)	···	5
5	···	18.929(006)	17.736(007)	···	16.365(013)	···	5
6	···	14.970(006)	14.447(006)	···	13.772(007)	···	5
7	···	14.752(006)	14.013(006)	···	13.224(008)	···	5
			SN 1999br				
1	16.931(014)	15.847(007)	14.778(005)	14.167(006)	13.684(006)	13.445(015)	8
2	18.157(020)	17.233(007)	16.186(005)	15.533(006)	14.992(005)	14.742(015)	8
3	16.723(013)	16.940(006)	16.479(005)	16.161(006)	15.832(006)	···	6
4	20.160(063)	18.934(011)	17.460(008)	16.463(010)	15.383(006)	···	6
5	18.700(022)	18.686(009)	17.923(006)	17.453(007)	17.002(008)	16.796(015)	8
6	19.749(046)	20.006(016)	19.466(013)	19.136(015)	18.795(021)	18.755(071)	8
7	20.321(082)	19.824(014)	18.911(008)	18.384(010)	17.915(014)	17.700(027)	8
8	···	21.049(061)	19.493(012)	18.233(009)	16.671(006)	16.072(015)	7
9	19.114(040)	18.010(006)	16.729(005)	15.896(007)	15.129(006)	14.815(015)	8
10	19.477(034)	19.482(014)	18.887(009)	18.500(011)	18.146(014)	17.915(033)	8
11	15.497(010)	15.431(005)	14.788(005)	14.420(007)	14.067(006)	13.889(015)	7
12	20.768(107)	19.712(017)	18.316(006)	17.405(010)	16.543(009)	16.145(015)	8
13	19.449(067)	19.070(013)	18.293(007)	17.822(010)	17.419(008)	17.251(019)	7
14	21.294(184)	21.266(054)	20.567(036)	20.079(042)	19.604(059)	19.438(132)	6
			SN 1999ca				
1	15.493(016)	15.148(010)	14.407(008)	13.965(015)	13.584(011)	13.422(015)	3
2	19.217(027)	19.084(010)	18.318(007)	17.878(007)	17.433(009)	17.250(037)	3

Table 4—Continued

Star	U	B	V	R	I	z	n
3	17.880(018)	17.727(016)	17.027(008)	16.595(015)	16.155(009)	···	4
4	19.448(028)	18.456(008)	17.403(009)	16.775(007)	16.234(008)	15.978(015)	4
5	19.388(027)	18.087(010)	16.819(009)	16.052(008)	15.419(009)	15.157(015)	3
6	14.787(016)	14.781(013)	14.155(015)	···	···	13.235(015)	1
7	16.025(012)	15.981(010)	15.336(011)	14.929(015)	14.558(015)	14.384(015)	2
8	16.601(011)	16.319(011)	15.607(007)	15.175(011)	14.776(008)	14.588(015)	4
9	16.874(009)	16.731(010)	16.069(009)	15.661(009)	15.271(009)	15.089(015)	3
10	15.555(009)	15.367(010)	14.707(008)	14.300(015)	13.943(011)	13.787(015)	3
11	19.104(022)	18.395(009)	17.337(007)	16.741(007)	16.178(008)	15.915(015)	4
12	18.400(031)	18.380(015)	17.742(007)	17.303(007)	16.882(008)	16.696(022)	4
			SN 1999cr				
1	···	14.468(005)	13.898(005)	13.534(005)	13.172(006)	···	6
2	···	16.022(004)	15.320(004)	14.888(004)	14.457(005)	···	11
3	···	18.354(007)	17.464(004)	16.924(004)	16.434(004)	···	11
4	···	20.035(015)	18.745(007)	17.904(005)	17.161(010)	···	11
5	···	17.083(004)	16.061(004)	15.448(004)	14.874(004)	···	11
6	···	16.843(004)	16.126(004)	15.690(004)	15.259(004)	···	11
7	···	16.677(004)	16.063(004)	15.685(004)	15.297(005)	···	11
8	···	20.522(025)	20.053(016)	19.762(015)	19.437(020)	···	11
9	···	19.677(013)	18.142(005)	17.132(006)	16.073(004)	···	11
10	···	20.320(019)	19.818(013)	19.471(011)	19.067(019)	···	11
11	···	19.227(007)	18.548(015)	18.164(008)	17.784(005)	···	11
12	···	15.814(004)	15.141(004)	14.735(004)	14.335(005)	···	11
13	···	16.759(004)	15.909(004)	15.411(004)	14.953(004)	···	11
			SN 1999eg				
1	···	17.159(018)	16.030(011)	15.357(011)	14.765(011)	···	3
2	···	16.934(009)	15.956(009)	15.378(009)	14.833(009)	···	4

Table 4—Continued

Star	U	B	V	R	I	z	n
3	· · ·	18.627(007)	17.813(009)	17.336(009)	16.862(010)	· · ·	4
4	· · ·	18.112(009)	17.543(011)	17.175(009)	16.788(009)	· · ·	4
5	· · ·	15.134(015)	13.783(015)	· · ·	· · ·	· · ·	1
6	· · ·	15.407(011)	14.467(011)	13.929(015)	13.391(015)	· · ·	2
7	· · ·	14.253(015)	13.478(015)	· · ·	· · ·	· · ·	1
8	· · ·	15.614(011)	14.560(011)	13.956(015)	13.404(015)	· · ·	3
9	· · ·	16.710(017)	15.964(011)	15.545(011)	15.145(011)	· · ·	2
10	· · ·	18.256(012)	17.550(011)	17.114(011)	16.697(011)	· · ·	2
SN 1999em							
1	16.162(014)	16.200(008)	15.614(003)	15.252(006)	14.892(006)	· · ·	5
2	17.616(027)	17.599(017)	16.967(006)	16.590(009)	16.233(011)	16.123(014)	7
3	15.729(011)	15.725(006)	15.121(003)	14.770(004)	14.427(004)	14.290(011)	7
4	17.476(012)	16.739(005)	15.768(002)	15.211(004)	14.721(004)	14.515(011)	7
5	18.915(015)	18.593(011)	17.825(006)	17.396(009)	17.004(011)	16.813(025)	22
6	14.861(010)	13.631(004)	12.401(001)	11.755(007)	11.170(002)	10.904(011)	7
7	17.647(024)	17.709(011)	17.147(006)	16.811(010)	16.475(010)	16.368(017)	6
8	15.390(011)	14.194(006)	13.015(003)	12.409(005)	11.877(005)	11.638(011)	3
9	16.039(008)	15.674(004)	14.892(002)	14.453(003)	14.059(003)	13.896(011)	7
11	16.729(014)	16.156(008)	15.298(004)	14.854(006)	14.459(006)	· · ·	3
12	15.153(010)	14.993(007)	14.339(004)	13.970(006)	13.627(006)	· · ·	3
13	15.102(012)	14.945(008)	14.231(004)	13.823(007)	13.428(006)	· · ·	3
14	13.870(012)	13.560(007)	12.853(004)	12.462(006)	12.120(006)	· · ·	3
16	18.398(014)	18.544(009)	18.184(004)	17.938(007)	17.703(010)	· · ·	22
17	18.878(018)	19.080(011)	18.542(006)	18.189(011)	17.825(011)	· · ·	21
SN 2000cb							
1	17.094(017)	16.910(008)	16.210(008)	15.806(008)	15.416(008)	· · ·	4
2	16.936(017)	16.991(008)	16.557(008)	16.282(008)	15.972(008)	· · ·	4

Table 4—Continued

Star	U	B	V	R	I	z	n
3	16.841(017)	16.435(008)	15.609(008)	15.141(008)	14.704(008)	···	4
4	15.521(017)	15.321(008)	14.626(008)	14.232(008)	13.851(008)	···	4
5	16.467(017)	16.054(008)	15.244(008)	14.791(008)	14.356(008)	···	4
6	16.895(017)	16.904(008)	16.291(008)	15.913(008)	15.524(008)	···	4
7	17.837(021)	17.788(008)	17.182(008)	16.827(008)	16.459(009)	···	4
8	19.397(073)	18.831(038)	18.003(009)	17.507(008)	17.018(021)	···	4
9	18.226(028)	17.961(008)	17.264(009)	16.845(008)	16.435(008)	···	4
10	19.280(074)	19.150(020)	18.481(010)	18.064(010)	17.683(012)	···	4
11	16.957(017)	17.003(009)	16.411(009)	16.051(009)	15.676(009)	···	3
12	17.711(018)	17.550(008)	16.853(010)	16.446(008)	16.039(008)	···	4
SN 2002ew							
1	15.750(017)	15.280(015)	14.467(014)	···	···	···	2
2	16.565(017)	16.600(011)	15.993(007)	15.611(015)	15.204(008)	···	4
3	17.619(017)	17.370(017)	16.589(007)	16.136(015)	15.681(008)	···	4
4	17.266(017)	17.174(014)	16.487(007)	16.081(015)	15.665(008)	···	4
5	15.888(017)	15.447(014)	14.639(014)	···	···	···	2
6	18.263(026)	17.972(016)	17.188(007)	16.734(015)	16.275(008)	···	4
7	20.393(145)	19.752(033)	18.408(023)	···	16.653(018)	···	4
8	17.844(019)	17.573(012)	16.830(007)	16.398(015)	15.960(008)	···	4
9	18.252(028)	18.307(009)	17.698(007)	17.316(015)	16.904(008)	···	4
10	···	19.250(019)	18.360(012)	17.831(015)	17.248(011)	···	4
11	20.127(125)	20.228(025)	19.659(018)	19.315(024)	18.969(034)	···	4
12	18.068(020)	17.166(014)	16.032(014)	15.284(015)	···	···	3
SN 2002fa							
1	···	15.812(009)	15.168(009)	···	14.370(010)	···	5
3	···	18.302(007)	17.511(005)	17.032(008)	16.583(009)	···	5
4	···	16.612(009)	15.850(005)	15.405(008)	15.001(007)	···	5

Table 4—Continued

Star	U	B	V	R	I	z	n
5	···	18.006(010)	17.309(005)	16.886(011)	16.494(006)	···	5
6	···	20.399(028)	19.028(010)	18.139(017)	17.312(015)	···	5
7	···	18.953(013)	18.151(006)	17.649(010)	17.199(006)	···	5
8	···	19.095(013)	18.319(008)	17.858(017)	17.426(007)	···	5
9	···	18.862(013)	17.761(005)	17.059(008)	16.455(010)	···	5
10	···	19.153(016)	18.424(006)	18.000(012)	17.567(015)	···	5
SN 200210							
1	···	18.671(011)	18.044(010)	···	17.271(011)	···	3
2	···	18.743(007)	18.000(012)	···	17.106(007)	···	3
3	···	17.526(011)	16.980(010)	···	16.255(009)	···	3
4	···	18.343(008)	17.527(008)	···	16.546(008)	···	3
5	···	20.353(021)	18.753(013)	···	16.071(019)	···	3
6	···	15.863(009)	15.095(013)	···	14.219(014)	···	3
7	···	16.586(009)	15.679(011)	···	14.612(014)	···	3
8	···	19.820(020)	18.603(008)	···	17.121(010)	···	3
9	···	20.716(046)	19.118(010)	···	16.642(017)	···	3
10	···	17.379(012)	16.480(009)	···	15.515(008)	···	2
11	···	16.588(007)	···	···	···	···	3
SN 2002gd							
1	···	17.045(026)	16.062(018)	···	14.972(023)	···	2
2	···	21.642(274)	19.971(053)	···	17.361(052)	···	2
3	···	20.747(101)	19.371(032)	···	17.203(033)	···	2
4	···	21.612(148)	19.835(037)	···	17.436(066)	···	2
5	···	17.673(012)	16.933(012)	···	16.070(010)	···	2
6	···	17.409(026)	16.174(020)	···	14.699(038)	···	2
7	···	15.138(011)	14.571(014)	···	13.861(014)	···	2
8	···	19.271(035)	17.859(015)	···	15.976(050)	···	2

Table 4—Continued

Star	U	B	V	R	I	z	n
9	···	15.905(016)	15.171(014)	···	14.343(014)	···	1
10	···	17.726(016)	16.661(014)	···	15.458(014)	···	1
11	···	17.676(016)	16.972(014)	···	16.138(014)	···	1
			SN 2002gw				
1	···	18.194(016)	17.249(008)	···	16.174(020)	···	4
2	···	16.575(009)	15.725(007)	···	14.800(014)	···	4
3	···	18.855(015)	17.768(012)	···	16.494(024)	···	4
4	···	15.356(011)	···	···	···	···	1
6	···	14.910(011)	···	···	···	···	1
7	···	15.823(009)	15.207(007)	···	14.481(011)	···	3
8	···	16.926(010)	16.243(007)	···	15.462(008)	···	3
9	···	18.582(014)	16.775(014)	···	14.101(014)	···	2
10	···	17.629(014)	16.766(011)	···	15.683(014)	···	1
11	···	15.451(011)	···	···	···	···	1
12	···	17.287(011)	16.764(008)	···	16.140(019)	···	2
13	···	19.019(018)	18.102(013)	···	17.040(009)	···	3
14	···	16.494(011)	15.810(008)	···	15.049(021)	···	2
			SN 2002hj				
1	···	17.161(009)	16.625(007)	16.324(015)	15.880(008)	···	5
2	···	17.012(010)	16.103(007)	15.622(015)	15.052(007)	···	5
3	···	19.522(014)	18.302(008)	17.551(015)	16.826(007)	···	5
4	···	18.005(015)	16.544(011)	15.641(015)	14.713(007)	···	5
5	···	19.967(014)	18.381(012)	17.381(015)	16.189(008)	···	5
6	···	18.541(013)	17.855(009)	17.485(015)	16.964(009)	···	5
7	···	21.253(071)	19.856(020)	···	18.004(015)	···	5
8	···	20.996(041)	19.705(017)	18.920(021)	18.176(011)	···	5
9	···	15.702(009)	15.048(008)	14.713(015)	14.238(008)	···	5

Table 4—Continued

Star	U	B	V	R	I	z	n
10	···	17.319(014)	16.149(009)	15.440(015)	14.739(009)	···	5
11	···	17.050(009)	16.499(007)	16.191(015)	15.738(006)	···	5
12	···	21.772(084)	20.365(034)	19.287(027)	18.148(011)	···	5
13	···	20.669(033)	19.453(014)	18.761(018)	18.071(010)	···	5
14	···	18.112(014)	17.182(007)	16.685(015)	16.133(008)	···	5
			SN 2002hx				
1	···	16.114(017)	···	···	···	···	4
2	···	16.205(015)	15.658(007)	···	15.003(006)	···	5
3	···	17.344(013)	16.722(006)	···	16.015(006)	···	5
4	···	18.192(016)	17.508(006)	···	16.735(006)	···	5
5	···	19.516(015)	18.920(007)	···	18.162(012)	···	5
6	···	18.393(011)	17.753(010)	···	17.003(006)	···	5
7	···	17.767(018)	17.098(007)	···	16.277(006)	···	5
8	···	15.948(016)	···	···	···	···	4
9	···	18.861(019)	18.131(009)	···	17.315(007)	···	5
10	···	19.774(015)	18.681(015)	···	17.249(015)	···	5
11	···	19.737(021)	19.048(010)	···	18.235(016)	···	5
12	···	17.377(015)	16.438(006)	···	15.438(006)	···	5
13	···	20.140(023)	19.032(008)	···	17.716(012)	···	5
14	···	18.843(023)	18.353(009)	···	17.720(009)	···	5
			SN 2002ig				
1	···	18.937(014)	18.109(017)	···	17.125(016)	···	3
2	···	18.414(024)	17.845(010)	···	17.096(013)	···	3
3	···	19.493(023)	18.161(013)	···	16.617(011)	···	3
5	···	19.872(033)	18.061(029)	···	14.875(029)	···	3
6	···	16.904(007)	16.039(006)	···	15.118(008)	···	3
8	···	20.299(049)	19.249(035)	···	18.081(017)	···	3

Table 4—Continued

Star	U	B	V	R	I	z	n
9	···	16.251(007)	15.726(006)	···	15.013(007)	···	3
			SN 2003B				
1	16.823(018)	16.238(009)	15.415(011)	14.941(031)	14.545(007)	···	9
3	20.561(254)	19.276(023)	18.007(018)	17.139(054)	16.436(006)	···	5
4	19.322(079)	18.570(020)	17.574(013)	16.943(031)	16.430(008)	···	7
5	19.891(218)	19.165(010)	17.619(011)	16.582(037)	15.234(011)	···	10
6	19.237(097)	18.145(026)	16.960(016)	16.199(015)	15.478(007)	···	4
7	19.858(104)	18.652(020)	17.139(017)	16.133(027)	15.055(012)	···	5
8	20.762(259)	19.839(018)	18.264(010)	17.251(035)	16.083(010)	···	10
9	18.836(041)	17.604(013)	16.334(010)	15.507(031)	14.776(010)	···	9
10	15.357(030)	15.282(010)	14.640(016)	14.260(028)	13.920(010)	···	10
11	···	16.545(016)	15.736(014)	···	14.817(014)	···	1
12	···	15.397(016)	14.706(014)	···	13.880(014)	···	1
13	···	20.392(046)	18.738(014)	···	16.578(014)	···	1
14	···	20.675(057)	19.197(021)	···	16.824(014)	···	1
15	···	18.891(016)	18.007(014)	···	17.001(014)	···	1
16	···	20.678(057)	18.891(015)	···	16.356(014)	···	1
			SN 2003E				
1	···	16.177(011)	15.623(008)	···	14.945(006)	···	5
2	···	18.229(015)	17.206(009)	···	16.009(006)	···	5
3	···	20.868(054)	19.215(013)	···	16.859(006)	···	5
4	···	18.294(012)	16.955(009)	···	15.329(006)	···	5
5	···	19.838(024)	18.803(016)	···	17.477(019)	···	5
6	···	16.703(011)	16.032(009)	···	15.244(007)	···	5
7	···	21.497(069)	20.126(087)	···	18.002(012)	···	5
8	···	22.260(180)	20.418(037)	···	17.994(012)	···	5
9	···	21.544(068)	20.135(028)	···	18.364(022)	···	5

Table 4—Continued

Star	U	B	V	R	I	z	n
10	···	16.474(012)	15.765(007)	···	14.927(006)	···	5
11	···	16.361(010)	15.680(007)	···	14.894(009)	···	5
12	···	16.937(011)	16.280(007)	···	15.499(009)	···	5
13	···	18.448(012)	17.122(011)	···	15.488(006)	···	5
14	···	16.374(011)	15.690(009)	···	14.893(006)	···	5
15	···	22.444(173)	20.963(095)	···	18.168(014)	···	5
			SN 2003T				
1	···	16.749(008)	15.764(006)	···	14.638(008)	···	4
2	···	18.676(012)	17.862(005)	···	16.892(012)	···	5
3	···	18.895(010)	18.303(007)	···	17.566(013)	···	4
4	···	20.310(024)	19.366(014)	···	18.182(013)	···	5
5	···	20.738(034)	20.510(049)	···	19.672(132)	···	5
6	···	16.582(008)	15.891(005)	···	15.089(006)	···	5
7	···	15.753(008)	15.222(006)	···	14.557(008)	···	4
8	···	20.017(025)	18.598(010)	···	16.767(011)	···	4
9	···	17.894(008)	16.699(005)	···	15.278(008)	···	5
11	···	17.999(016)	16.801(010)	···	15.354(014)	···	5
12	···	16.853(016)	16.703(010)	···	16.443(014)	···	1
			SN 2003bg				
1	···	16.623(013)	16.051(006)	15.708(009)	15.366(005)	···	8
2	···	16.472(012)	15.632(007)	15.106(008)	14.637(005)	···	8
3	···	17.937(014)	16.891(008)	16.238(011)	15.702(005)	···	7
4	···	18.276(015)	17.707(008)	17.349(010)	17.019(010)	···	8
5	···	19.841(012)	18.386(007)	17.443(012)	16.496(006)	···	8
6	···	18.615(014)	17.927(008)	17.530(009)	17.128(009)	···	8
7	···	19.756(013)	19.310(013)	18.960(017)	18.539(020)	···	8
8	···	21.175(050)	19.745(025)	18.821(010)	17.927(014)	···	8

Table 4—Continued

Star	U	B	V	R	I	z	n
9	···	17.661(009)	16.685(009)	16.090(009)	15.596(005)	···	8
10	···	20.547(029)	19.442(026)	18.717(010)	18.071(015)	···	8
				SN 2003bj			
1	···	16.137(011)	···	···	14.581(014)	···	2
3	···	17.281(011)	16.171(014)	···	14.927(010)	···	2
4	···	18.135(011)	17.236(010)	···	16.192(008)	···	3
5	···	19.203(011)	17.632(013)	···	15.313(010)	···	3
6	···	16.752(011)	16.032(010)	···	15.228(008)	···	3
7	···	18.166(011)	17.376(010)	···	16.479(008)	···	3
8	···	18.246(011)	17.644(010)	···	16.892(008)	···	3
9	···	17.972(011)	16.938(010)	···	15.779(008)	···	3
10	···	18.490(011)	18.025(014)	···	17.420(010)	···	2
12	···	16.932(011)	16.200(010)	···	15.350(008)	···	3
13	···	16.972(011)	16.316(010)	···	15.572(008)	···	3
14	···	19.356(013)	18.143(012)	···	16.780(008)	···	3
				SN 2003bl			
1	···	16.909(009)	16.229(008)	···	15.433(009)	···	3
2	···	18.338(014)	17.674(014)	···	16.834(012)	···	3
3	···	20.428(037)	18.851(015)	···	16.283(014)	···	3
4	···	18.662(012)	17.865(009)	···	16.889(012)	···	3
5	···	18.759(014)	18.231(009)	···	17.511(011)	···	3
6	···	17.973(010)	18.054(013)	···	18.246(035)	···	3
7	···	15.250(016)	···	···	···	···	1
8	···	18.693(012)	18.148(019)	···	17.457(015)	···	3
10	···	18.835(015)	17.315(008)	···	15.337(014)	···	3
11	···	21.905(138)	20.204(037)	···	17.965(018)	···	3
12	···	21.488(220)	20.910(067)	···	20.146(247)	···	2

Table 4—Continued

Star	U	B	V	R	I	z	n
13	···	19.576(030)	18.075(009)	···	16.026(008)	···	3
14	···	20.915(060)	19.566(027)	···	16.966(008)	···	3
SN 2003bn							
1	···	15.177(010)	14.671(012)	···	14.063(010)	···	3
2	···	15.557(011)	14.896(013)	···	14.175(010)	···	3
3	···	15.837(012)	14.802(016)	···	13.753(010)	···	3
4	···	17.884(009)	17.293(008)	···	16.591(008)	···	3
5	···	19.380(021)	18.348(009)	···	17.307(010)	···	3
6	···	18.826(022)	17.810(012)	···	16.737(008)	···	3
7	···	17.435(012)	16.635(009)	···	15.716(008)	···	3
8	···	18.679(015)	18.123(009)	···	17.400(018)	···	3
9	···	15.376(010)	14.561(016)	···	13.719(010)	···	3
10	···	20.303(031)	18.830(013)	···	16.850(013)	···	3
11	···	19.451(017)	18.181(010)	···	16.726(013)	···	3
12	···	17.595(009)	16.665(009)	···	15.575(008)	···	3
13	···	17.831(017)	16.836(009)	···	15.775(008)	···	3
14	···	17.457(014)	16.484(010)	···	15.496(008)	···	3
15	···	16.592(010)	15.883(008)	···	15.114(008)	···	3
SN 2003ci							
1	···	16.879(009)	16.264(007)	···	15.514(007)	···	4
2	···	17.017(010)	16.037(008)	···	14.980(008)	···	4
3	···	18.629(010)	17.833(011)	···	16.920(009)	···	4
4	···	16.178(009)	15.530(008)	···	14.771(008)	···	3
5	···	19.886(019)	19.344(022)	···	18.691(019)	···	4
6	···	15.677(011)	14.917(014)	···	14.041(014)	···	2
7	···	19.207(013)	18.714(008)	···	18.081(011)	···	4
8	···	19.175(012)	18.325(016)	···	17.471(010)	···	3

Table 4—Continued

Star	U	B	V	R	I	z	n
9	···	16.571(009)	15.944(007)	···	15.149(007)	···	4
10	···	15.237(016)	···	···	···	···	1
11	···	17.263(009)	16.547(007)	···	15.727(007)	···	4
12	···	16.364(009)	15.487(008)	···	14.570(008)	···	3
			SN 2003cn				
1	···	15.400(011)	···	···	···	···	2
2	···	15.956(008)	15.389(010)	···	14.699(010)	···	4
3	···	16.552(008)	16.014(007)	···	15.329(007)	···	4
4	···	19.579(029)	18.723(011)	···	17.653(008)	···	4
5	···	19.935(024)	18.530(009)	···	16.750(007)	···	4
6	···	18.670(009)	18.433(010)	···	17.655(008)	···	4
7	···	19.871(016)	19.397(014)	···	18.784(068)	···	4
8	···	20.103(021)	19.565(017)	···	18.874(038)	···	4
9	···	19.720(014)	19.253(014)	···	18.634(020)	···	4
10	···	17.382(009)	···	···	···	···	4
11	···	22.472(320)	20.709(070)	···	18.038(013)	···	4
12	···	19.569(021)	18.189(011)	···	16.295(007)	···	4
			SN 2003cv				
1	···	19.063(015)	17.574(008)	···	15.592(008)	···	3
2	···	17.844(011)	16.989(008)	···	15.993(008)	···	3
3	···	18.140(011)	17.317(008)	···	16.376(008)	···	3
4	···	16.467(011)	15.567(014)	···	14.531(014)	···	2
5	···	17.255(011)	16.330(008)	···	15.289(008)	···	3
6	···	21.516(083)	19.975(036)	···	17.541(017)	···	3
7	···	20.376(028)	19.832(018)	···	19.105(093)	···	3
8	···	20.991(097)	19.312(012)	···	16.570(008)	···	3
9	···	19.084(014)	18.387(008)	···	17.577(020)	···	3

Table 4—Continued

Star	U	B	V	R	I	z	n
10	···	21.013(042)	19.717(023)	···	17.860(016)	···	3
			SN 2003cx				
1	···	19.976(038)	18.938(009)	18.265(040)	17.683(034)	···	3
2	···	18.034(013)	16.725(010)	15.846(021)	15.084(011)	···	2
3	···	18.224(011)	17.640(008)	17.275(012)	16.885(012)	···	3
4	···	19.358(028)	18.772(009)	18.401(010)	18.005(017)	···	3
5	···	18.484(011)	17.215(014)	16.382(018)	15.675(010)	···	3
6	···	15.965(011)	15.298(014)	14.872(015)	14.470(014)	···	2
7	···	16.912(009)	16.227(010)	15.825(012)	15.424(008)	···	3
8	···	17.080(009)	16.429(008)	16.031(010)	15.625(010)	···	3
9	···	19.077(014)	18.467(016)	18.082(013)	17.674(013)	···	3
10	···	17.795(010)	16.836(008)	16.268(013)	15.762(011)	···	3
11	···	16.282(011)	15.546(014)	15.085(015)	14.659(014)	···	2
			SN 2003dq				
1	···	20.744(030)	19.176(014)	···	16.541(010)	···	4
2	···	20.816(034)	19.093(010)	···	16.594(008)	···	4
3	···	20.494(037)	19.796(017)	···	19.041(037)	···	4
4	···	20.198(020)	19.525(013)	···	18.734(053)	···	4
5	···	21.346(052)	19.775(019)	···	17.357(007)	···	4
6	···	17.773(011)	17.185(008)	···	16.484(008)	···	3
7	···	15.838(010)	···	···	···	···	3
8	···	18.747(017)	17.201(008)	···	15.057(013)	···	3
9	···	18.242(015)	17.098(007)	···	15.651(008)	···	4
10	···	18.286(009)	17.587(016)	···	16.721(010)	···	4
11	···	20.873(054)	19.454(016)	···	17.211(008)	···	4
12	···	19.742(013)	18.180(009)	···	15.923(011)	···	4
13	···	17.132(008)	16.556(007)	···	15.843(007)	···	4

Table 4—Continued

Star	U	B	V	R	I	z	n
SN 2003ef							
1	···	16.933(011)	16.213(008)	15.793(018)	15.385(029)	···	4
2	···	17.295(010)	16.710(008)	16.348(017)	15.985(026)	···	4
3	···	18.122(014)	17.466(008)	17.079(016)	16.697(031)	···	4
4	···	18.535(008)	17.973(010)	17.615(009)	17.231(029)	···	4
5	···	18.718(010)	17.990(008)	17.587(016)	17.138(016)	···	4
6	···	18.761(009)	17.299(010)	16.342(016)	15.339(010)	···	4
7	···	18.345(008)	16.913(013)	15.948(018)	14.913(033)	···	4
8	···	17.141(009)	16.302(008)	15.818(015)	15.353(021)	···	4
9	···	20.366(022)	18.928(020)	17.970(008)	16.985(028)	···	4
10	···	19.756(017)	19.303(013)	19.012(022)	18.614(025)	···	4
11	···	19.039(010)	18.190(008)	17.697(013)	17.196(015)	···	4
12	···	20.417(023)	18.911(029)	17.848(018)	16.506(024)	···	4
SN 2003eg							
1	···	17.848(009)	17.020(008)	16.530(014)	16.099(008)	···	3
2	···	17.053(009)	16.119(008)	15.519(014)	15.087(009)	···	3
3	···	18.203(009)	17.634(008)	17.252(014)	16.882(012)	···	3
4	···	19.401(017)	18.489(008)	17.910(008)	17.423(008)	···	3
5	···	19.716(015)	18.335(008)	17.417(024)	16.594(015)	···	3
6	···	14.919(016)	···	···	···	···	1
7	···	16.058(011)	···	···	···	···	2
9	···	18.027(014)	17.049(008)	16.409(015)	15.861(008)	···	3
10	···	20.122(030)	19.135(013)	18.479(010)	17.946(009)	···	3
11	···	20.677(029)	19.766(019)	19.172(027)	18.792(019)	···	3
12	···	20.463(024)	19.476(012)	18.749(020)	18.147(028)	···	3
13	···	19.407(010)	18.924(008)	18.560(027)	18.172(016)	···	3
14	···	19.579(011)	18.541(008)	17.883(013)	17.236(008)	···	3

Table 4—Continued

Star	U	B	V	R	I	z	n
15	⋯	17.753(009)	16.869(008)	16.345(012)	15.881(008)	⋯	3
			SN 2003ej				
1	⋯	16.938(013)	16.211(008)	15.800(010)	15.383(008)	⋯	3
2	⋯	20.133(023)	19.345(015)	18.933(021)	18.430(049)	⋯	3
3	⋯	19.869(018)	19.223(013)	18.876(013)	18.511(036)	⋯	3
4	⋯	21.569(097)	20.077(055)	19.083(023)	17.884(020)	⋯	3
5	⋯	17.635(009)	16.999(011)	16.637(010)	16.273(009)	⋯	3
6	⋯	18.977(011)	17.499(013)	16.558(010)	15.559(013)	⋯	3
7	⋯	18.692(019)	17.116(010)	16.116(010)	14.835(011)	⋯	3
8	⋯	18.064(011)	17.517(023)	17.193(014)	16.816(014)	⋯	2
9	⋯	21.553(177)	20.524(046)	19.383(021)	18.547(024)	⋯	3
10	⋯	20.411(029)	19.878(026)	19.499(026)	19.110(058)	⋯	3
11	⋯	21.097(055)	19.430(019)	18.392(016)	16.972(011)	⋯	3
			SN 2003fb				
1	⋯	17.961(011)	16.951(011)	16.376(009)	15.849(007)	⋯	4
2	⋯	20.545(033)	19.338(023)	18.588(009)	17.949(014)	⋯	4
3	⋯	17.699(009)	17.106(015)	16.757(009)	16.377(008)	⋯	4
5	⋯	19.768(011)	18.707(026)	18.087(009)	17.478(012)	⋯	4
6	⋯	18.397(010)	17.270(016)	16.562(009)	15.948(007)	⋯	4
7	⋯	17.945(015)	17.184(014)	16.753(009)	16.319(007)	⋯	4
8	⋯	21.522(089)	20.273(028)	19.524(014)	18.820(017)	⋯	4
9	⋯	17.159(010)	16.264(014)	15.771(009)	15.318(007)	⋯	4
10	⋯	19.713(038)	18.719(016)	18.202(009)	17.694(008)	⋯	4
11	⋯	19.538(011)	18.612(012)	18.082(009)	17.604(008)	⋯	4
12	⋯	16.990(012)	16.301(014)	15.898(009)	15.492(007)	⋯	4
			SN 2003gd				

Table 4—Continued

Star	U	B	V	R	I	z	n
1	13.960(019)	13.704(012)	12.984(017)	12.586(015)	12.170(010)	···	2
2	17.223(032)	16.065(009)	14.987(007)	14.329(007)	13.806(006)	···	6
3	15.333(019)	14.055(015)	···	···	···	···	3
4	···	19.625(015)	18.132(025)	17.158(008)	16.029(007)	···	5
5	17.808(066)	18.101(008)	17.425(009)	16.999(008)	16.513(008)	···	5
6	18.237(085)	17.691(011)	16.815(014)	16.317(008)	15.849(007)	···	5
7	···	18.443(011)	17.830(010)	17.455(011)	17.037(021)	···	2
8	···	20.367(033)	19.041(032)	18.175(013)	17.399(016)	···	5
9	···	14.511(016)	13.796(014)	13.359(015)	12.964(014)	···	1
11	···	14.545(016)	13.814(014)	13.366(015)	12.997(014)	···	1
SN 2003hd							
1	···	15.916(010)	15.094(008)	···	14.202(010)	···	5
2	···	19.561(010)	18.342(006)	17.570(010)	16.910(006)	···	8
3	···	19.083(010)	18.736(008)	18.301(009)	17.915(009)	···	8
4	···	20.718(024)	19.648(014)	18.941(014)	18.322(018)	···	8
5	···	19.812(010)	18.674(007)	17.962(010)	17.370(013)	···	8
6	···	20.323(016)	18.816(008)	17.760(009)	16.326(011)	···	8
7	···	17.029(009)	16.125(005)	15.580(008)	15.110(006)	···	8
8	···	16.443(009)	15.913(006)	15.584(009)	15.274(007)	···	7
9	···	17.881(011)	17.211(005)	16.820(008)	16.452(008)	···	7
11	···	20.237(025)	18.609(009)	17.541(011)	16.181(010)	···	6
SN 2003hg							
1	···	15.831(007)	14.917(014)	···	···	···	5
2	···	17.989(016)	16.440(010)	15.394(009)	14.359(013)	···	4
3	···	17.870(008)	16.580(008)	15.713(009)	14.967(012)	···	5
4	···	17.752(007)	17.061(008)	16.647(009)	16.231(010)	···	5

Table 4—Continued

Star	U	B	V	R	I	z	n
5	···	17.763(007)	16.731(008)	16.130(009)	15.638(010)	···	5
6	···	17.769(007)	16.942(008)	16.457(009)	15.994(010)	···	5
7	···	18.600(007)	17.952(013)	17.528(009)	17.125(019)	···	5
8	···	19.973(019)	18.625(008)	17.791(009)	17.075(021)	···	5
9	···	18.539(009)	17.858(019)	17.458(009)	17.044(010)	···	4
10	···	21.482(077)	19.943(017)	18.889(010)	17.675(033)	···	5
11	···	20.257(015)	18.674(013)	17.640(009)	16.519(010)	···	5
12	···	17.794(008)	16.206(014)	15.177(009)	···	···	5
13	···	17.363(007)	16.601(008)	16.154(009)	15.698(010)	···	5
14	···	17.691(007)	16.928(008)	16.473(009)	16.034(010)	···	5
SN 2003hk							
1	···	17.118(009)	16.367(009)	15.949(009)	15.551(008)	···	5
2	···	20.520(028)	19.056(012)	18.119(008)	17.177(015)	···	5
4	···	19.658(024)	18.681(011)	18.112(008)	17.584(011)	···	5
5	···	19.057(011)	18.402(017)	18.033(008)	17.644(008)	···	5
6	···	18.405(009)	17.448(011)	16.894(015)	16.385(017)	···	4
9	···	19.706(020)	18.704(010)	18.131(014)	17.620(010)	···	4
11	···	···	···	17.341(014)	···	···	1
13	···	19.108(010)	18.328(017)	17.892(011)	17.461(010)	···	5
14	···	19.258(014)	18.451(011)	18.006(012)	17.579(008)	···	5
15	···	21.087(129)	19.609(044)	18.573(022)	17.286(014)	···	3
16	···	16.768(016)	···	15.009(023)	···	···	2
17	···	16.232(016)	···	14.382(015)	···	···	1
18	···	20.456(068)	18.992(026)	17.997(011)	16.970(014)	···	3
SN 2003hl							
1	···	16.047(010)	15.308(010)	14.895(015)	14.501(010)	···	3
2	···	16.834(016)	···	14.322(013)	···	···	3

Table 4—Continued

Star	U	B	V	R	I	z	n
3	···	17.486(009)	16.356(010)	15.675(015)	15.034(008)	···	3
4	···	18.288(010)	17.308(013)	16.760(015)	16.250(012)	···	3
5	···	16.756(016)	15.771(011)	15.217(015)	14.709(009)	···	3
6	···	19.669(017)	17.983(010)	16.884(015)	15.514(011)	···	3
7	···	19.744(019)	18.366(013)	17.502(017)	16.768(007)	···	3
8	···	20.093(036)	18.711(010)	17.933(013)	17.230(008)	···	3
9	···	15.899(016)	···	···	···	···	1
11	···	16.938(009)	15.999(011)	15.476(015)	14.952(008)	···	3
12	···	16.437(009)	15.501(010)	14.994(009)	14.487(010)	···	3
13	···	19.192(011)	17.971(014)	17.255(020)	16.631(007)	···	3
14	···	18.131(009)	17.323(011)	16.881(016)	16.434(009)	···	3
SN 2003hn							
1	13.380(031)	13.332(012)	12.683(014)	12.308(011)	11.946(014)	···	3
2	15.808(014)	15.357(009)	14.533(005)	14.037(006)	13.586(005)	···	7
3	18.017(032)	16.879(009)	15.781(005)	15.095(005)	14.526(005)	···	8
4	17.689(015)	16.887(008)	15.950(005)	15.408(006)	14.949(005)	···	8
5	16.718(011)	16.528(009)	15.840(006)	15.454(008)	15.091(006)	···	8
6	18.492(023)	17.883(007)	16.979(007)	16.434(005)	15.951(005)	···	8
7	18.890(048)	17.941(010)	16.926(006)	16.306(006)	15.789(007)	···	8
8	17.498(022)	16.463(008)	15.397(005)	14.718(005)	14.151(005)	···	8
9	14.322(020)	14.047(010)	13.207(022)	12.715(010)	12.243(015)	···	6
10	17.374(017)	16.623(010)	15.706(006)	15.162(006)	14.681(006)	···	8
11	15.494(018)	15.377(009)	14.676(005)	14.265(006)	13.866(006)	···	8
12	16.800(019)	16.679(010)	16.056(006)	15.712(007)	15.390(006)	···	8
13	16.050(021)	15.956(008)	15.294(005)	14.904(006)	14.534(006)	···	8
14	19.012(032)	17.916(008)	16.408(005)	15.446(007)	14.428(007)	···	8
15	17.639(012)	17.603(012)	16.955(006)	16.569(007)	16.191(010)	···	8
SN 2003ho							

Table 4—Continued

Star	U	B	V	R	I	z	n
1	···	17.679(009)	17.039(010)	16.673(008)	16.306(008)	···	3
2	···	19.365(009)	18.092(012)	17.290(011)	16.560(008)	···	3
3	···	18.845(009)	18.111(008)	17.695(008)	17.277(011)	···	3
4	···	18.935(009)	18.267(008)	17.887(011)	17.512(009)	···	3
5	···	18.048(009)	17.457(016)	17.111(008)	16.746(008)	···	3
6	···	18.302(011)	17.705(008)	17.361(009)	16.981(008)	···	3
7	···	17.854(009)	17.221(008)	16.862(008)	16.486(008)	···	3
8	···	16.170(009)	15.524(014)	15.173(011)	14.815(014)	···	3
9	···	18.933(009)	18.065(008)	17.581(010)	17.134(008)	···	3
10	···	18.992(011)	18.488(010)	18.179(017)	17.853(027)	···	3
11	···	16.839(009)	16.030(009)	15.553(008)	15.046(008)	···	3
12	···	17.373(009)	16.463(009)	15.948(008)	15.481(008)	···	3
13	···	20.916(045)	19.364(016)	18.280(014)	16.847(008)	···	3
14	···	17.780(009)	16.983(009)	16.528(008)	16.084(009)	···	3
SN 2003ib							
1	···	16.914(009)	15.587(014)	14.734(011)	14.053(014)	···	3
2	···	15.438(011)	···	···	···	···	2
3	···	15.158(011)	···	14.071(015)	···	···	2
4	···	16.352(011)	15.730(008)	15.349(009)	14.994(017)	···	3
5	···	18.612(014)	17.728(008)	17.202(009)	16.737(010)	···	3
6	···	18.688(009)	18.035(008)	17.647(009)	17.282(010)	···	3
8	···	18.683(009)	17.997(008)	17.610(009)	17.196(020)	···	3
9	···	18.357(009)	17.567(008)	17.109(009)	16.653(015)	···	3
10	···	19.229(010)	18.290(008)	17.780(009)	17.286(014)	···	3
11	···	17.197(011)	16.678(008)	16.333(009)	16.004(013)	···	3
12	···	22.081(094)	20.173(028)	18.863(011)	17.052(010)	···	3
13	···	19.975(015)	19.051(010)	18.442(016)	17.940(017)	···	3
14	···	19.378(011)	18.284(013)	17.609(009)	17.058(020)	···	3

Table 4—Continued

Star	U	B	V	R	I	z	n
			SN 2003ip				
1	···	18.997(012)	17.471(011)	16.483(012)	15.460(009)	···	3
2	···	20.691(037)	19.255(031)	18.348(009)	17.401(017)	···	3
3	···	20.749(067)	19.550(025)	18.831(015)	18.158(018)	···	3
4	···	16.643(021)	15.901(008)	15.477(009)	15.056(008)	···	3
5	···	19.789(030)	19.137(036)	18.676(020)	18.273(028)	···	3
6	···	15.395(024)	14.510(014)	14.013(015)	13.478(014)	···	3
7	···	21.217(081)	20.254(053)	19.706(026)	19.076(095)	···	3
8	···	20.364(027)	20.013(048)	19.445(020)	18.809(050)	···	3
9	···	21.453(101)	20.214(054)	19.298(028)	18.429(039)	···	3
10	···	16.422(017)	15.755(009)	15.362(009)	14.964(009)	···	3
11	···	18.442(020)	17.131(008)	16.290(009)	15.518(009)	···	3
12	···	17.059(017)	16.036(009)	15.415(009)	14.849(009)	···	3
13	···	15.853(018)	···	···	···	···	3
14	···	19.991(044)	19.144(016)	18.639(016)	18.090(017)	···	3
15	···	17.405(011)	16.541(013)	16.022(009)	15.547(010)	···	3
			SN 2003iq				
1	···	16.047(010)	15.308(010)	14.875(022)	14.501(010)	···	4
2	···	16.834(016)	···	14.308(016)	···	···	4
3	···	17.486(009)	16.365(008)	15.658(019)	15.034(008)	···	4
4	···	18.288(010)	17.319(009)	16.745(018)	16.250(012)	···	4
5	···	16.756(016)	15.780(008)	15.198(021)	14.709(009)	···	4
6	···	19.669(017)	17.991(008)	16.873(015)	15.514(011)	···	4
7	···	19.744(019)	18.376(011)	17.485(021)	16.768(007)	···	4
8	···	20.093(036)	18.719(010)	17.921(014)	17.230(008)	···	4
9	···	15.899(016)	···	14.274(014)	···	···	1
11	···	16.938(009)	16.010(008)	15.456(021)	14.952(008)	···	4

Table 4—Continued

Star	U	B	V	R	I	z	n
12	···	16.437(009)	15.501(010)	14.966(026)	14.487(010)	···	3
13	···	19.192(011)	17.984(009)	17.240(021)	16.631(007)	···	4
14	···	18.131(009)	17.334(008)	16.861(022)	16.434(009)	···	4

Note. — Uncertainties given in parenthesis in thousandths of a magnitude. n is the number of nights on which each star was observed.

Table 5. $UBVRIz$ Photometry for 51 Type II Supernovae

JD-2,400,000	U	B	V	R	I	z	Telescope
			SN 1986L				
46712.4	···	13.836(015)	14.013(017)	···	···	···	CTIO-0.9m
46712.4	···	13.815(015)	13.940(017)	···	···	···	CTIO-4m
46714.3	···	13.771(015)	13.756(017)	···	···	···	CTIO-0.9m
46715.3	···	13.712(015)	13.711(017)	···	···	···	CTIO-0.9m
46716.2	···	13.764(015)	13.683(017)	···	···	···	CTIO-0.9m
46717.3	···	13.755(015)	13.680(017)	···	···	···	CTIO-0.9m
46729.3	···	14.201(015)	13.912(017)	···	···	···	CTIO-0.9m
46730.4	···	14.313(015)	13.940(017)	···	···	···	CTIO-0.9m
46732.4	···	14.546(015)	14.055(017)	···	···	···	CTIO-0.9m
46735.2	···	14.594(015)	14.139(017)	···	···	···	CTIO-0.9m
46736.2	···	14.791(015)	14.141(017)	···	···	···	CTIO-0.9m
46737.4	···	14.571(015)	14.052(017)	···	···	···	CTIO-0.9m
46738.4	···	14.790(015)	14.188(017)	···	···	···	CTIO-0.9m
46740.3	···	14.912(015)	14.280(017)	···	···	···	CTIO-0.9m
46742.3	···	15.084(015)	14.397(017)	···	···	···	CTIO-0.9m
46744.3	···	15.144(015)	14.310(017)	···	···	···	CTIO-0.9m
46748.2	···	15.270(015)	14.438(017)	···	···	···	CTIO-0.9m
46750.3	···	15.439(015)	14.482(017)	···	···	···	CTIO-0.9m
46754.2	···	15.493(015)	14.492(017)	···	···	···	CTIO-0.9m
46756.2	···	15.588(018)	14.561(017)	···	···	···	CTIO-0.9m
46770.3	···	15.782(018)	14.681(018)	···	···	···	CTIO-0.9m
46781.3	···	16.128(018)	14.869(018)	···	···	···	CTIO-0.9m
46784.2	···	16.240(018)	14.854(018)	···	···	···	CTIO-0.9m
46788.2	···	16.270(018)	14.910(018)	···	···	···	CTIO-0.9m
46796.3	···	16.512(018)	15.052(018)	···	···	···	CTIO-0.9m
46807.2	···	16.965(018)	15.403(018)	···	···	···	CTIO-0.9m
46811.1	···	17.610(018)	15.519(018)	···	···	···	CTIO-0.9m
46814.1	···	18.246(018)	15.876(018)	···	···	···	CTIO-0.9m

Table 5—Continued

JD-2,400,000	U	B	V	R	I	z	Telescope
46821.2	···	18.510(018)	16.498(018)	···	···	···	CTIO-0.9m
46855.0	···	19.953(039)	17.735(034)	···	···	···	CTIO-4m
46864.1	···	19.850(039)	18.156(034)	···	···	···	CTIO-4m
SN 1991al							
48455.67	···	16.608(018)	···	16.230(015)	···	···	CTIO-0.9m
48458.77	···	16.660(018)	16.570(016)	16.286(014)	16.126(015)	···	CTIO-0.9m
48459.60	···	16.664(018)	16.604(016)	16.300(014)	16.138(015)	···	CTIO-0.9m
48478.65	···	17.703(012)	16.907(011)	16.467(010)	16.342(011)	···	CTIO-4m
48490.70	···	···	17.067(014)	···	16.380(015)	···	CTIO-0.9m
48499.56	···	···	17.195(030)	16.731(014)	16.465(015)	···	CTIO-0.9m
48508.63	···	18.702(018)	17.378(016)	16.848(014)	16.568(015)	···	CTIO-0.9m
48537.65	···	20.683(141)	19.206(037)	18.333(023)	17.842(032)	···	CTIO-0.9m
48545.53	···	20.864(349)	19.237(065)	···	···	···	CTIO-0.9m
48546.52	···	20.984(200)	19.309(041)	···	···	···	CTIO-0.9m
48547.52	···	21.158(169)	19.292(043)	···	···	···	CTIO-0.9m
48548.55	···	20.893(175)	19.311(054)	···	···	···	CTIO-0.9m
48550.54	···	21.088(198)	19.391(034)	···	18.016(015)	···	CTIO-0.9m
48551.53	···	20.679(178)	19.579(090)	18.529(021)	18.000(033)	···	CTIO-0.9m
48555.52	···	20.923(074)	19.443(043)	18.524(013)	18.055(018)	···	CTIO-0.9m
48578.53	···	···	19.694(104)	18.767(051)	18.247(065)	···	CTIO-0.9m
48835.68	···	···	···	21.598(106)	···	···	CTIO-0.9m
48848.60	···	···	···	21.395(251)	···	···	CTIO-0.9m
48868.62	···	···	···	22.567(285)	···	···	CTIO-0.9m
48871.64	···	···	···	22.318(518)	···	···	CTIO-0.9m
48885.61	···	···	···	22.740(209)	···	···	CTIO-0.9m
SN 1992T							
48725.70	···	19.823(061)	19.260(037)	···	···	···	CTIO-0.9m

Table 5—Continued

JD-2,400,000	U	B	V	R	I	z	Telescope
48726.72	···	19.862(079)	19.250(048)	···	···	···	CTIO-0.9m
48727.76	···	19.880(123)	19.393(067)	···	···	···	CTIO-0.9m
48728.70	···	···	19.527(204)	···	···	···	CTIO-0.9m
48731.56	···	19.868(262)	19.381(158)	···	19.121(207)	···	CTIO-0.9m
48732.84	···	20.020(127)	19.393(063)	···	19.030(073)	···	CTIO-0.9m
48767.55	···	21.278(115)	19.726(086)	···	19.111(083)	···	CTIO-0.9m
SN 1992U							
48727.92	···	19.587(067)	18.485(017)	···	···	···	CTIO-0.9m
48728.92	···	19.881(072)	18.535(035)	···	···	···	CTIO-0.9m
48731.83	···	19.966(090)	18.711(030)	···	···	···	CTIO-0.9m
48732.90	···	20.090(098)	18.758(035)	···	···	···	CTIO-0.9m
48767.79	···	···	19.505(224)	···	···	···	CTIO-0.9m
48776.87	···	20.577(048)	19.303(015)	···	18.197(019)	···	CTIO-0.9m
48793.75	···	···	19.425(191)	···	···	···	CTIO-0.9m
48843.70	···	···	19.867(214)	···	18.788(060)	···	CTIO-0.9m
48846.59	···	···	20.262(120)	···	18.817(038)	···	CTIO-0.9m
48847.56	···	···	20.023(105)	···	18.780(043)	···	CTIO-0.9m
48848.81	···	21.019(331)	20.233(119)	···	18.814(050)	···	CTIO-0.9m
48871.78	···	21.452(184)	20.373(057)	···	18.998(033)	···	CTIO-0.9m
48872.62	···	···	20.146(274)	···	18.977(133)	···	CTIO-0.9m
SN 1992ad							
48806.47	···	···	14.229(015)	···	···	···	CTIO-0.9m
48807.47	···	14.949(019)	14.239(015)	13.891(014)	13.767(015)	···	CTIO-0.9m
48811.46	···	···	14.282(016)	···	···	···	CTIO-0.9m
48813.46	···	15.226(012)	14.324(009)	···	13.811(011)	···	CTIO-0.9m
48815.52	···	15.299(015)	14.426(009)	···	···	···	LCO-1m
48844.50	···	16.336(027)	15.049(015)	14.465(014)	14.229(015)	···	CTIO-0.9m

Table 5—Continued

JD-2,400,000	U	B	V	R	I	z	Telescope
48846.48	···	16.352(021)	15.079(015)	···	14.262(015)	···	CTIO-0.9m
49126.53	···	20.379(053)	19.798(034)	···	18.845(042)	···	CTIO-0.9m
49186.48	···	21.125(078)	···	···	19.639(054)	···	CTIO-0.9m
SN 1992af							
48805.81	···	17.756(017)	17.145(011)	···	···	···	CTIO-0.9m
48807.62	···	17.842(026)	17.172(018)	···	16.185(188)	···	CTIO-0.9m
48809.90	···	17.867(017)	17.173(016)	···	···	···	CTIO-0.9m
48813.85	···	17.991(025)	17.206(016)	···	···	···	CTIO-0.9m
48815.82	···	···	17.327(111)	···	···	···	LCO-1m
48816.88	···	···	17.299(029)	···	···	···	LCO-1m
48817.67	···	18.147(098)	17.210(024)	···	16.662(030)	···	LCO-1m
48818.67	···	18.042(052)	17.249(024)	···	···	···	LCO-1m
48831.84	···	18.346(017)	17.257(016)	···	···	···	CTIO-0.9m
48842.60	···	18.631(043)	17.369(015)	···	···	···	CTIO-0.9m
48843.65	···	18.658(044)	17.394(015)	···	16.711(016)	···	CTIO-0.9m
48845.53	···	18.745(048)	17.437(015)	···	16.729(015)	···	CTIO-0.9m
48846.66	···	18.785(042)	17.423(015)	···	16.734(016)	···	CTIO-0.9m
48847.59	···	18.754(039)	17.459(015)	···	16.720(015)	···	CTIO-0.9m
48848.63	···	18.882(038)	17.478(015)	···	···	···	CTIO-0.9m
48849.70	···	18.807(044)	17.535(015)	···	16.794(017)	···	CTIO-0.9m
48871.58	···	21.010(145)	19.035(031)	···	17.892(015)	···	CTIO-0.9m
48872.57	···	20.562(323)	19.213(072)	···	17.933(059)	···	CTIO-0.9m
48885.69	···	21.149(071)	19.387(017)	···	18.183(017)	···	CTIO-0.9m
48891.57	···	21.172(072)	19.420(019)	···	18.243(016)	···	CTIO-0.9m
48905.60	···	21.293(235)	19.554(059)	···	18.444(031)	···	CTIO-0.9m
48908.59	···	21.312(166)	19.564(026)	···	18.398(017)	···	CTIO-0.9m
48919.61	···	21.455(075)	19.758(015)	···	18.572(015)	···	CTIO-4m
SN 1992am							

Table 5—Continued

JD-2,400,000	U	B	V	R	I	z	Telescope
48832.93	···	19.002(017)	18.494(016)	···	···	···	CTIO-0.9m
48846.88	···	19.549(044)	18.608(020)	···	···	···	CTIO-0.9m
48847.82	···	19.573(052)	18.585(016)	···	18.037(016)	···	CTIO-0.9m
48848.87	···	19.814(076)	18.649(021)	···	18.055(020)	···	CTIO-0.9m
48872.79	···	20.454(178)	18.938(028)	···	18.119(028)	···	CTIO-0.9m
48885.89	···	20.604(066)	19.059(019)	···	18.181(054)	···	CTIO-0.9m
48905.68	···	20.881(287)	19.233(061)	···	18.246(043)	···	CTIO-0.9m
48908.68	···	···	19.280(063)	···	18.309(043)	···	CTIO-0.9m
48919.68	···	21.336(021)	19.454(015)	···	18.322(015)	···	CTIO-4m
48922.59	···	21.412(089)	19.482(016)	···	18.357(018)	···	CTIO-0.9m
48979.65	···	23.805(308)	21.601(056)	···	20.053(035)	···	CTIO-4m
SN 1992ba							
48904.77	···	15.554(021)	15.234(011)	14.949(008)	14.848(011)	···	CTIO-0.9m
48905.83	···	15.613(019)	15.226(015)	14.977(015)	14.870(015)	···	CTIO-0.9m
48908.81	···	15.828(019)	15.296(015)	15.007(015)	14.860(015)	···	CTIO-0.9m
48922.80	···	16.305(017)	15.421(015)	···	14.831(015)	···	CTIO-0.9m
48940.77	···	16.654(017)	15.509(015)	···	14.787(015)	···	CTIO-0.9m
48941.79	···	16.678(017)	15.522(015)	···	14.787(015)	···	CTIO-0.9m
48956.80	···	16.905(016)	15.606(016)	···	14.845(015)	···	CTIO-0.9m
48975.86	···	17.147(017)	15.760(015)	···	···	···	CTIO-0.9m
48979.68	···	17.170(012)	15.804(011)	···	14.956(011)	···	CTIO-0.9m
48997.77	···	17.480(019)	16.090(015)	···	15.224(015)	···	CTIO-0.9m
49012.69	···	18.497(017)	16.882(015)	···	15.803(015)	···	CTIO-0.9m
49016.72	···	19.022(022)	17.332(015)	···	16.160(015)	···	CTIO-0.9m
49037.69	···	20.117(065)	18.169(015)	···	16.777(015)	···	CTIO-0.9m
49078.63	···	20.238(077)	18.543(016)	···	17.124(015)	···	CTIO-0.9m
49084.55	···	20.533(126)	18.558(022)	···	17.162(015)	···	CTIO-0.9m

Table 5—Continued

JD-2,400,000	U	B	V	R	I	z	Telescope
			SN 1993A				
49007.74	···	···	19.489(021)	···	···	···	CTIO-1.5m
49010.74	···	19.924(028)	19.487(016)	···	19.004(028)	···	CTIO-0.9m
49012.73	···	19.910(022)	19.500(015)	···	18.963(024)	···	CTIO-0.9m
49013.76	···	19.961(028)	19.455(017)	···	18.847(029)	···	CTIO-0.9m
49016.76	···	20.143(024)	19.457(015)	···	19.001(023)	···	CTIO-0.9m
49017.68	···	20.095(020)	19.517(018)	···	18.927(026)	···	CTIO-0.9m
49026.74	···	20.403(162)	19.587(085)	···	18.767(061)	···	CTIO-0.9m
49037.72	···	20.834(040)	19.724(018)	···	18.906(020)	···	CTIO-0.9m
49038.68	···	20.891(046)	19.671(017)	···	18.824(027)	···	CTIO-0.9m
49040.73	···	20.988(024)	19.725(015)	···	18.902(015)	···	CTIO-4m
49050.75	···	21.081(075)	19.704(029)	···	···	···	CTIO-0.9m
49053.70	···	20.962(353)	19.634(112)	···	18.921(079)	···	CTIO-0.9m
49073.68	···	21.561(096)	20.008(036)	···	19.002(029)	···	CTIO-0.9m
49084.61	···	21.273(191)	19.843(047)	···	18.948(046)	···	CTIO-0.9m
49091.63	···	21.497(157)	19.840(064)	···	18.855(088)	···	CTIO-0.9m
			SN 1993K				
49076.59	···	15.395(016)	15.247(016)	15.101(015)	14.936(014)	···	CTIO-0.9m
49077.62	···	15.380(016)	15.207(016)	15.060(015)	14.887(014)	···	CTIO-0.9m
49078.60	···	15.390(019)	15.209(016)	15.040(015)	14.892(015)	···	CTIO-0.9m
49083.52	···	15.508(017)	15.249(016)	···	14.849(015)	···	CTIO-0.9m
49084.52	···	15.529(019)	15.271(016)	15.069(015)	14.855(015)	···	CTIO-0.9m
49088.52	···	15.692(019)	15.374(016)	···	14.940(015)	···	CTIO-0.9m
49091.60	···	15.857(019)	15.427(016)	15.194(015)	14.995(015)	···	CTIO-0.9m
49109.49	···	16.799(045)	15.885(016)	15.487(015)	15.215(015)	···	CTIO-0.9m
			SN 1993S				

Table 5—Continued

JD-2,400,000	U	B	V	R	I	z	T
49142.86	···	···	18.150(024)	···	···	···	CT
49143.85	···	18.289(020)	18.142(042)	···	17.875(026)	···	CT
49152.86	···	18.603(019)	18.176(016)	···	17.872(020)	···	CT
49154.83	···	18.765(019)	18.239(019)	···	17.842(018)	···	CT
49161.84	···	19.258(027)	18.465(016)	···	17.919(023)	···	CT
49162.82	···	19.324(015)	18.513(015)	···	18.008(017)	···	C
49164.90	···	19.372(075)	18.546(045)	···	···	···	CT
49179.90	···	20.279(050)	18.925(016)	···	18.241(015)	···	CT
49184.75	···	20.443(030)	19.057(015)	···	18.291(015)	···	CT
49185.83	···	20.533(035)	19.073(015)	···	18.357(015)	···	CT
49186.79	···	20.322(170)	19.125(022)	···	18.336(033)	···	CT
49187.89	···	20.510(032)	19.093(015)	···	18.331(019)	···	CT
49202.81	···	21.024(336)	19.350(051)	···	18.530(039)	···	CT
SN 1999br							
51283.50	···	17.573(014)	17.617(015)	···	···	···	CT
51284.50	···	17.570(014)	17.537(015)	···	17.296(015)	···	CT
51285.50	···	17.576(014)	17.517(015)	17.331(015)	17.263(018)	···	CT
51286.50	···	17.638(014)	17.571(015)	17.339(015)	17.239(015)	···	CT
51291.50	···	17.743(014)	17.486(015)	17.194(015)	17.034(017)	···	CT
51294.50	···	17.934(011)	17.515(012)	17.205(011)	17.037(011)	···	CT
51294.50	17.825(025)	17.939(028)	17.502(011)	17.233(011)	17.097(024)	16.902(020)	ES
51295.50	···	18.117(032)	17.515(029)	17.277(020)	16.988(042)	···	CT
51296.50	···	18.067(017)	17.604(023)	17.263(017)	17.036(020)	···	CT
51299.48	···	18.202(066)	17.603(042)	17.244(024)	16.991(053)	···	CT
51301.50	···	18.292(019)	17.609(011)	17.265(015)	17.000(016)	···	CT
51301.50	18.779(028)	18.262(013)	17.602(015)	17.251(015)	17.038(016)	16.859(015)	ES
51301.52	···	18.166(025)	17.571(026)	17.214(016)	17.031(040)	···	CT
51304.50	···	18.371(020)	17.596(015)	17.213(015)	16.977(017)	···	CT
51305.50	19.035(027)	18.416(014)	17.602(015)	17.230(015)	16.985(016)	16.796(015)	ES

Table 5—Continued

JD-2,400,000	U	B	V	R	I	z	T
51305.75	···	18.465(024)	17.603(016)	···	···	···	CT
51306.66	···	···	···	17.181(012)	16.960(023)	···	CT
51309.50	···	18.503(017)	17.605(007)	···	···	···	ES
51309.61	···	18.507(020)	17.589(016)	17.162(012)	16.892(028)	···	CT
51314.57	···	18.548(017)	17.544(015)	17.110(012)	16.869(025)	···	CT
51317.50	19.625(036)	18.711(018)	17.612(015)	17.122(015)	16.824(016)	16.597(015)	ES
51318.59	···	18.668(021)	17.523(015)	17.114(012)	16.792(026)	···	CT
51323.50	···	18.837(071)	17.625(040)	17.111(022)	16.663(044)	···	CT
51328.49	···	19.011(080)	17.527(022)	17.061(012)	16.679(021)	···	CT
51330.48	···	18.830(022)	17.552(015)	17.040(012)	16.615(019)	···	CT
51335.49	···	18.894(026)	17.569(016)	17.057(012)	16.600(025)	···	CT
51345.48	···	19.002(017)	17.570(019)	17.021(015)	16.626(085)	···	CT
51352.46	···	19.159(044)	17.603(018)	17.022(012)	16.545(023)	···	CT
51356.48	···	19.162(058)	17.659(025)	17.056(013)	16.575(026)	···	CT
51643.50	···	···	22.188(068)	···	···	···	E
51666.50	···	···	···	21.815(060)	···	···	E
				SN 1999ca			
51305.50	17.107(016)	16.755(013)	15.959(015)	15.537(015)	15.315(016)	15.171(015)	ES
51308.56	17.754(034)	17.001(017)	16.067(015)	15.639(012)	15.379(016)	···	CT
51309.51	17.647(019)	17.083(017)	16.108(008)	15.641(015)	15.399(015)	···	ES
51313.47	18.298(054)	17.359(017)	16.244(015)	15.768(012)	15.465(016)	···	CT
51317.52	18.621(074)	17.565(017)	16.371(015)	15.869(012)	15.576(016)	···	CT
51317.54	18.382(016)	17.527(013)	16.392(015)	15.832(015)	15.580(016)	15.357(015)	ES
51319.46	18.964(137)	17.651(017)	16.425(015)	15.910(012)	15.611(016)	···	CT
51321.46	18.879(111)	17.715(017)	16.469(015)	15.957(012)	15.641(016)	···	CT
51322.50	18.850(064)	17.704(017)	16.510(009)	15.942(015)	15.679(015)	15.448(104)	ES
51327.46	19.144(306)	17.958(017)	16.592(015)	16.049(012)	15.727(016)	···	CT
51329.46	19.468(218)	18.015(017)	16.612(015)	16.063(012)	15.761(016)	···	CT
51331.46	19.293(177)	18.064(017)	16.636(015)	16.086(012)	15.768(016)	···	CT

Table 5—Continued

JD-2,400,000	U	B	V	R	I	z	T
51335.45	19.544(277)	18.157(017)	16.701(015)	16.134(012)	15.852(016)	···	CT
51340.46	19.862(284)	18.323(017)	16.819(015)	16.208(012)	15.894(016)	···	CT
51345.46	···	18.442(017)	16.868(015)	16.256(012)	15.925(016)	···	CT
51351.47	···	18.614(046)	16.984(015)	16.319(012)	15.977(019)	···	CT
51355.46	···	18.746(017)	17.100(015)	16.449(012)	16.126(016)	···	CT
51464.86	···	···	20.685(141)	19.645(034)	···	···	CT
51471.87	···	21.641(258)	···	···	···	···	CT
51478.86	···	···	20.857(092)	19.858(043)	19.373(091)	···	CT
51480.86	···	···	···	···	19.477(123)	···	CT
51481.83	···	22.428(428)	21.217(110)	19.935(039)	19.580(054)	···	CT
51484.85	···	22.821(236)	21.097(057)	19.931(027)	19.667(065)	···	CT
51488.83	···	22.572(148)	21.293(043)	20.084(022)	···	···	CT
51489.83	···	···	···	···	19.718(035)	19.331(056)	CT
51493.85	···	22.969(167)	21.291(071)	···	19.776(149)	···	CT
51499.86	···	22.781(174)	21.327(065)	20.247(032)	19.951(130)	···	CT
51506.85	···	···	21.393(114)	···	···	···	CT
				SN 1999cr			
51256.78	···	18.402(017)	18.068(015)	17.777(012)	17.562(016)	···	CT
51257.84	···	18.416(021)	18.062(011)	17.773(027)	17.540(030)	···	CT
51259.82	···	18.509(017)	18.097(015)	17.807(012)	17.558(016)	···	CT
51261.82	···	18.603(017)	18.131(015)	17.818(012)	17.545(016)	···	CT
51263.77	···	18.702(017)	18.169(015)	17.827(012)	17.569(016)	···	CT
51266.73	···	18.860(017)	18.244(015)	17.867(012)	17.604(016)	···	CT
51266.80	···	18.830(015)	18.213(013)	17.843(011)	17.563(012)	···	CT
51267.83	···	18.906(020)	18.215(043)	17.849(011)	17.589(015)	···	CT
51274.83	···	19.135(017)	18.376(017)	17.912(015)	17.652(017)	···	CT
51275.82	···	19.234(017)	18.379(015)	17.975(015)	17.677(015)	···	CT
51277.79	···	19.268(011)	18.423(021)	17.980(019)	17.698(016)	···	CT
51285.68	···	19.477(028)	18.531(022)	18.039(017)	17.749(015)	···	CT

Table 5—Continued

JD-2,400,000	U	B	V	R	I	z	Telescope
51291.82	···	19.626(040)	18.596(014)	18.098(016)	17.796(015)	···	CTIO-1.5m
51294.74	···	19.571(022)	18.587(015)	18.101(015)	17.766(015)	···	CTIO-0.9m
51296.70	···	19.669(042)	18.597(015)	18.103(015)	17.765(015)	···	CTIO-1.5m
51296.71	···	19.672(047)	18.655(023)	18.176(012)	17.855(025)	···	CTIO-1.0m
51298.53	···	19.662(121)	18.662(034)	···	17.775(044)	···	CTIO-1.5m
51299.51	···	19.756(068)	18.636(039)	18.175(018)	17.910(045)	···	CTIO-1.0m
51301.55	···	19.751(051)	18.640(024)	18.170(013)	17.845(023)	···	CTIO-1.0m
51301.68	···	19.718(029)	···	···	···	···	ESO-NTT
51302.79	···	19.756(127)	18.638(037)	18.166(027)	17.793(019)	···	CTIO-1.5m
51304.74	···	19.751(020)	18.665(015)	18.143(015)	17.831(015)	···	CTIO-1.5m
51305.60	···	19.806(019)	18.689(015)	18.126(015)	17.832(016)	···	ESO-NTT
51305.79	···	19.751(021)	18.632(015)	18.077(015)	17.798(015)	···	CTIO-1.5m
51308.77	···	···	18.693(017)	18.174(012)	17.823(026)	···	CTIO-1.0m
51314.59	···	19.902(048)	18.671(022)	18.169(012)	···	···	CTIO-1.0m
51320.57	···	19.947(031)	18.768(017)	18.230(012)	17.907(019)	···	CTIO-1.0m
51347.47	···	20.982(059)	19.514(022)	18.887(012)	18.508(026)	···	CTIO-1.0m
51353.47	···	21.917(326)	20.286(090)	19.418(043)	19.148(069)	···	CTIO-1.0m
				SN 1999eg			
51464.76	···	18.434(014)	18.209(015)	17.997(015)	17.840(027)	···	CTIO-0.9m
51467.75	···	18.572(017)	18.250(015)	17.982(015)	17.860(025)	···	CTIO-0.9m
51471.75	···	18.836(017)	18.314(015)	18.026(015)	17.833(015)	···	CTIO-0.9m
51472.72	···	18.950(024)	18.358(015)	18.036(015)	17.876(020)	···	CTIO-0.9m
51479.72	···	19.431(072)	18.548(018)	18.155(015)	17.945(015)	···	CTIO-0.9m
51481.72	···	19.466(029)	18.611(018)	18.219(015)	18.028(021)	···	CTIO-0.9m
51486.74	···	19.671(030)	18.717(015)	18.296(015)	18.107(027)	···	CTIO-0.9m
51487.80	···	19.769(023)	18.706(015)	···	···	···	CTIO-0.9m
51489.79	···	19.762(019)	18.713(036)	18.278(015)	18.068(019)	···	CTIO-0.9m
51490.70	···	19.822(018)	18.751(015)	18.305(015)	18.045(015)	···	CTIO-0.9m
51493.71	···	19.956(032)	18.812(015)	18.348(015)	18.099(019)	···	CTIO-0.9m

Table 5—Continued

JD-2,400,000	*U*	*B*	*V*	*R*	*I*	*z*	T
51498.72	· · ·	20.099(023)	· · ·	18.347(015)	· · ·	· · ·	CT
51508.67	· · ·	20.193(115)	18.980(028)	18.451(017)	18.225(030)	· · ·	CT
51509.71	· · ·	20.227(102)	18.948(032)	18.487(021)	18.217(038)	· · ·	CT
				SN 1999em			
51481.8	12.893(012)	13.852(010)	13.856(011)	13.718(011)	13.714(011)	13.687(011)	CT
51483.7	12.898(017)	13.813(014)	13.802(015)	13.654(015)	13.639(015)	13.614(015)	CT
51484.8	12.970(016)	13.830(010)	13.792(011)	13.629(011)	13.620(011)	13.571(011)	CT
51485.8	13.022(023)	13.862(014)	13.814(015)	13.623(015)	13.621(015)	13.550(015)	CT
51486.8	13.102(017)	13.891(014)	13.815(015)	13.628(015)	13.599(015)	13.542(015)	CT
51487.8	13.164(017)	13.925(014)	13.831(015)	13.621(015)	13.580(015)	13.514(015)	CT
51488.8	13.232(017)	13.950(014)	13.846(015)	13.630(015)	13.563(017)	13.508(015)	CT
51489.8	13.288(017)	14.014(014)	13.896(015)	13.683(015)	13.604(015)	13.521(015)	CT
51490.8	13.352(017)	14.001(014)	13.847(015)	13.618(015)	13.548(015)	· · ·	CT
51492.8	13.591(017)	14.051(014)	13.825(015)	13.579(015)	13.491(015)	· · ·	CT
51493.7	13.714(017)	14.084(014)	13.825(015)	13.563(015)	13.478(015)	· · ·	CT
51495.7	14.001(017)	14.177(014)	13.826(015)	13.547(015)	13.469(015)	· · ·	CT
51498.6	14.365(017)	14.333(014)	13.819(015)	13.547(015)	13.457(015)	· · ·	CT
51498.8	14.448(019)	14.395(014)	13.896(015)	13.667(015)	13.510(015)	· · ·	CT
51499.8	14.516(021)	14.422(014)	13.934(015)	13.670(015)	13.509(015)	· · ·	CT
51500.7	14.603(017)	14.452(014)	13.907(015)	13.611(015)	13.505(015)	· · ·	CT
51501.7	14.725(017)	14.476(014)	13.888(015)	13.586(015)	13.469(015)	13.295(015)	CT
51502.7	14.767(017)	14.517(014)	13.868(015)	13.545(015)	13.420(015)	· · ·	CT
51504.7	14.952(017)	14.594(014)	13.890(015)	13.584(015)	13.443(015)	· · ·	CT
51506.8	15.089(017)	14.685(014)	13.944(015)	13.620(015)	13.433(015)	13.262(015)	CT
51508.8	15.210(017)	14.743(014)	13.956(015)	13.619(015)	13.461(015)	13.247(015)	CT
51509.9	15.280(017)	14.798(014)	13.962(015)	13.626(015)	13.426(015)	13.231(020)	CT
51511.9	· · ·	14.820(009)	13.963(009)	13.626(007)	13.407(007)	· · ·	S
51522.7	15.994(015)	15.118(012)	14.005(011)	13.606(013)	13.341(015)	· · ·	S
51531.8	· · ·	15.167(009)	14.001(009)	13.571(009)	13.285(009)	· · ·	S

Table 5—Continued

JD-2,400,000	U	B	V	R	I	z	T
51538.6	16.635(017)	15.301(014)	14.038(015)	13.559(015)	13.304(015)	13.088(011)	CT
51540.5	16.715(017)	15.329(014)	14.062(015)	13.583(015)	13.311(015)	13.109(015)	CT
51546.5	16.910(018)	15.402(014)	14.074(015)	13.568(015)	13.298(015)	13.118(015)	CT
51550.5	17.014(024)	15.434(014)	14.066(015)	13.556(015)	13.290(015)	13.110(015)	CT
51551.6	17.032(017)	15.433(014)	14.083(015)	13.542(015)	13.265(015)	···	CT
51556.6	17.097(017)	15.488(014)	14.093(015)	13.557(015)	13.292(015)	···	CT
51578.6	···	16.034(010)	14.399(012)	13.844(008)	13.495(009)	···	S
51607.6	···	18.265(020)	16.412(011)	15.506(019)	14.919(011)	···	S
51636.5	20.792(133)	18.318(013)	16.690(015)	15.704(015)	15.174(016)	14.900(015)	ES
51666.5	···	18.431(020)	16.957(015)	15.977(015)	15.411(016)	···	ES
SN 2000cb							
51663.80	19.356(036)	18.793(014)	18.078(015)	17.677(015)	17.553(015)	···	CT
51675.70	···	18.084(014)	17.195(015)	16.747(015)	16.517(015)	···	CT
51676.75	···	18.008(014)	17.127(015)	16.678(015)	16.449(015)	···	CT
51677.76	···	17.957(014)	17.063(015)	16.610(015)	16.394(015)	···	CT
51681.73	···	17.798(014)	16.889(015)	16.423(015)	16.206(015)	···	CT
51682.81	···	17.742(014)	16.850(015)	16.381(015)	16.143(015)	···	CT
51683.77	···	17.729(014)	16.812(015)	16.342(015)	16.106(015)	···	CT
51684.74	18.542(043)	···	16.784(015)	16.301(015)	16.063(015)	···	CT
51695.57	···	17.783(014)	16.622(015)	16.097(015)	15.833(016)	···	ES
51699.72	···	17.871(014)	16.583(015)	16.041(015)	15.732(015)	···	CT
51705.69	···	17.995(014)	16.580(015)	16.005(015)	15.673(015)	···	CT
51711.77	···	18.087(022)	···	···	···	···	CT
51730.67	···	18.226(014)	16.591(015)	15.956(015)	15.554(015)	···	CT
51738.63	···	18.293(014)	16.641(015)	15.980(015)	15.574(015)	···	CT
51745.65	···	18.416(014)	16.745(015)	16.063(015)	15.638(015)	···	CT
51752.69	···	18.636(014)	16.943(015)	16.195(015)	15.774(015)	···	CT
51757.64	···	18.881(014)	17.164(015)	16.384(015)	15.945(015)	···	CT
51795.51	···	19.655(044)	17.997(015)	17.063(015)	16.637(015)	···	CT

Table 5—Continued

JD-2,400,000	U	B	V	R	I	z	Telescope
			SN 2002ew				
52528.5	···	18.817(016)	18.241(014)	17.985(015)	17.686(014)	···	LCO-1m
52529.7	···	18.930(016)	18.354(014)	18.034(015)	17.714(014)	···	LCO-1m
52538.7	···	19.422(076)	···	···	···	···	LCO-1m
52545.6	···	19.835(024)	19.004(014)	···	···	···	LCO-Baade
52547.7	···	19.609(082)	19.054(037)	···	···	···	LCO-2.5m
52555.6	···	20.199(039)	19.227(048)	···	···	···	LCO-2.5m
52562.6	···	20.755(185)	19.543(051)	···	···	···	LCO-Baade
52568.6	···	···	19.650(117)	···	18.616(024)	···	LCO-1m
52572.6	···	···	19.873(026)	···	···	···	LCO-Baade
52572.6	···	···	···	···	18.718(125)	···	CTIO-0.9m
52576.6	···	21.099(059)	20.070(047)	···	···	···	LCO-Baade
52577.5	···	21.088(077)	20.261(040)	···	19.002(053)	···	LCO-2.5m
52585.6	···	···	20.712(054)	···	···	···	LCO-1m
			SN 2002fa				
52528.6	···	21.224(077)	20.242(020)	···	···	···	LCO-1m
52529.5	···	21.168(034)	20.274(021)	19.760(026)	19.538(023)	···	LCO-1m
52538.6	···	21.576(200)	20.417(056)	19.920(032)	19.678(044)	···	LCO-1m
52545.6	···	21.817(049)	20.561(016)	···	···	···	LCO-Baade
52547.6	···	21.844(051)	20.486(024)	···	···	···	LCO-2.5m
52548.6	···	21.854(121)	20.603(036)	···	19.786(075)	···	LCO-1m
52555.6	···	22.171(060)	20.674(056)	···	···	···	LCO-2.5m
52561.5	···	22.173(091)	20.799(034)	···	···	···	LCO-Baade
52568.5	···	···	20.861(076)	···	19.844(088)	···	LCO-1m
52572.5	···	···	21.222(030)	···	···	···	LCO-Baade
52572.6	···	···	21.182(096)	···	···	···	LCO-1m
52576.5	···	23.040(066)	21.437(029)	···	···	···	LCO-Baade

Table 5—Continued

JD-2,400,000	*U*	*B*	*V*	*R*	*I*	*z*	Telescope
52577.6	···	···	21.559(074)	···	20.453(080)	···	LCO-2.5m
52820.8	···	···	24.031(220)	···	···	···	LCO-Clay
			SN 200210				
52545.8	···	22.029(087)	20.475(033)	···	···	···	LCO-Baade
52547.7	···	22.205(078)	20.536(023)	···	19.486(047)	···	LCO-2.5m
52548.8	···	22.171(075)	20.569(043)	···	19.594(054)	···	LCO-1m
52555.8	···	22.371(066)	20.640(044)	···	19.670(072)	···	LCO-2.5m
52561.8	···	22.399(046)	20.770(021)	···	···	···	LCO-Baade
52572.7	···	···	21.001(050)	···	···	···	LCO-Baade
52576.7	···	22.942(033)	21.164(016)	···	···	···	LCO-Baade
52577.7	···	22.980(072)	21.178(033)	···	19.980(049)	···	LCO-2.5m
52585.6	···	···	21.620(059)	···	···	···	LCO-2.5m
52588.7	···	23.733(108)	21.975(036)	···	···	···	LCO-Clay
			SN 2002gd				
52555.8	···	17.549(026)	17.457(014)	···	17.305(028)	···	LCO-2.5m
52561.7	···	17.497(017)	17.256(014)	···	···	···	LCO-Baade
52568.6	···	17.854(021)	17.351(029)	···	16.812(013)	···	LCO-1m
52572.6	···	18.137(016)	17.501(014)	···	16.900(014)	···	LCO-1m
52572.6	···	18.081(022)	17.512(015)	···	16.886(015)	···	CTIO-0.9m
52572.7	···	···	17.509(014)	···	···	···	LCO-Baade
52573.5	···	18.203(014)	17.520(015)	···	16.906(015)	···	CTIO-0.9m
52574.7	···	18.297(014)	17.554(015)	···	16.929(015)	···	CTIO-0.9m
52576.6	···	···	17.617(010)	···	···	···	LCO-Baade
52577.6	···	18.500(034)	17.650(013)	···	17.060(035)	···	LCO-2.5m
52585.6	···	···	17.780(032)	···	···	···	LCO-2.5m
52585.6	···	18.853(022)	17.784(014)	···	17.010(014)	···	LCO-1m
52586.6	···	18.871(016)	17.814(014)	···	17.016(014)	···	LCO-1m

Table 5—Continued

JD-2,400,000	U	B	V	R	I	z	Telescope
52588.7	···	···	17.811(014)	···	···	···	LCO-Clay
52590.6	···	18.976(017)	17.812(014)	···	16.995(014)	···	LCO-1m
52596.5	···	19.095(026)	17.827(014)	···	16.978(014)	···	LCO-1m
52609.6	···	19.195(017)	17.836(014)	···	16.906(010)	···	LCO-2.5m
52615.6	···	19.236(016)	17.826(014)	···	16.882(014)	···	LCO-1m
			SN 2002gw				
52567.8	···	···	17.279(088)	···	···	···	LCO-1m
52568.7	···	17.550(019)	17.317(029)	···	16.920(021)	···	LCO-1m
52572.6	···	17.629(014)	17.324(015)	···	16.857(015)	···	CTIO-0.9m
52572.7	···	17.658(016)	17.307(014)	···	16.861(014)	···	LCO-1m
52574.7	···	17.721(014)	17.329(015)	···	16.838(015)	···	CTIO-0.9m
52576.7	···	17.879(017)	···	···	···	···	LCO-Baade
52577.7	···	17.831(017)	17.365(009)	···	16.862(018)	···	LCO-2.5m
52585.7	···	···	17.406(014)	···	16.774(023)	···	LCO-2.5m
52585.7	···	18.108(016)	17.406(014)	···	16.778(014)	···	LCO-1m
52586.7	···	18.130(016)	17.404(014)	···	16.742(014)	···	LCO-1m
52588.8	···	···	17.434(014)	···	···	···	LCO-Baade
52590.7	···	18.232(016)	17.393(014)	···	16.722(014)	···	LCO-1m
52596.6	···	18.298(022)	17.398(014)	···	16.703(014)	···	LCO-1m
52609.7	···	18.504(017)	···	···	16.678(016)	···	LCO-2.5m
52615.8	···	18.559(016)	17.446(014)	···	16.672(018)	···	LCO-1m
52625.7	···	18.660(036)	17.513(031)	···	16.735(014)	···	LCO-1m
52647.6	···	18.913(017)	17.739(012)	···	16.965(021)	···	LCO-1m
52672.6	···	···	···	···	17.493(014)	···	LCO-1m
52694.5	···	···	19.985(030)	···	18.575(026)	···	LCO-1m
52702.5	···	21.414(061)	19.988(037)	···	18.683(028)	···	LCO-2.5m
52710.5	···	21.576(149)	20.030(044)	···	18.618(062)	···	LCO-2.5m
52797.9	···	···	20.710(029)	···	···	···	LCO-2.5m
52841.8	···	···	21.046(111)	···	···	···	LCO-1m

Table 5—Continued

JD-2,400,000	U	B	V	R	I	z	Telescope
52843.9	···	···	21.236(072)	···	···	···	LCO-1m
52846.8	···	···	21.605(151)	···	···	···	LCO-1m
52906.8	···	···	21.566(062)	···	···	···	LCO-1m
52914.8	···	···	21.333(285)	···	···	···	LCO-1m
SN 2002hj							
52585.7	···	19.011(016)	18.278(014)	···	17.694(014)	···	LCO-1m
52585.7	···	···	18.272(022)	···	17.671(056)	···	LCO-2.5m
52586.6	···	19.058(016)	18.304(014)	···	17.689(015)	···	LCO-1m
52590.6	···	19.234(016)	18.414(014)	···	17.747(014)	···	LCO-1m
52596.6	···	19.476(061)	18.520(022)	···	17.823(016)	···	LCO-1m
52609.8	···	19.846(021)	18.670(017)	···	17.906(031)	···	LCO-2.5m
52611.6	···	···	···	···	17.911(028)	···	LCO-2.5m
52612.7	···	···	18.741(020)	···	17.951(022)	···	LCO-1m
52615.7	···	20.033(031)	18.801(014)	18.334(015)	···	···	LCO-1m
52619.6	···	···	···	···	18.047(014)	···	LCO-1m
52649.7	···	20.952(045)	19.557(020)	···	18.453(039)	···	LCO-2.5m
52665.6	···	22.405(110)	20.824(049)	···	19.541(039)	···	LCO-1m
52666.6	···	···	20.902(038)	···	···	···	LCO-2.5m
52672.6	···	23.366(425)	21.618(115)	···	20.142(091)	···	LCO-1m
52673.6	···	···	21.629(150)	···	···	···	LCO-2.5m
52701.5	···	···	22.024(104)	···	20.732(180)	···	LCO-2.5m
52710.5	···	···	21.594(210)	···	20.303(240)	···	LCO-2.5m
SN 2002hx							
52596.84	···	19.543(019)	18.742(014)	···	18.204(015)	···	LCO-1m
52609.82	···	19.973(025)	18.969(018)	···	18.274(034)	···	LCO-2.5m
52612.84	···	20.111(034)	19.056(014)	···	18.321(016)	···	LCO-1m
52615.82	···	20.332(043)	19.114(014)	···	···	···	LCO-1m

Table 5—Continued

JD-2,400,000	U	B	V	R	I	z	Telescope
52618.83	···	···	···	···	18.353(018)	···	LCO-1m
52625.80	···	20.638(050)	19.341(020)	···	18.407(014)	···	LCO-1m
52643.82	···	21.067(031)	19.541(019)	···	18.511(014)	···	LCO-1m
52645.79	···	21.096(028)	19.546(013)	···	18.491(021)	···	LCO-1m
52649.75	···	21.254(036)	···	···	···	···	LCO-2.5m
52665.76	···	22.065(114)	20.869(047)	···	19.521(038)	···	LCO-1m
52666.76	···	22.511(114)	20.887(027)	···	19.544(029)	···	LCO-2.5m
52668.73	···	22.376(120)	20.861(039)	···	19.637(042)	···	CTIO-1.5m
52669.68	···	22.579(121)	20.915(032)	···	19.591(032)	···	CTIO-1.5m
52671.73	···	22.501(098)	20.900(033)	···	19.734(029)	···	CTIO-1.5m
52672.75	···	···	20.986(057)	···	19.640(035)	···	LCO-1m
52680.73	···	22.588(130)	21.085(042)	···	19.814(036)	···	LCO-1m
52694.69	···	22.661(233)	21.191(053)	···	19.757(036)	···	LCO-1m
52702.67	···	22.921(091)	21.264(033)	···	19.962(051)	···	LCO-2.5m
52710.75	···	23.023(130)	21.455(051)	···	20.075(060)	···	LCO-2.5m
52733.60	···	23.206(117)	21.695(046)	···	20.235(055)	···	LCO-2.5m
52744.56	···	···	21.768(221)	···	20.489(134)	···	CTIO-0.9m
52745.55	···	···	···	···	20.844(168)	···	CTIO-0.9m
52746.57	···	···	···	···	20.316(136)	···	CTIO-0.9m
52764.54	···	23.004(301)	22.229(061)	···	···	···	LCO-Clay
52777.47	···	···	22.289(101)	···	···	···	LCO-1m
52789.47	···	···	22.240(102)	···	···	···	LCO-2.5m
52794.47	···	···	22.493(083)	···	···	···	LCO-Clay
			SN 2002ig				
52585.7	···	20.276(022)	19.916(043)	···	···	···	CTIO-1.5m
52586.7	···	20.329(026)	19.913(026)	···	···	···	CTIO-1.5m
52588.7	···	20.482(039)	20.011(028)	···	19.521(051)	···	LCO-1m
52590.6	···	20.566(056)	20.047(033)	···	19.527(051)	···	LCO-1m
52610.7	···	21.768(048)	20.590(023)	···	19.632(080)	···	LCO-2.5m

Table 5—Continued

JD-2,400,000	U	B	V	R	I	z	Telescope
52611.6	···	···	···	···	19.689(091)	···	LCO-2.5m
52617.7	···	21.854(156)	20.822(071)	···	···	···	LCO-1m
52619.6	···	···	20.822(071)	···	19.716(048)	···	LCO-1m
52625.6	···	···	20.817(155)	···	19.934(136)	···	LCO-1m
SN 2003B							
52645.7	16.823(030)	16.497(016)	15.821(017)	15.500(015)	15.332(010)	···	LCO-1m
52648.7	17.067(030)	16.583(016)	15.847(013)	15.512(015)	15.326(014)	···	LCO-1m
52649.7	17.128(015)	16.604(017)	15.866(014)	15.521(015)	15.320(026)	···	LCO-2.5m
52665.6	17.980(046)	16.970(016)	15.961(014)	15.559(015)	15.321(014)	···	LCO-1m
52668.6	18.025(019)	17.014(014)	15.959(015)	15.567(015)	15.322(015)	···	CTIO-1.5m
52671.6	18.109(019)	17.059(014)	15.984(015)	15.572(015)	15.353(015)	···	CTIO-1.5m
52672.6	18.292(066)	17.056(016)	16.005(014)	15.600(015)	15.333(014)	···	LCO-1m
52680.6	···	17.182(022)	16.033(014)	15.633(015)	15.378(014)	···	LCO-1m
52694.6	18.711(095)	17.324(016)	16.168(014)	15.766(015)	15.503(014)	···	LCO-1m
52700.5	···	17.449(016)	···	···	···	···	LCO-2.5m
52701.5	···	17.417(022)	16.327(021)	···	15.700(028)	···	LCO-2.5m
52734.5	···	19.766(018)	18.357(028)	···	···	···	LCO-2.5m
52797.9	···	20.181(101)	19.021(033)	···	···	···	LCO-2.5m
52811.9	···	···	19.216(042)	···	···	···	LCO-1m
52846.9	···	20.689(076)	19.546(032)	···	18.275(037)	···	LCO-1m
52848.9	···	20.431(047)	19.592(028)	···	18.280(027)	···	LCO-1m
52906.8	···	20.974(100)	20.053(052)	···	18.963(053)	···	LCO-1m
52952.8	···	21.091(157)	20.537(086)	···	19.543(057)	···	LCO-1m
52967.8	···	21.633(077)	20.923(046)	···	19.849(057)	···	LCO-1m
52988.8	···	21.768(153)	21.029(094)	···	20.005(072)	···	LCO-1m
52995.6	···	···	21.013(063)	···	20.183(081)	···	LCO-1m
52996.6	···	21.571(069)	···	···	···	···	LCO-1m
53001.6	···	21.890(087)	21.245(058)	···	20.307(086)	···	LCO-1m
53019.6	···	22.080(105)	21.530(082)	···	20.743(131)	···	LCO-1m

Table 5—Continued

JD-2,400,000	U	B	V	R	I	z	Telescope
			SN 2003E				
52648.66	···	19.053(058)	18.349(012)	···	17.616(019)	···	LCO-1m
52649.69	···	18.965(035)	···	···	···	···	LCO-2.5m
52665.67	···	19.417(020)	18.419(015)	···	17.569(016)	···	LCO-1m
52666.69	···	···	18.424(035)	···	···	···	LCO-2.5m
52668.64	···	19.406(014)	18.412(015)	···	17.550(015)	···	CTIO-1.5m
52672.67	···	19.525(020)	18.446(014)	···	17.563(014)	···	LCO-1m
52680.63	···	19.609(035)	18.467(016)	···	17.484(015)	···	LCO-1m
52694.63	···	19.570(023)	18.421(014)	···	17.454(014)	···	LCO-1m
52701.62	···	19.692(033)	18.416(013)	···	17.474(031)	···	LCO-2.5m
52710.58	···	19.702(047)	18.385(015)	···	17.491(021)	···	LCO-2.5m
52735.50	···	20.114(055)	18.584(024)	···	17.569(035)	···	LCO-2.5m
52739.48	···	20.246(059)	18.618(038)	···	17.608(039)	···	LCO-2.5m
52739.50	···	20.125(027)	18.799(014)	···	···	···	LCO-Clay
52744.49	···	20.409(131)	18.823(033)	···	17.700(023)	···	CTIO-0.9m
52745.52	···	···	18.784(037)	···	17.694(017)	···	LCO-1m
52745.52	···	20.458(184)	18.721(036)	···	17.676(018)	···	CTIO-0.9m
52746.56	···	···	18.710(160)	···	···	···	CTIO-0.9m
52750.52	···	20.725(056)	19.052(020)	···	17.847(015)	···	LCO-1m
52764.47	···	21.320(121)	20.080(037)	···	···	···	LCO-Clay
			SN 2003T				
52668.7	···	19.310(014)	18.921(015)	···	18.456(015)	···	CTIO-1.5m
52669.7	···	19.334(019)	18.924(015)	···	18.482(022)	···	CTIO-1.5m
52671.7	···	19.439(014)	18.932(015)	···	18.486(016)	···	CTIO-1.5m
52673.8	···	···	18.916(021)	···	···	···	LCO-2.5m
52680.7	···	19.890(023)	19.072(012)	···	18.437(015)	···	LCO-1m
52701.7	···	20.427(028)	19.192(015)	···	18.404(029)	···	LCO-2.5m

Table 5—Continued

JD-2,400,000	U	B	V	R	I	z	Telescope
52710.7	···	20.602(026)	19.279(016)	···	18.404(021)	···	LCO-2.5m
52733.6	···	20.966(027)	19.442(013)	···	18.502(027)	···	LCO-2.5m
52738.6	···	21.028(033)	19.510(029)	···	18.561(027)	···	LCO-2.5m
52739.6	···	···	19.536(025)	···	···	···	LCO-Clay
52744.5	···	21.390(337)	19.526(048)	···	18.587(039)	···	CTIO-0.9m
52745.6	···	···	19.603(070)	···	18.560(040)	···	CTIO-0.9m
52745.6	···	20.961(280)	19.582(079)	···	18.697(039)	···	LCO-1m
52746.6	···	···	19.830(126)	···	···	···	CTIO-0.9m
52754.5	···	21.739(082)	20.083(020)	···	18.863(030)	···	LCO-1m
52760.5	···	···	20.838(032)	···	19.422(048)	···	LCO-1m
52764.5	···	23.242(094)	21.292(036)	···	···	···	LCO-Clay
52777.5	···	···	21.590(146)	···	20.248(126)	···	LCO-1m
52789.5	···	···	21.773(094)	···	···	···	LCO-2.5m
52794.5	···	···	21.924(058)	···	···	···	LCO-Clay
			SN 2003bg				
52700.6	···	15.979(017)	···	···	···	···	LCO-2.5m
52702.5	···	15.720(024)	15.244(012)	···	···	···	LCO-2.5m
52710.5	···	14.692(017)	14.380(023)	···	14.062(028)	···	LCO-2.5m
52733.5	···	15.751(012)	14.756(018)	···	···	···	LCO-2.5m
52738.5	···	16.132(028)	15.033(025)	···	14.082(031)	···	LCO-2.5m
52744.5	···	16.418(016)	15.312(014)	···	14.282(014)	···	CTIO-0.9m
52745.5	···	···	15.315(014)	···	14.292(014)	···	CTIO-0.9m
52745.5	···	16.445(016)	15.322(014)	···	14.287(014)	···	LCO-1m
52746.5	···	16.590(040)	15.389(014)	···	14.320(014)	···	CTIO-0.9m
52754.5	···	16.679(016)	15.563(014)	···	14.481(014)	···	LCO-1m
52843.9	···	···	16.888(014)	···	···	···	LCO-1m
52845.9	···	17.730(017)	16.914(014)	16.319(015)	15.800(014)	···	LCO-1m
52870.9	···	18.098(016)	17.276(016)	16.611(018)	16.184(014)	···	LCO-1m
52871.9	···	···	17.287(025)	···	···	···	LCO-2.5m

Table 5—Continued

JD-2,400,000	U	B	V	R	I	z	Telescope
52905.9	···	18.700(016)	17.918(015)	17.097(022)	16.846(016)	···	LCO-1m
52951.8	···	19.409(041)	18.737(030)	17.643(018)	17.571(023)	···	LCO-1m
52959.7	···	···	18.911(044)	···	···	···	LCO-1m
52966.9	···	19.623(107)	···	···	···	···	LCO-1m
52988.8	···	20.509(057)	19.835(052)	18.809(024)	18.647(040)	···	LCO-1m
52989.8	···	···	20.062(076)	···	18.648(044)	···	LCO-2.5m
52995.7	···	20.890(061)	20.307(060)	19.054(028)	19.075(058)	···	LCO-1m
52996.7	···	···	20.262(049)	···	···	···	LCO-2.5m
53000.6	···	20.894(060)	20.361(056)	19.198(025)	19.122(044)	···	LCO-1m
53001.7	···	21.023(048)	20.567(064)	19.214(032)	19.472(068)	···	LCO-1m
53019.7	···	21.652(079)	21.036(070)	19.750(020)	19.876(048)	···	LCO-1m
SN 2003bj							
52700.8	···	···	15.569(021)	···	···	···	LCO-2.5m
52702.7	···	15.796(022)	15.564(011)	···	···	···	LCO-2.5m
52710.8	···	16.062(032)	15.747(023)	···	15.193(032)	···	LCO-2.5m
52734.8	···	18.247(012)	17.198(010)	···	16.064(015)	···	LCO-2.5m
52738.7	···	18.749(037)	17.596(019)	···	16.361(022)	···	LCO-2.5m
52739.8	···	···	17.680(020)	···	···	···	LCO-Clay
52744.7	···	19.176(050)	18.042(022)	···	16.804(020)	···	CTIO-0.9m
52745.7	···	19.163(081)	18.110(033)	···	16.744(033)	···	LCO-1m
52753.7	···	19.673(028)	18.573(014)	···	17.249(014)	···	LCO-1m
52754.8	···	19.761(022)	18.606(014)	···	17.254(014)	···	LCO-1m
52764.8	···	20.010(035)	18.911(016)	···	···	···	LCO-Clay
52782.7	···	20.225(046)	19.361(027)	···	17.960(014)	···	LCO-1m
52789.8	···	···	19.635(052)	···	18.163(046)	···	LCO-2.5m
52797.7	···	···	19.742(033)	···	18.313(033)	···	LCO-2.5m
SN 2003bl							

Table 5—Continued

JD-2,400,000	U	B	V	R	I	z	Telescope
52701.5	···	18.790(012)	18.848(014)	···	18.828(033)	···	LCO-2.5m
52702.8	···	18.798(016)	18.773(011)	···	18.648(019)	···	LCO-2.5m
52710.9	···	19.021(023)	18.858(026)	···	18.534(020)	···	LCO-2.5m
52735.8	···	19.951(018)	18.996(013)	···	18.355(017)	···	LCO-2.5m
52738.7	···	19.958(022)	19.008(014)	···	18.385(025)	···	LCO-2.5m
52739.9	···	···	19.012(010)	···	···	···	LCO-Clay
52744.7	···	19.983(067)	19.027(038)	···	18.295(016)	···	CTIO-0.9m
52750.8	···	20.270(040)	19.032(016)	···	18.265(016)	···	LCO-1m
52754.7	···	20.253(026)	19.032(014)	···	18.264(014)	···	LCO-1m
52764.7	···	20.336(016)	19.059(014)	···	···	···	LCO-Clay
52777.8	···	20.230(094)	19.087(033)	···	18.277(024)	···	LCO-1m
52782.8	···	20.340(080)	19.116(026)	···	···	···	LCO-1m
52789.7	···	···	19.174(033)	···	18.391(045)	···	LCO-2.5m
52794.7	···	···	19.360(014)	···	···	···	LCO-Clay
52812.5	···	···	22.578(107)	···	20.805(078)	···	LCO-2.5m
SN 2003bn							
52704.63	···	17.286(015)	17.172(014)	···	16.946(020)	···	LCO-2.5m
52705.59	···	17.282(022)	17.215(021)	···	16.976(035)	···	LCO-2.5m
52706.55	···	···	17.179(010)	···	16.920(016)	···	LCO-2.5m
52710.80	···	17.514(059)	17.175(016)	···	···	···	LCO-2.5m
52733.63	···	18.364(033)	17.434(014)	···	16.845(026)	···	LCO-2.5m
52736.58	···	18.432(039)	17.443(050)	···	16.850(055)	···	LCO-2.5m
52738.66	···	18.497(051)	17.464(048)	···	16.825(050)	···	LCO-2.5m
52739.72	···	···	17.459(015)	···	···	···	LCO-Clay
52744.61	···	18.593(033)	17.486(015)	···	16.811(015)	···	CTIO-0.9m
52745.62	···	18.533(026)	17.453(018)	···	16.783(028)	···	CTIO-0.9m
52745.64	···	18.493(027)	17.449(014)	···	16.780(014)	···	LCO-1m
52750.56	···	18.603(061)	17.464(010)	···	16.783(015)	···	LCO-1m
52760.55	···	18.739(020)	17.490(014)	···	16.782(014)	···	LCO-1m

Table 5—Continued

JD-2,400,000	U	B	V	R	I	z	Telescope
52764.61	···	···	17.520(014)	···	···	···	LCO-Clay
52772.56	···	18.820(031)	17.527(013)	···	16.788(014)	···	LCO-1m
52777.55	···	18.904(023)	17.572(014)	···	16.811(014)	···	LCO-1m
52782.53	···	18.964(017)	17.624(014)	···	16.880(014)	···	LCO-1m
52789.51	···	···	17.703(026)	···	···	···	LCO-2.5m
52794.57	···	···	17.825(015)	···	···	···	LCO-Clay
52797.50	···	···	17.879(037)	···	···	···	LCO-2.5m
52811.48	···	20.560(045)	18.709(015)	···	17.591(014)	···	LCO-1m
52813.48	···	20.691(104)	18.905(027)	···	17.738(038)	···	LCO-2.5m
52820.53	···	···	19.636(017)	···	···	···	LCO-Clay
52849.47	···	···	···	···	18.929(230)	···	LCO-1m
52850.47	···	···	20.253(054)	···	18.911(075)	···	LCO-1m
SN 2003ci							
52733.7	···	19.857(017)	18.894(015)	···	18.225(019)	···	LCO-2.5m
52738.7	···	20.148(018)	19.028(015)	···	18.305(023)	···	LCO-2.5m
52745.7	···	20.432(200)	19.163(037)	···	18.466(035)	···	LCO-1m
52750.6	···	20.654(045)	19.310(024)	···	18.488(018)	···	LCO-1m
52760.6	···	21.001(034)	19.498(015)	···	18.560(021)	···	LCO-1m
52764.7	···	21.130(070)	19.566(022)	···	···	···	LCO-Clay
52777.6	···	···	19.705(039)	···	18.684(023)	···	LCO-1m
52782.6	···	21.198(094)	19.889(037)	···	18.717(040)	···	LCO-1m
52789.6	···	···	19.848(047)	···	18.781(044)	···	LCO-2.5m
52794.5	···	···	20.041(024)	···	···	···	LCO-Clay
52797.5	···	···	20.086(049)	···	18.923(049)	···	LCO-2.5m
52811.5	···	···	20.771(045)	···	···	···	LCO-1m
52816.6	···	···	21.481(057)	···	20.162(081)	···	LCO-2.5m
SN 2003cn							

Table 5—Continued

JD-2,400,000	U	B	V	R	I	z	Telescope
52733.9	···	18.660(012)	18.280(012)	···	17.981(035)	···	LCO-2.5m
52736.7	···	18.822(012)	18.365(032)	···	17.924(021)	···	LCO-2.5m
52739.8	···	18.992(017)	18.445(014)	···	···	···	LCO-Clay
52744.7	···	19.168(044)	18.503(026)	···	18.144(071)	···	CTIO-0.9m
52754.6	···	19.492(016)	18.642(009)	···	18.065(014)	···	LCO-1m
52760.7	···	19.645(020)	18.728(015)	···	18.129(017)	···	LCO-1m
52764.7	···	19.760(023)	18.767(014)	···	···	···	LCO-Clay
52777.7	···	19.977(063)	18.972(022)	···	18.221(017)	···	LCO-1m
52782.7	···	20.322(025)	19.057(014)	···	18.283(015)	···	LCO-1m
52797.7	···	···	19.805(034)	···	18.876(039)	···	LCO-2.5m
52815.6	···	23.543(198)	22.883(144)	···	21.828(246)	···	LCO-2.5m
SN 2003cv							
52735.6	···	19.707(020)	18.462(021)	···	17.657(020)	···	LCO-2.5m
52738.7	···	20.076(023)	18.734(017)	···	17.759(022)	···	LCO-2.5m
52739.7	···	···	18.804(020)	···	···	···	LCO-Clay
52744.6	···	20.291(150)	19.056(042)	···	17.954(032)	···	CTIO-0.9m
52745.6	···	···	18.964(135)	···	17.967(137)	···	CTIO-0.9m
52754.6	···	21.172(056)	19.612(019)	···	18.336(025)	···	LCO-1m
52794.5	···	···	20.338(032)	···	···	···	LCO-Clay
52811.5	···	21.588(104)	···	···	···	···	LCO-1m
52815.5	···	···	20.517(172)	···	···	···	LCO-2.5m
52816.5	···	21.869(059)	20.489(032)	···	19.370(036)	···	LCO-2.5m
SN 2003cx							
52739.9	···	19.841(017)	19.423(017)	···	···	···	LCO-Clay
52750.8	···	20.134(039)	19.483(018)	···	18.900(019)	···	LCO-1m
52754.7	···	20.309(023)	19.527(014)	···	18.904(018)	···	LCO-1m
52760.7	···	20.377(027)	19.593(017)	···	18.846(015)	···	LCO-1m

Table 5—Continued

JD-2,400,000	U	B	V	R	I	z	Telescope
52764.8	···	20.452(024)	19.690(019)	···	···	···	LCO-Clay
52777.8	···	20.866(196)	19.631(078)	···	···	···	LCO-1m
52782.8	···	20.732(107)	19.748(026)	···	18.981(038)	···	LCO-1m
52794.7	···	···	19.809(015)	···	···	···	LCO-Clay
52797.7	···	···	19.820(058)	···	19.200(173)	···	LCO-2.5m
52814.6	···	21.249(028)	20.033(024)	···	19.259(060)	···	LCO-2.5m
52820.6	···	···	20.353(017)	···	···	···	LCO-Clay
52842.6	···	23.071(280)	21.367(119)	···	···	···	LCO-1m
52845.6	···	···	21.503(093)	20.820(043)	20.550(097)	···	LCO-1m
52870.6	···	···	21.897(147)	21.152(106)	···	···	LCO-1m
			SN 2003dq				
52754.6	···	20.768(088)	19.800(019)	···	19.087(049)	···	LCO-1m
52764.6	···	21.655(060)	20.241(036)	···	···	···	LCO-Clay
52777.6	···	21.421(227)	20.417(083)	···	19.579(059)	···	LCO-1m
52782.6	···	21.996(230)	20.190(067)	···	19.437(135)	···	LCO-1m
52789.6	···	···	20.645(087)	···	19.809(091)	···	LCO-2.5m
52794.5	···	···	21.097(046)	···	···	···	LCO-Clay
			SN 2003ef				
52772.7	···	17.957(042)	17.488(052)	···	16.666(056)	···	LCO-1m
52782.6	···	18.468(017)	17.574(014)	···	16.804(014)	···	LCO-1m
52789.7	···	18.764(017)	17.655(024)	···	16.856(037)	···	LCO-2.5m
52794.6	···	···	17.745(017)	···	···	···	LCO-Clay
52797.6	···	···	17.714(032)	···	16.856(025)	···	LCO-2.5m
52811.6	···	19.141(032)	17.795(016)	17.229(015)	16.852(015)	···	LCO-1m
52814.5	···	19.302(035)	17.844(023)	···	16.815(019)	···	LCO-2.5m
52820.6	···	···	17.910(011)	···	···	···	LCO-Clay
52826.6	···	19.407(026)	17.896(014)	17.281(015)	16.836(014)	···	LCO-1m

Table 5—Continued

JD-2,400,000	U	B	V	R	I	z	Telescope
52841.6	···	19.657(021)	18.056(014)	17.351(015)	16.904(014)	···	LCO-1m
52843.6	···	19.735(038)	18.109(019)	···	···	···	LCO-1m
52845.6	···	19.759(024)	18.127(014)	17.391(015)	16.954(014)	···	LCO-1m
52866.5	···	21.062(036)	19.260(014)	···	···	···	LCO-Clay
52871.5	···	···	19.895(040)	···	18.159(027)	···	LCO-2.5m
			SN 2003eg				
52782.7	···	17.016(016)	16.562(014)	···	15.989(014)	···	LCO-1m
52789.7	···	17.627(025)	17.035(022)	···	16.351(035)	···	LCO-2.5m
52794.7	···	···	17.312(014)	···	···	···	LCO-Clay
52797.7	···	18.353(040)	17.476(027)	···	···	···	LCO-2.5m
52820.6	···	19.386(017)	17.926(010)	···	···	···	LCO-Clay
52871.5	···	···	19.800(038)	···	···	···	LCO-2.5m
			SN 2003ej				
52782.6	···	16.909(016)	16.755(014)	···	16.417(014)	···	LCO-1m
52789.6	···	17.248(017)	16.971(017)	···	16.597(017)	···	LCO-2.5m
52797.6	···	···	17.191(018)	···	16.699(036)	···	LCO-2.5m
52811.6	···	···	···	···	16.974(017)	···	LCO-1m
52815.6	···	18.938(024)	17.873(016)	···	17.068(028)	···	LCO-2.5m
52826.5	···	19.449(038)	18.212(019)	···	17.354(019)	···	LCO-1m
52841.5	···	20.100(070)	18.749(032)	···	17.902(049)	···	LCO-1m
52851.5	···	20.971(067)	19.511(025)	···	18.302(023)	···	LCO-1m
			SN 2003fb				
52797.8	···	20.589(040)	19.375(063)	···	18.260(061)	···	LCO-2.5m
52811.9	···	20.876(052)	19.551(018)	18.872(015)	18.248(014)	···	LCO-1m
52820.8	···	···	19.634(019)	···	···	···	LCO-Clay

Table 5—Continued

JD-2,400,000	U	B	V	R	I	z	Telescope
52826.7	···	21.193(050)	19.619(020)	18.912(015)	18.304(081)	···	LCO-1m
52841.7	···	21.313(063)	19.677(020)	18.908(015)	18.276(015)	···	LCO-1m
52842.6	···	···	19.671(029)	18.920(060)	18.195(065)	···	LCO-1m
52845.7	···	21.420(060)	···	18.948(015)	18.303(014)	···	LCO-1m
52851.7	···	21.428(061)	19.780(021)	18.988(015)	18.325(014)	···	LCO-1m
52866.7	···	21.798(037)	20.138(011)	···	···	···	LCO-Clay
52870.6	···	22.134(092)	20.408(026)	19.409(019)	18.782(017)	···	LCO-1m
52871.6	···	···	20.431(077)	···	···	···	LCO-2.5m
52879.6	···	23.236(291)	21.279(077)	20.270(026)	19.479(028)	···	LCO-1m
52889.6	···	···	21.214(084)	···	···	···	LCO-Clay
52897.6	···	···	21.691(016)	···	···	···	LCO-Clay
52901.6	···	···	21.861(273)	···	···	···	LCO-1m
52906.5	···	···	21.721(107)	···	···	···	LCO-1m
52915.5	···	···	21.869(114)	···	···	···	LCO-1m
52929.6	···	···	21.997(093)	···	···	···	LCO-1m
SN 2003gd							
52811.9	17.012(021)	15.462(016)	14.154(014)	13.626(015)	13.270(014)	···	LCO-1m
52817.9	···	15.627(031)	14.333(033)	···	···	···	LCO-2.5m
52841.8	19.407(145)	17.677(034)	16.068(024)	15.253(030)	14.768(018)	···	LCO-1m
52843.8	···	18.199(019)	16.684(019)	15.743(018)	15.256(021)	···	LCO-1m
52845.9	···	18.810(021)	17.221(014)	16.174(015)	15.663(021)	···	LCO-1m
52870.8	···	19.234(021)	17.612(021)	16.566(015)	16.010(014)	···	LCO-1m
52906.7	···	19.310(028)	17.865(021)	16.837(015)	16.346(014)	···	LCO-1m
52908.7	···	···	17.887(012)	···	···	···	LCO-2.5m
52952.7	···	19.611(296)	18.254(133)	17.324(048)	16.878(042)	···	LCO-1m
52967.7	···	19.814(034)	18.593(026)	17.539(019)	···	···	LCO-1m
52988.6	···	19.857(031)	18.707(026)	17.688(015)	17.337(017)	···	LCO-1m
53000.5	···	···	18.871(031)	17.895(031)	17.605(028)	···	LCO-1m
53019.5	···	19.878(081)	19.046(026)	18.103(017)	17.743(021)	···	LCO-1m

Table 5—Continued

JD-2,400,000	U	B	V	R	I	z	Telescope
			SN 2003hd				
52866.8	···	18.976(012)	18.831(011)	···	···	···	LCO-Clay
52870.7	···	19.127(018)	18.747(040)	18.659(015)	18.525(022)	···	LCO-1m
52871.9	···	19.160(064)	···	···	···	···	LCO-2.5m
52879.9	···	19.605(019)	18.971(014)	18.695(015)	18.528(020)	···	LCO-1m
52888.8	···	19.985(023)	19.130(014)	18.788(016)	18.504(020)	···	LCO-1m
52901.8	···	20.394(055)	19.279(036)	18.872(029)	18.574(032)	···	LCO-1m
52905.7	···	20.480(031)	19.344(017)	18.848(015)	18.556(022)	···	LCO-1m
52907.7	···	20.497(026)	19.316(014)	18.856(015)	18.579(015)	···	LCO-1m
52908.7	···	20.564(027)	19.336(014)	18.849(015)	18.635(021)	···	LCO-1m
52914.7	···	20.586(064)	19.294(027)	18.817(023)	18.584(031)	···	LCO-1m
52929.7	···	20.960(045)	19.522(015)	18.989(015)	18.673(016)	···	LCO-1m
52951.7	···	21.867(266)	20.359(062)	19.572(028)	19.208(034)	···	LCO-1m
52966.7	···	···	22.104(114)	21.022(059)	20.675(186)	···	LCO-1m
52988.7	···	···	22.025(105)	21.309(068)	20.816(137)	···	LCO-1m
52995.5	···	···	22.423(142)	21.178(065)	20.999(127)	···	LCO-1m
52996.5	···	···	···	···	···	···	LCO-1m
53001.5	···	···	22.304(114)	21.353(086)	20.891(129)	···	LCO-1m
53016.6	···	···	···	21.678(130)	···	···	LCO-1m
			SN 2003hg				
52871.7	···	18.315(035)	17.476(022)	···	16.541(019)	···	LCO-2.5m
52879.8	···	18.463(017)	17.573(015)	16.930(015)	16.531(014)	···	LCO-1m
52888.7	···	18.803(017)	17.614(014)	16.925(015)	16.475(014)	···	LCO-1m
52890.7	···	18.947(035)	17.650(014)	16.973(015)	16.489(014)	···	LCO-1m
52901.7	···	19.466(269)	17.900(020)	17.093(017)	16.599(029)	···	LCO-1m
52902.7	···	19.483(037)	17.894(014)	17.123(015)	16.589(014)	···	LCO-1m
52905.6	···	19.570(017)	17.925(014)	17.109(015)	16.575(014)	···	LCO-1m

Table 5—Continued

JD-2,400,000	U	B	V	R	I	z	Telescope
52906.7	···	19.658(022)	17.958(014)	17.176(015)	16.643(014)	···	LCO-1m
52908.6	···	···	17.916(019)	···	···	···	LCO-2.5m
52908.6	···	19.758(034)	17.961(014)	17.113(015)	16.580(014)	···	LCO-1m
52915.7	···	19.911(042)	18.037(014)	17.191(015)	16.626(014)	···	LCO-1m
52928.6	···	20.160(069)	···	17.223(022)	···	···	LCO-1m
52928.6	···	···	18.050(027)	···	···	···	LCO-2.5m
52929.6	···	20.124(032)	18.091(009)	17.210(015)	16.638(014)	···	LCO-1m
52952.5	···	20.284(041)	18.171(014)	17.263(015)	16.671(014)	···	LCO-1m
52953.6	···	20.234(107)	18.211(019)	17.258(015)	16.657(014)	···	LCO-1m
52969.5	···	20.717(132)	18.384(020)	17.252(031)	16.813(014)	···	LCO-1m
52988.5	···	22.509(246)	19.056(030)	17.942(015)	···	···	LCO-1m
52989.6	···	···	19.165(060)	···	17.373(020)	···	LCO-2.5m
52996.5	···	···	19.719(043)	···	···	···	LCO-2.5m
SN 2003hk							
52902.8	···	18.747(016)	17.849(013)	17.441(015)	17.215(014)	···	LCO-1m
52905.8	···	18.854(017)	17.969(014)	17.441(015)	···	···	LCO-1m
52906.9	···	18.951(016)	17.931(014)	17.473(015)	17.235(014)	···	LCO-1m
52908.8	···	19.007(016)	17.988(014)	17.504(015)	17.279(014)	···	LCO-1m
52908.8	···	···	17.936(023)	···	···	···	LCO-2.5m
52915.9	···	19.311(021)	18.092(016)	17.545(019)	17.301(014)	···	LCO-1m
52928.8	···	···	18.408(055)	···	···	···	LCO-2.5m
52929.8	···	19.755(024)	18.339(014)	17.724(015)	17.428(015)	···	LCO-1m
52952.8	···	20.363(169)	19.080(057)	18.295(040)	17.875(025)	···	LCO-1m
52972.7	···	···	21.726(154)	···	···	···	LCO-2.5m
52987.7	···	···	21.743(181)	···	···	···	LCO-1m
52988.7	···	···	···	20.338(058)	···	···	LCO-1m
52989.7	···	···	21.628(276)	···	19.912(111)	···	LCO-2.5m
52996.6	···	···	21.878(130)	20.662(073)	···	···	LCO-1m
53017.6	···	···	···	20.908(066)	···	···	LCO-1m

Table 5—Continued

JD-2,400,000	U	B	V	R	I	z	Telescope
			SN 2003hl				
52879.9	···	17.342(016)	16.684(014)	16.289(015)	15.973(014)	···	LCO-1m
52890.8	···	17.665(016)	16.679(014)	16.162(015)	15.824(014)	···	LCO-1m
52901.8	···	18.181(063)	16.818(042)	16.246(049)	15.805(015)	···	LCO-1m
52902.7	···	18.196(016)	16.820(010)	16.220(015)	15.795(014)	···	LCO-1m
52905.8	···	18.309(016)	16.898(014)	16.251(015)	15.824(014)	···	LCO-1m
52907.8	···	18.290(048)	16.883(014)	16.241(022)	15.760(018)	···	LCO-1m
52908.7	···	···	16.864(010)	···	···	···	LCO-2.5m
52915.8	···	18.586(016)	16.941(014)	16.257(015)	15.756(014)	···	LCO-1m
52928.7	···	18.765(027)	17.022(010)	16.252(011)	15.744(014)	···	LCO-1m
52948.7	···	···	17.088(009)	···	···	···	LCO-Clay
52952.6	···	19.104(079)	17.188(022)	16.330(011)	15.812(013)	···	LCO-1m
52953.7	···	19.178(099)	17.171(027)	16.361(014)	15.801(015)	···	LCO-1m
52966.7	···	···	17.323(008)	···	···	···	LCO-2.5m
52967.6	···	19.341(043)	17.312(030)	16.412(083)	15.900(024)	···	LCO-1m
52987.6	···	19.843(048)	17.785(014)	16.796(015)	16.195(014)	···	LCO-1m
52989.7	···	···	17.817(021)	···	16.218(020)	···	LCO-2.5m
52995.5	···	···	···	17.184(015)	16.516(014)	···	LCO-1m
52996.5	···	20.537(075)	18.324(015)	17.251(015)	16.597(014)	···	LCO-1m
53001.5	···	21.128(157)	18.865(018)	17.669(011)	16.927(010)	···	LCO-1m
53018.6	···	22.299(242)	20.526(071)	19.136(026)	18.103(024)	···	LCO-1m
			SN 2003hn				
52879.9	14.013(018)	14.649(016)	14.448(014)	14.189(015)	14.030(014)	···	LCO-1m
52888.9	15.036(018)	15.096(016)	14.566(014)	14.230(015)	14.045(014)	···	LCO-1m
52890.9	15.249(018)	15.209(016)	14.605(014)	14.252(015)	14.048(014)	···	LCO-1m
52902.8	16.338(018)	15.756(025)	14.864(007)	14.407(011)	14.166(010)	···	LCO-1m
52905.9	16.560(018)	15.883(016)	14.908(014)	14.446(015)	14.181(014)	···	LCO-1m

Table 5—Continued

JD-2,400,000	U	B	V	R	I	z	Telescope
52907.9	16.688(033)	15.957(012)	···	14.463(011)	14.199(014)	···	LCO-1m
52908.8	···	···	14.965(010)	···	···	···	LCO-2.5m
52908.9	16.766(018)	15.976(016)	14.948(014)	14.473(015)	14.198(014)	···	LCO-1m
52914.9	···	16.168(021)	15.020(013)	14.540(015)	14.233(014)	···	LCO-1m
52915.9	17.105(020)	16.173(016)	15.048(014)	···	···	···	LCO-1m
52928.8	···	···	15.172(010)	···	···	···	LCO-2.5m
52929.8	17.739(026)	16.444(016)	15.178(010)	14.634(015)	14.314(014)	···	LCO-1m
52951.8	18.675(107)	17.040(016)	15.570(014)	14.929(015)	14.586(014)	···	LCO-1m
52953.8	18.768(198)	17.103(023)	15.620(015)	14.970(015)	14.627(017)	···	LCO-1m
52959.6	···	17.521(016)	15.922(014)	15.223(015)	14.837(014)	···	LCO-1m
52966.8	···	···	17.074(014)	···	···	···	LCO-2.5m
52966.8	20.541(151)	18.801(028)	17.090(018)	16.127(015)	15.693(014)	···	LCO-1m
52967.8	20.615(131)	19.032(026)	17.246(014)	16.250(015)	15.822(014)	···	LCO-1m
52987.8	20.962(457)	19.550(043)	17.858(017)	16.740(015)	16.345(014)	···	LCO-1m
52989.7	···	···	17.896(025)	···	16.359(044)	···	LCO-2.5m
52995.7	···	19.625(036)	17.900(018)	16.852(015)	16.456(014)	···	LCO-1m
52996.5	···	···	17.932(021)	···	···	···	LCO-2.5m
53000.6	···	19.684(037)	18.005(019)	16.920(015)	16.550(014)	···	LCO-1m
53001.6	···	19.684(038)	18.012(019)	16.940(015)	16.544(014)	···	LCO-1m
53018.7	···	19.866(035)	18.209(018)	17.141(015)	16.771(014)	···	LCO-1m
53040.7	···	···	18.418(024)	···	···	···	LCO-Clay
			SN 2003ho				
52888.6	···	21.076(084)	19.104(018)	···	17.490(010)	···	LCO-1m
52901.6	···	21.264(163)	19.293(026)	18.335(031)	17.626(014)	···	LCO-1m
52905.6	···	21.373(046)	19.458(014)	18.414(015)	17.701(014)	···	LCO-1m
52906.6	···	21.545(047)	19.495(014)	18.445(015)	17.718(014)	···	LCO-1m
52907.5	···	21.508(047)	19.495(014)	18.465(015)	17.718(014)	···	LCO-1m
52914.6	···	···	19.790(132)	18.630(064)	17.894(037)	···	LCO-1m
52915.5	···	21.826(126)	19.825(022)	18.701(015)	17.950(014)	···	LCO-1m

Table 5—Continued

JD-2,400,000	U	B	V	R	I	z	Telescope
52928.6	···	···	21.463(049)	20.088(025)	19.294(028)	···	LCO-1m
52952.6	···	···	21.943(139)	20.539(047)	19.794(046)	···	LCO-1m
52967.5	···	···	···	20.690(181)	···	···	LCO-1m
52969.6	···	···	22.150(159)	20.630(081)	19.932(082)	···	LCO-1m
52987.6	···	···	22.482(304)	···	···	···	LCO-1m
			SN 2003ib				
52901.5	···	18.238(016)	18.036(014)	17.833(015)	17.672(017)	···	LCO-1m
52905.5	···	18.220(017)	18.014(014)	17.782(015)	17.659(014)	···	LCO-1m
52906.5	···	18.272(016)	18.004(014)	17.782(015)	17.646(014)	···	LCO-1m
52907.6	···	18.294(016)	18.019(014)	17.780(015)	17.620(014)	···	LCO-1m
52908.5	···	18.314(016)	18.022(014)	17.776(015)	17.616(014)	···	LCO-1m
52914.5	···	18.436(034)	18.109(024)	17.760(046)	17.676(040)	···	LCO-1m
52928.6	···	18.986(015)	18.390(014)	18.018(015)	17.786(014)	···	LCO-1m
52951.6	···	19.686(043)	18.805(027)	18.285(018)	17.977(014)	···	LCO-1m
52953.5	···	19.809(027)	18.815(014)	18.316(017)	17.996(014)	···	LCO-1m
52959.5	···	19.958(025)	18.888(016)	18.339(022)	18.041(141)	···	LCO-1m
52966.6	···	20.126(032)	19.027(014)	18.473(015)	18.136(019)	···	LCO-1m
52987.5	···	···	19.624(051)	···	18.446(041)	···	LCO-1m
			SN 2003ip				
52915.7	···	17.302(016)	16.631(014)	16.281(015)	16.086(014)	···	LCO-1m
52929.7	···	18.026(016)	16.965(008)	16.517(015)	16.246(014)	···	LCO-1m
52951.6	···	18.791(031)	17.397(014)	16.794(015)	16.512(014)	···	LCO-1m
52953.6	···	18.783(021)	17.443(015)	16.830(015)	16.579(014)	···	LCO-1m
52959.6	···	19.004(022)	17.566(014)	16.880(024)	16.601(014)	···	LCO-1m
52966.6	···	···	17.694(015)	···	···	···	LCO-2.5m
52966.6	···	19.172(016)	17.723(014)	17.058(015)	16.741(014)	···	LCO-1m
52987.6	···	20.029(031)	18.461(014)	17.632(015)	17.272(014)	···	LCO-1m

Table 5—Continued

JD-2,400,000	U	B	V	R	I	z	Telescope
52989.6	···	···	18.530(027)	···	17.463(045)	···	LCO-2.5m
52996.4	···	20.960(046)	19.331(019)	18.314(015)	17.949(014)	···	LCO-1m
			SN 2003iq				
52928.7	···	···	15.931(010)	···	···	···	LCO-2.5m
52928.7	···	16.168(016)	15.904(008)	15.635(011)	15.485(014)	···	LCO-1m
52952.6	···	17.044(017)	16.142(010)	15.713(011)	15.460(010)	···	LCO-1m
52953.7	···	17.097(020)	16.151(031)	15.705(025)	15.453(022)	···	LCO-1m
52966.7	···	···	16.216(010)	···	···	···	LCO-2.5m
52967.6	···	17.384(016)	16.225(014)	15.696(057)	15.492(023)	···	LCO-1m
52987.6	···	17.700(016)	16.354(014)	15.831(015)	15.486(014)	···	LCO-1m
52989.7	···	···	16.416(027)	···	15.529(034)	···	LCO-2.5m
52995.5	···	···	···	15.909(015)	15.538(014)	···	LCO-1m
52996.5	···	17.889(016)	16.474(010)	15.914(015)	15.562(014)	···	LCO-1m
52996.6	···	···	16.454(013)	···	···	···	LCO-2.5m
53001.5	···	···	16.578(010)	16.002(011)	15.639(010)	···	LCO-1m
53018.6	···	18.852(019)	17.282(014)	16.564(015)	16.168(014)	···	LCO-1m

Note. — Uncertainties given in parentheses in thousandths of a magnitude.

Table 6. Type II Supernovae used in Fig. 8

SN name	bands	Photometry reference
1968L	*UBV*	Wood & Andrews (1974)
1970G	*UBV*	Barbon et al. (1973); Winzer (1974)
1973R	*BV*	Ciatti & Rosino (1977)
1986I	*VRI*	Pennypacker et al. (1989)
1988A	*BVR*	Benetti et al. (1991); Turatto et al. (1993)
1988H	*BVR*	Turatto et al. (1993)
1989C	*BVR*	Turatto et al. (1993)
1990E	*BVRI*	Schmidt et al. (1993); Benetti et al. (1994)
1990K	*BVRI*	Cappellaro et al. (1995)
1991G	*VRI*	Blanton et al. (1995)
1992H	*BVR*	Clocchiatti et al. (1996)
1993G	*BV*	Tsvetkov (1994)
1994N	*BVR*	Pastorello et al. (2004)
1995ad	*BVRI*	Inserra et al. (2013)
1996W	*UBVRI*	Inserra et al. (2013)
1998S	*BVR*	Liu et al. (2000)
1999bg	*BVI*	Faran et al. (2014a)
1999co	*BVI*	Faran et al. (2014b)
1999eu	*UBVRI*	Pastorello et al. (2004)
1999gi	*BVRI*	Leonard et al. (2002)
2000dc	*BVRI*	Faran et al. (2014b)
2000dj	*BVI*	Faran et al. (2014a)
2001X	*BVRI*	Tsvetkov (2006); Faran et al. (2014a)
2001bq	*BVI*	Faran et al. (2014a)
2001cm	*BVI*	Faran et al. (2014a)
2001cy	*BVRI*	Faran et al. (2014b)
2001dc	*BVRI*	Pastorello et al. (2004)
2001do	*BVRI*	Faran et al. (2014b)
2001fa	*BVRI*	Faran et al. (2014b)
2002hh	*VRI*	Pozzo et al. (2006); Tsvetkov et al. (2007); Faran et al. (2014a)
2003Z	*BVRI*	Spiro et al. (2014); Faran et al. (2014a)
2003hf	*BVRI*	Faran et al. (2014b)
2004A	*BVRI*	Hendry et al. (2006); Tsvetkov (2008)
2004dj	*UBVRI*	Chugai et al. (2005); Vinkó et al. (2006)
		Zhang et al. (2006); Tsvetkov et al. (2008)
2004eg	*BVRI*	Spiro et al. (2014)
2004et	*UBVRI*	Misra et al. (2007); Faran et al. (2014a)
2005ay	*UBVRI*	Tsvetkov (2006); Faran et al. (2014a)
2005cs	*UBVRI*	Tsvetkov et al. (2006); Dessart et al. (2008); Pastorello et al. (2009)
		Pritchard et al. (2014); Faran et al. (2014a)
2005dq	*BVRI*	Faran et al. (2014b)
2006bp	*UBV*	Dessart et al. (2008); Pritchard et al. (2014)
2006ov	*BVRI*	Spiro et al. (2014)
2007ck	*UBV*	Pritchard et al. (2014)
2007fz	*BVRI*	Faran et al. (2014b)
2008fq	*BVRI*	Faran et al. (2014b)

Table 6—Continued

SN name	bands	Photometry reference
2008ij	UBV	Pritchard et al. (2014)
2008jb	VI	Prieto et al. (2012)
2009at	UBV	Prieto et al. (2012)
2009bw	$UBVRI$	Inserra et al. (2012)
2009dd	$UBVRI$	Prieto et al. (2012); Inserra et al. (2013)
2009js	$BVRI$	Gandhi et al. (2013)
2009kr	UBV	Prieto et al. (2012)
2009md	$UBVRI$	Fraser et al. (2011)
2010F	UBV	Prieto et al. (2012)
2010aj	$UBVRI$	Inserra et al. (2013)
2010gs	UBV	Prieto et al. (2012)
2010id	$UBVRI$	Gal-Yam et al. (2011)
2011cj	UBV	Prieto et al. (2012)
2012A	$UBVRI$	Prieto et al. (2012); Tomasella et al. (2013)
2012ak	UBV	Prieto et al. (2012)
2012aw	$UBVRI$	Prieto et al. (2012); Bose et al. (2013); Dall'Ora et al. (2014)
2012ec	$BVRI$	Barbarino et al. (2015); Jerkstrand et al. (2015)
2013ab	$UBVRI$	Barbarino et al. (2015)
2013am	$UBVRI$	Zhang et al. (2014)
2013by	UBV	Valenti et al. (2014)
2013ej	$UBVRI$	Valenti et al. (2014); Richmond (2014)
ASASSN-13co	UBV	Holoien et al. (2014)
LSQ13cuw	V	Gall et al. (2015)

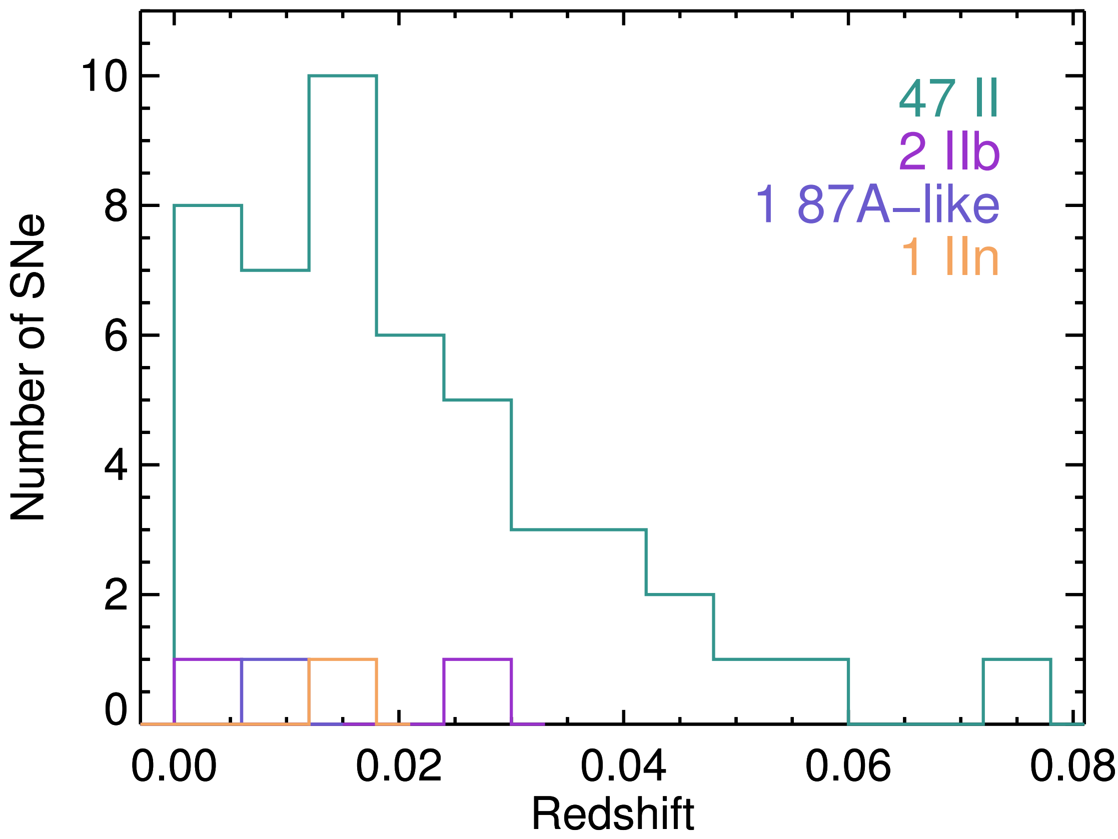


Fig. 1.— Redshift distribution of the 51 SN II presented in this work, separated in normal SN II, IIb, and peculiar events. The median value of the distribution is 0.017, the average value is 0.021, and the standard deviation is 0.016.

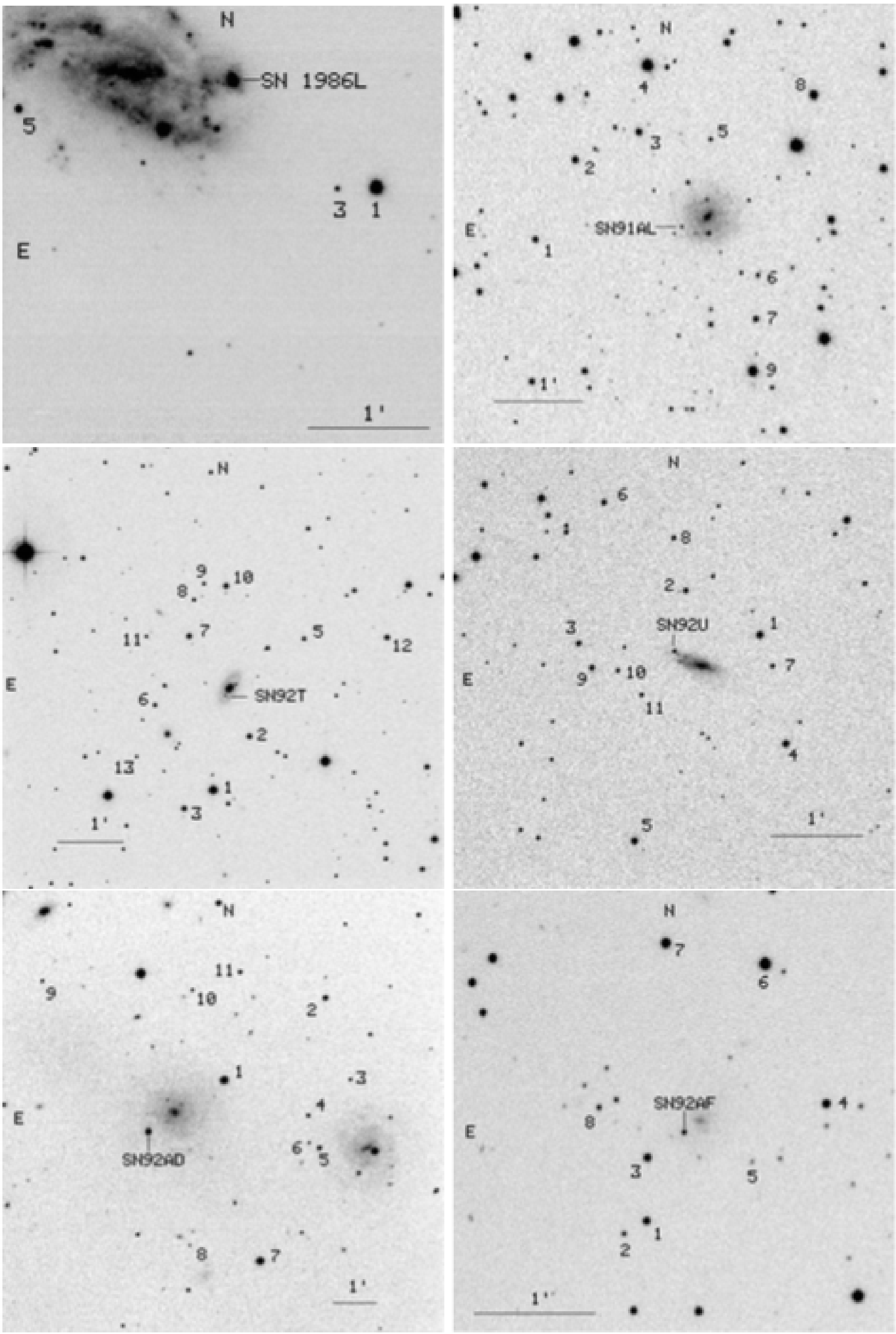


Fig. 2.— V-band images of the 51 SNe. North is up and east is to the left. Both the supernova and the comparison stars used to derive differential photometry of the SN are labeled. The scale is shown with an horizontal line near the bottom. Here, supernovae 1986L, 1991al, 1992T, 1992U, 1992ad, and 1992af are shown.

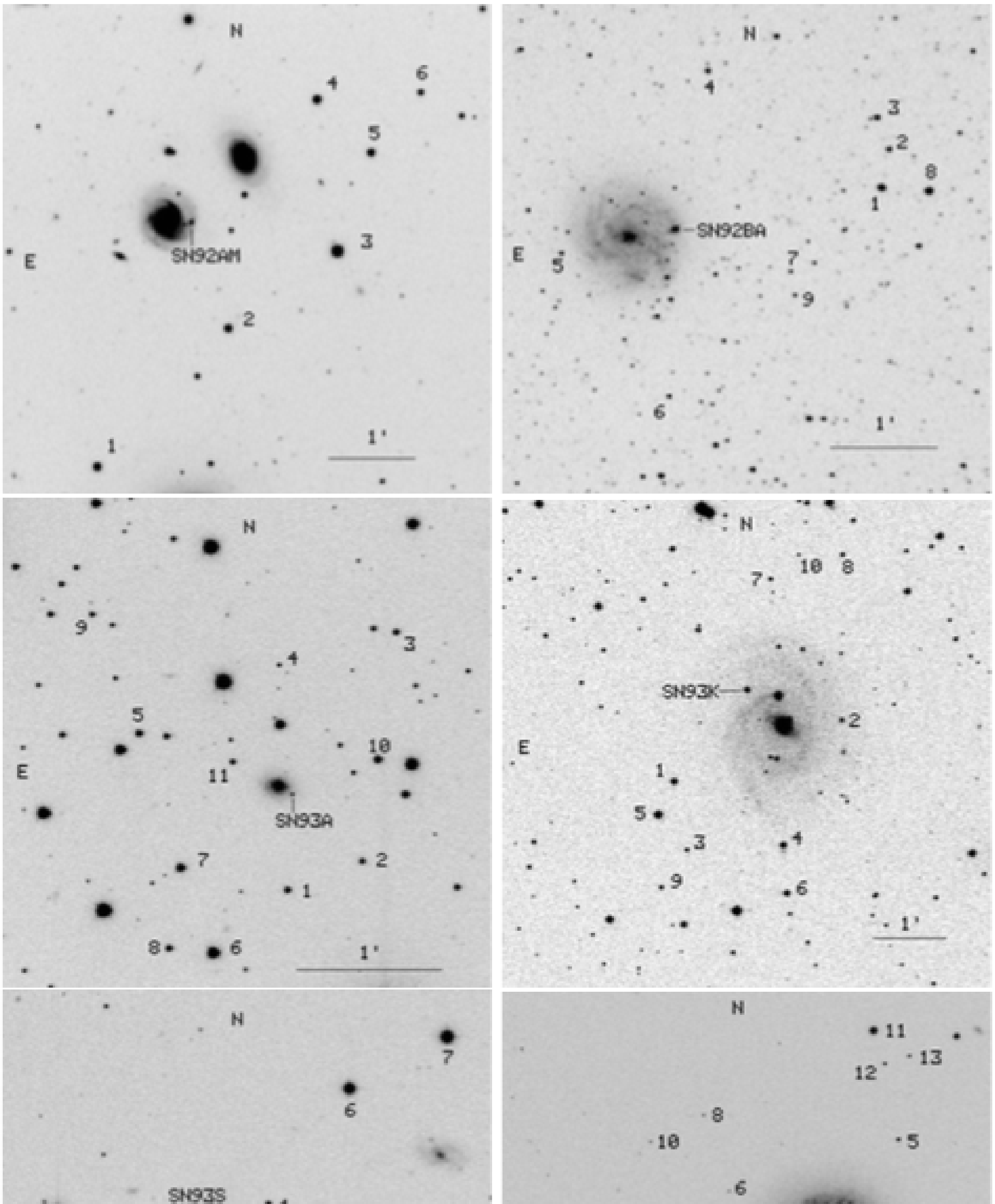


Fig. 2 (Cont.).— Supernovae 1992am, 1992ba, 1993A, 1993K, 1993S, and 1999br.

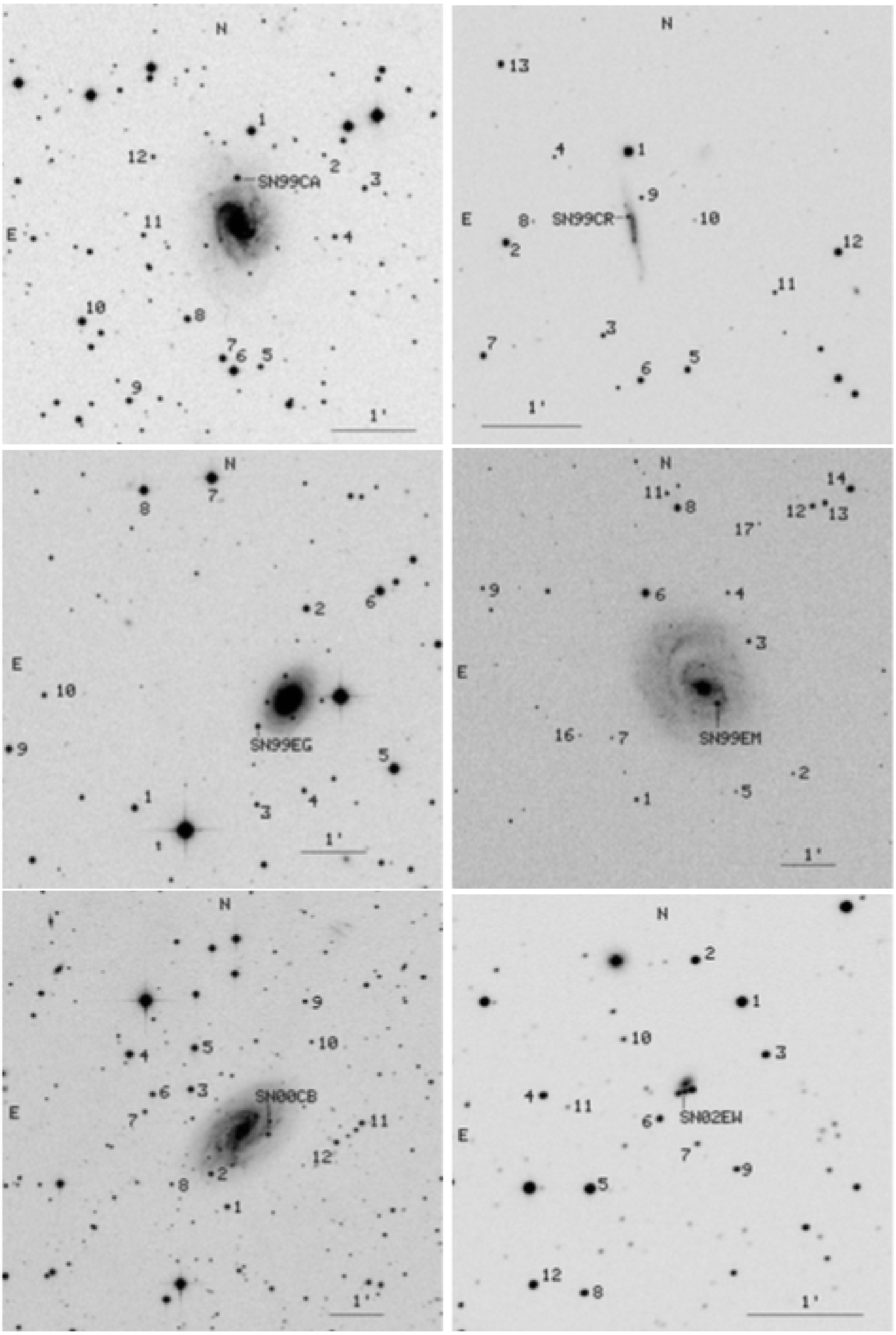


Fig. 2 (Cont.).— Supernovae 1999ca, 1999cr, 1999eg, 1999em, 2000cb, and 2002ew.

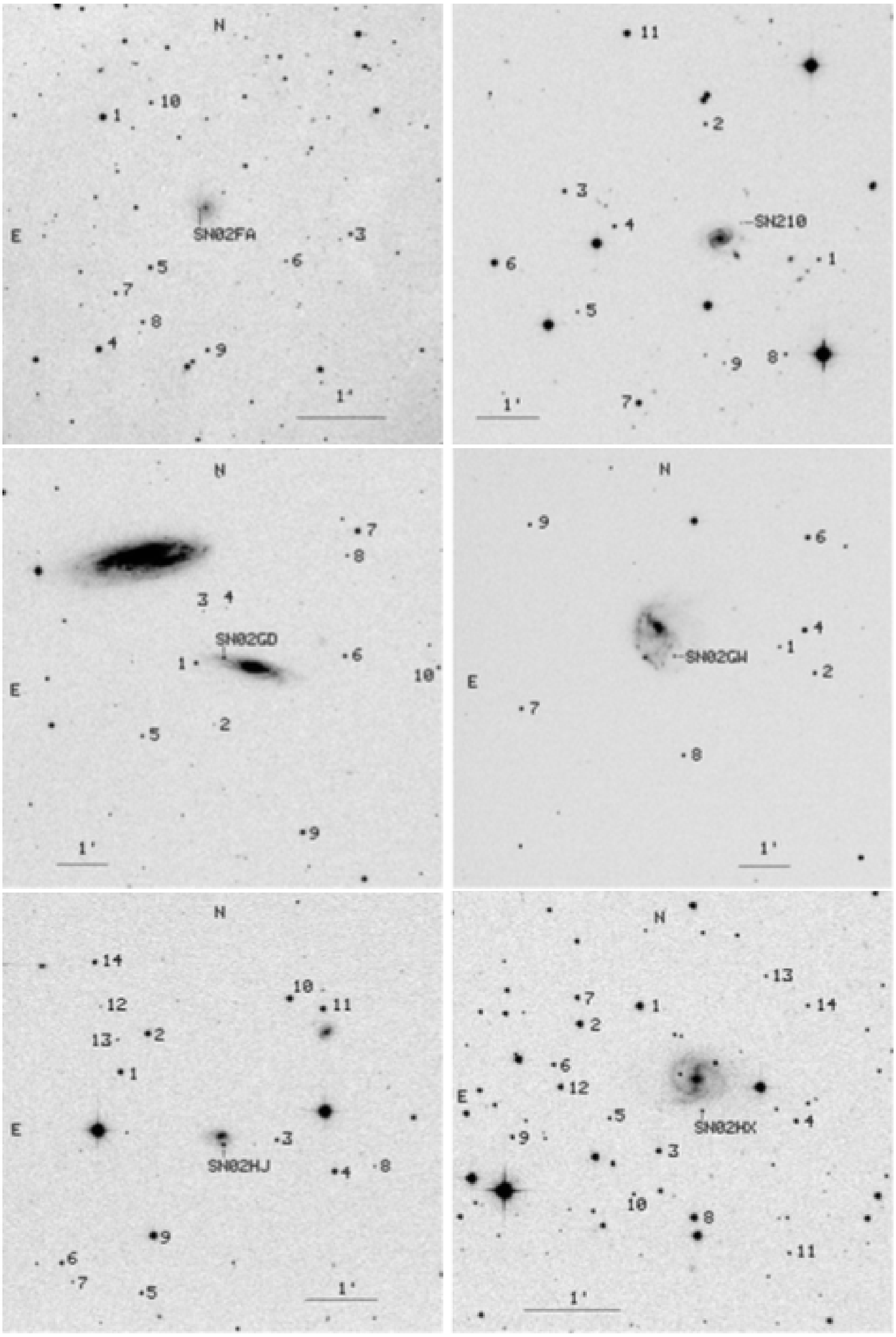


Fig. 2 (Cont.).— Supernovae 2002fa, 0210, 2002gd, 2002gw, 2002hj, and 2002hx.

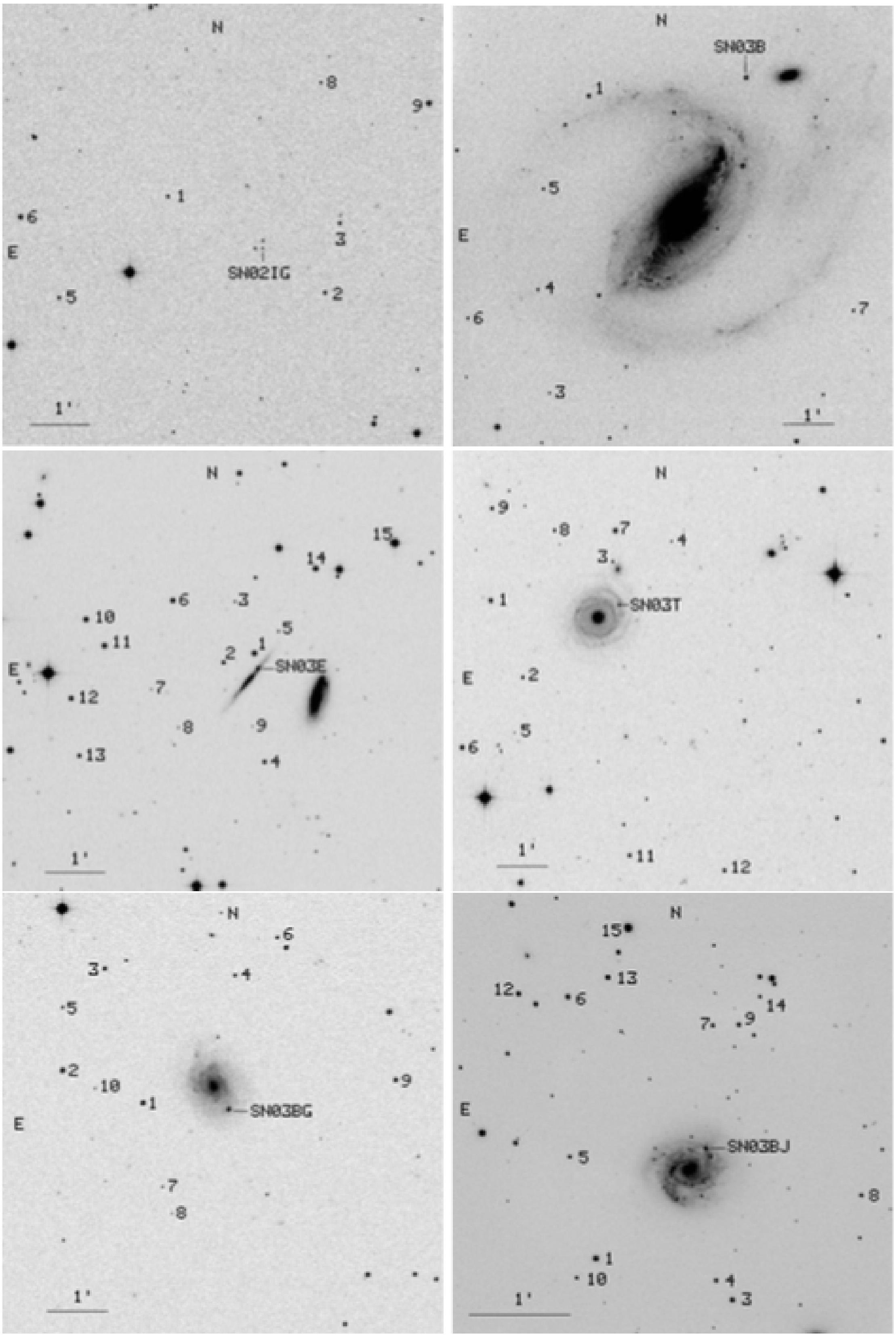


Fig. 2 (Cont.).— Supernovae 2002ig, 2003B, 2003E, 2003T, 2003bg, and 2003bj.

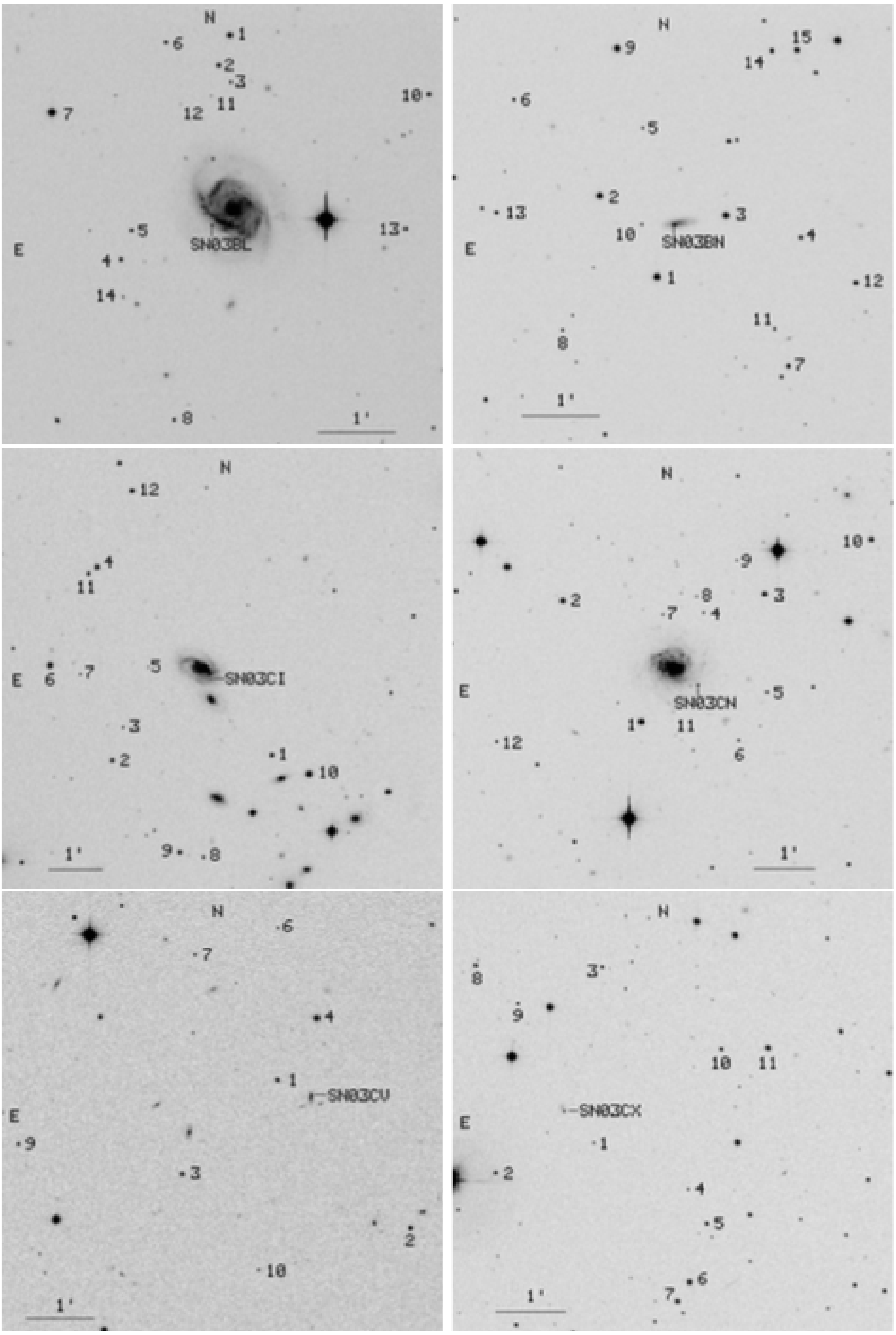


Fig. 2 (Cont.).— Supernovae 2003bl, 2003bn, 2003ci, 2003cn, 2003cv, and 2003cx.

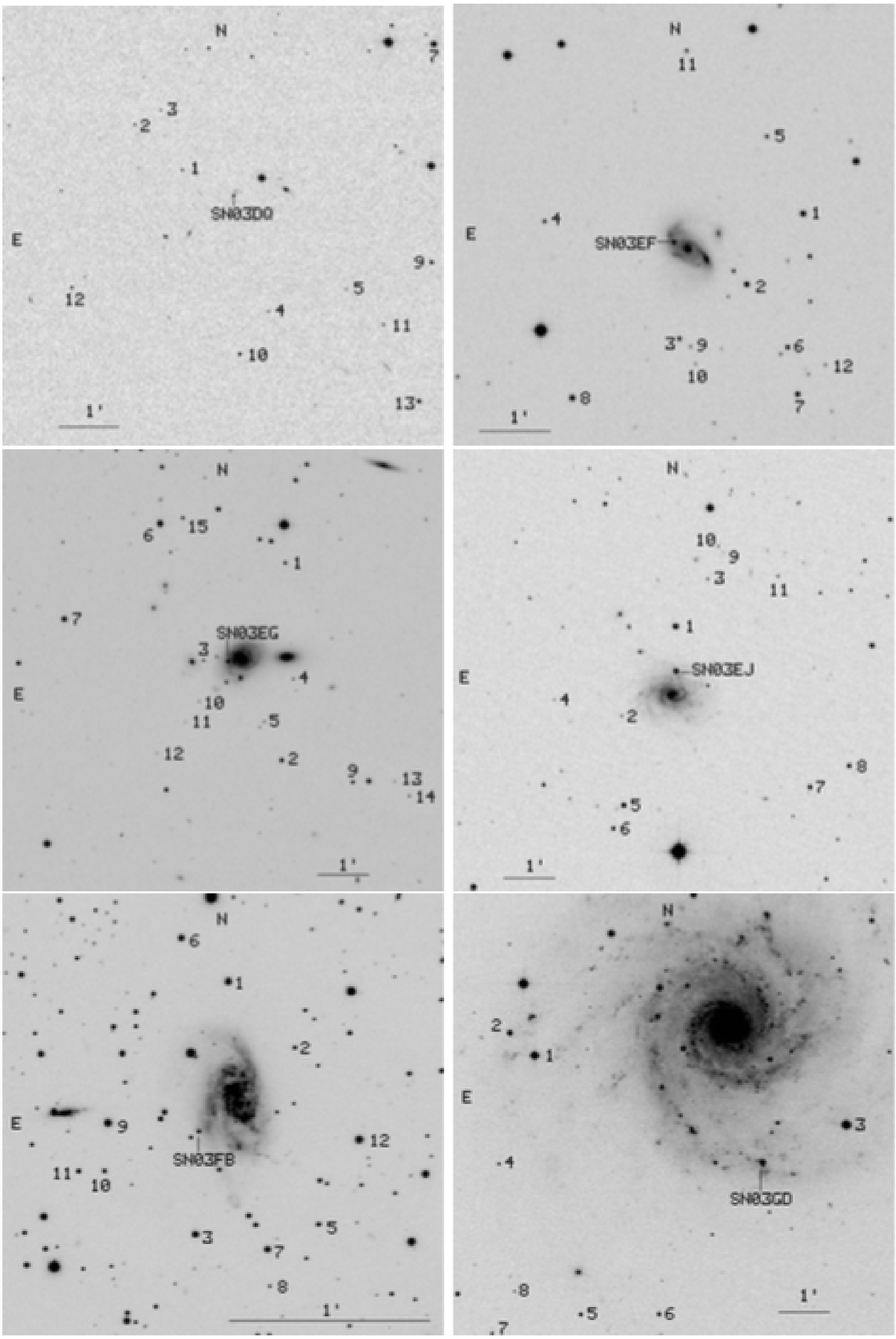


Fig. 2 (Cont.).— Supernovae 2003dq, 2003ef, 2003eg, 2003ej, 2003fb, and 2003gd.

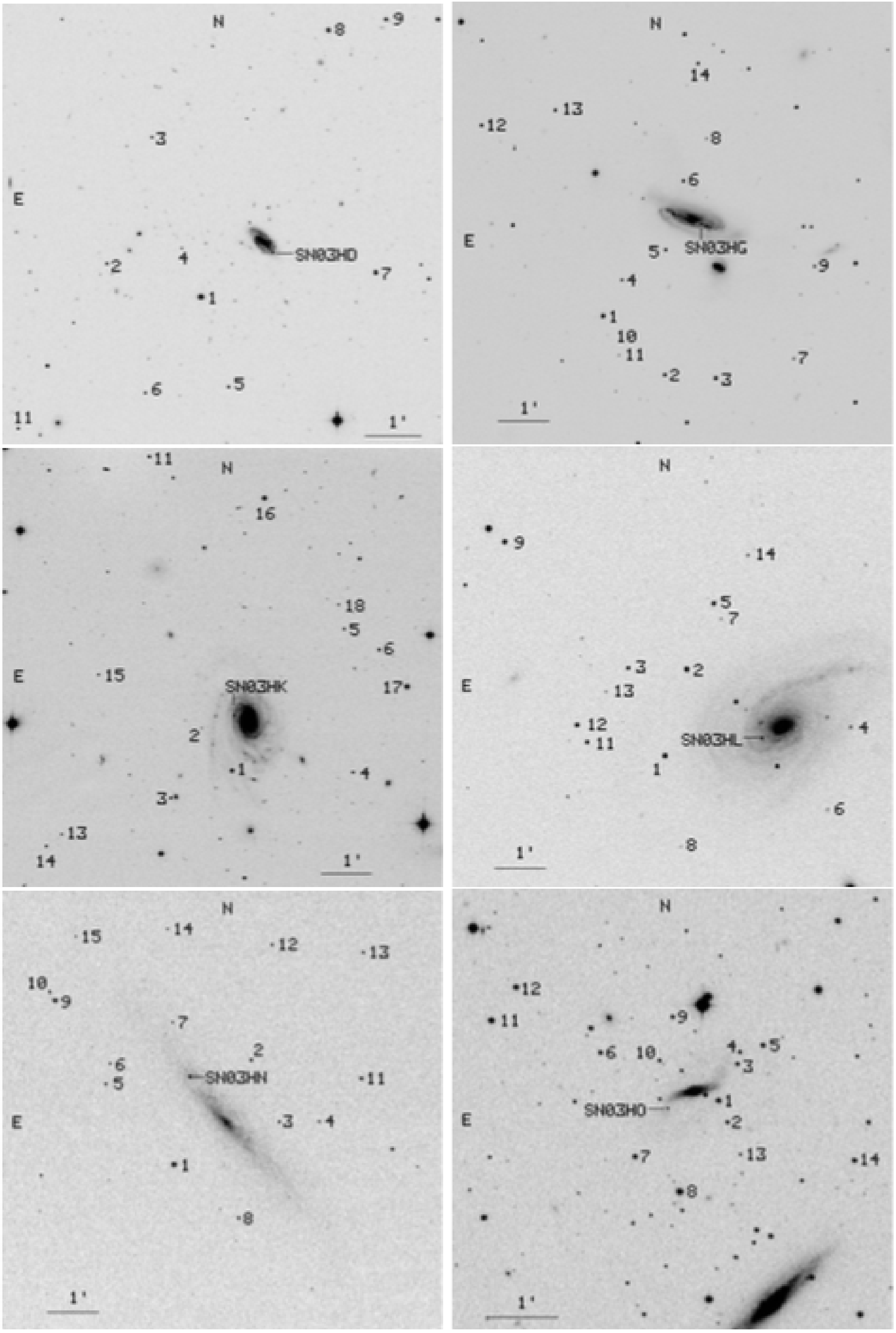


Fig. 2 (Cont.).— Supernovae 2003hd, 2003hg, 2003gk, 2003hl, 2003hn, and 2003ho.

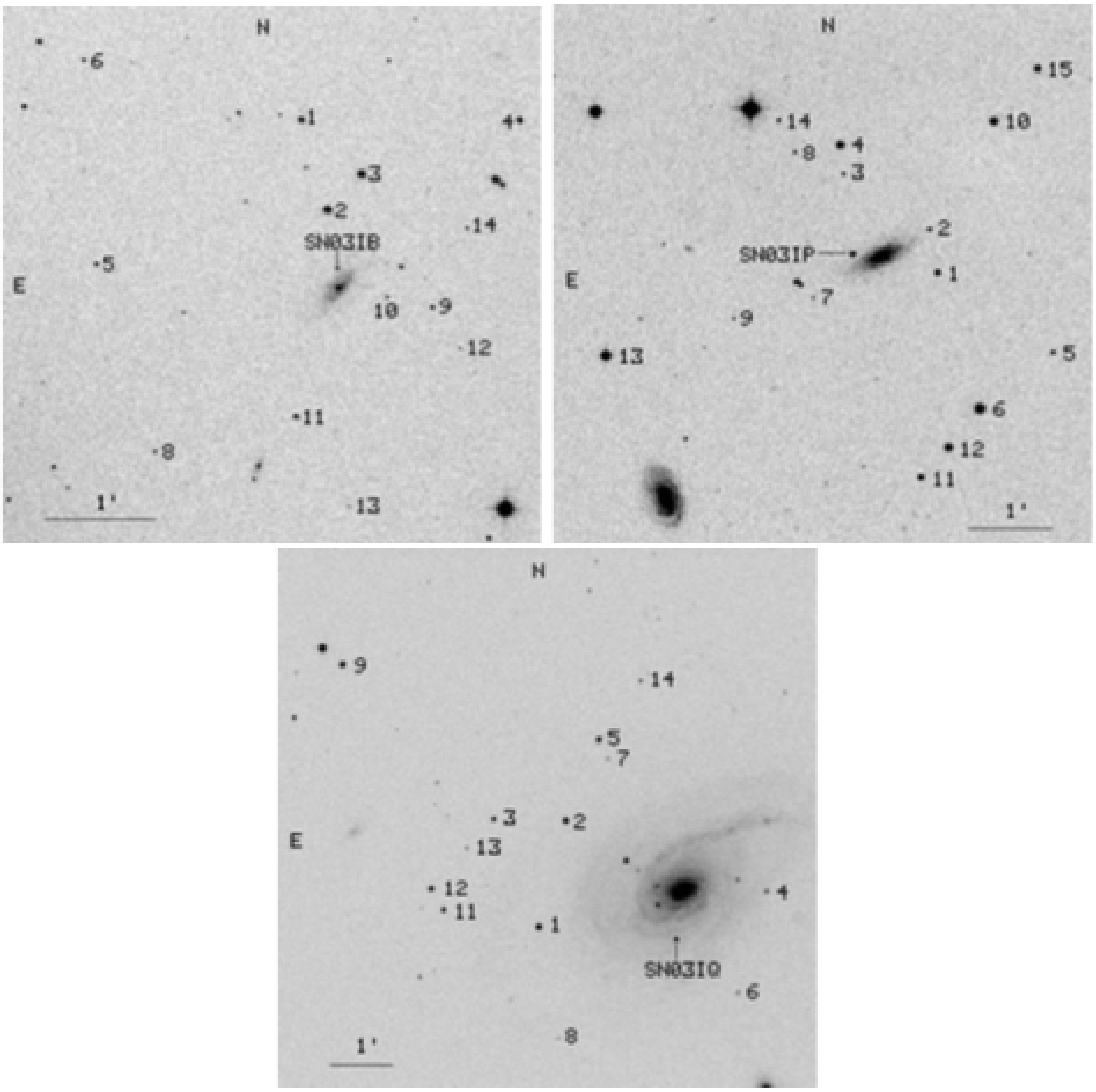


Fig. 2 (Cont.).— Supernovae 2003ib, 2003ip, and 2003iq.

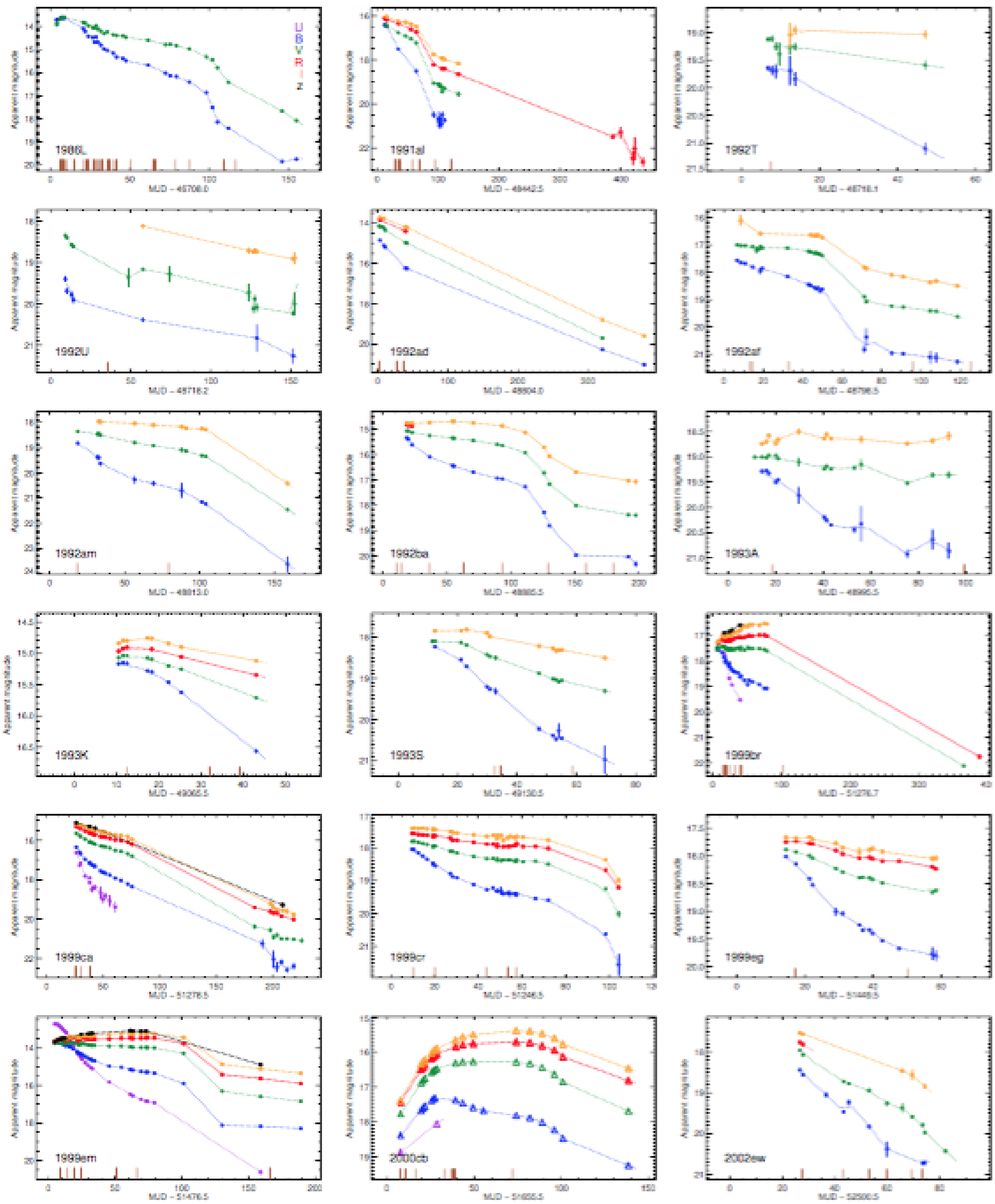


Fig. 3.— MW Extinction-corrected apparent $UBVRIz$ light-curves of the 51 SNe II. The explosion epoch in each panel is that estimated in Gutiérrez et al. (in prep.). Photometric errors are plotted and are usually smaller than the symbol. Type IIb, IIn, and SN 1987A-like SNe II are plotted with unfilled triangles. Lines correspond to spline fits of the data. Vertical brown tick marks represent the epochs of the available spectra.

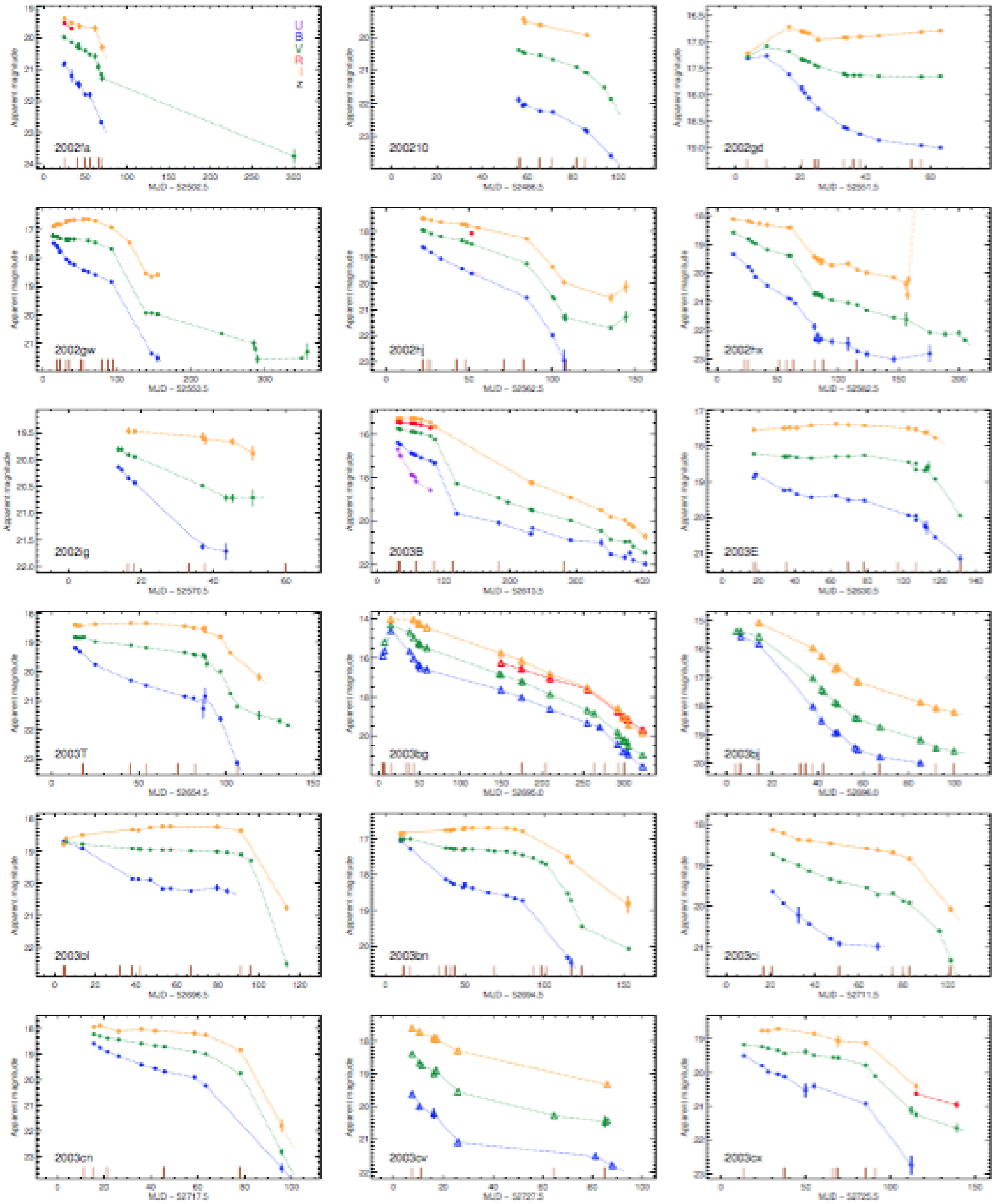
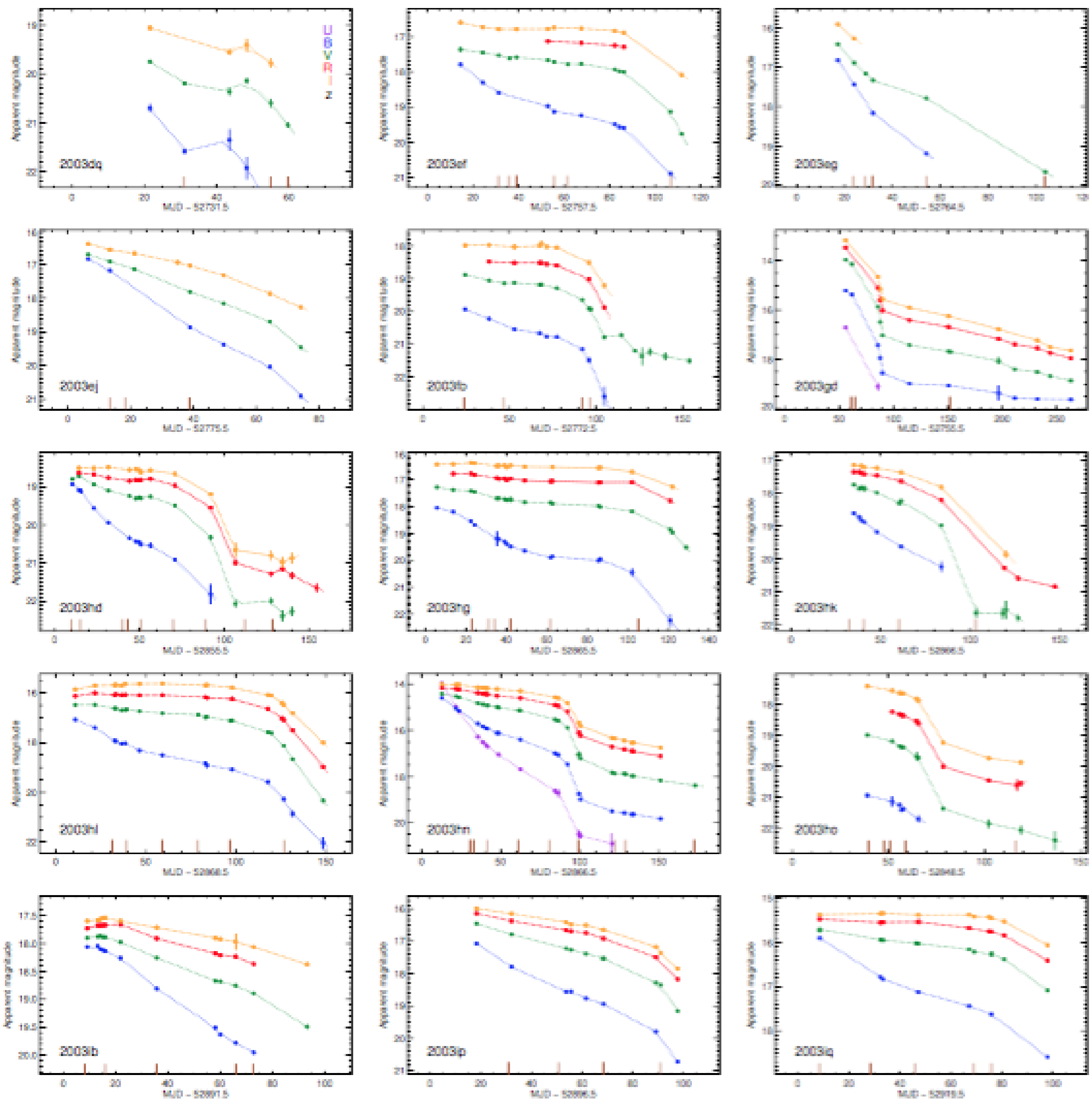


Fig. 3 (Cont.).—


U
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2003iq

Fig. 3 (Cont.).—

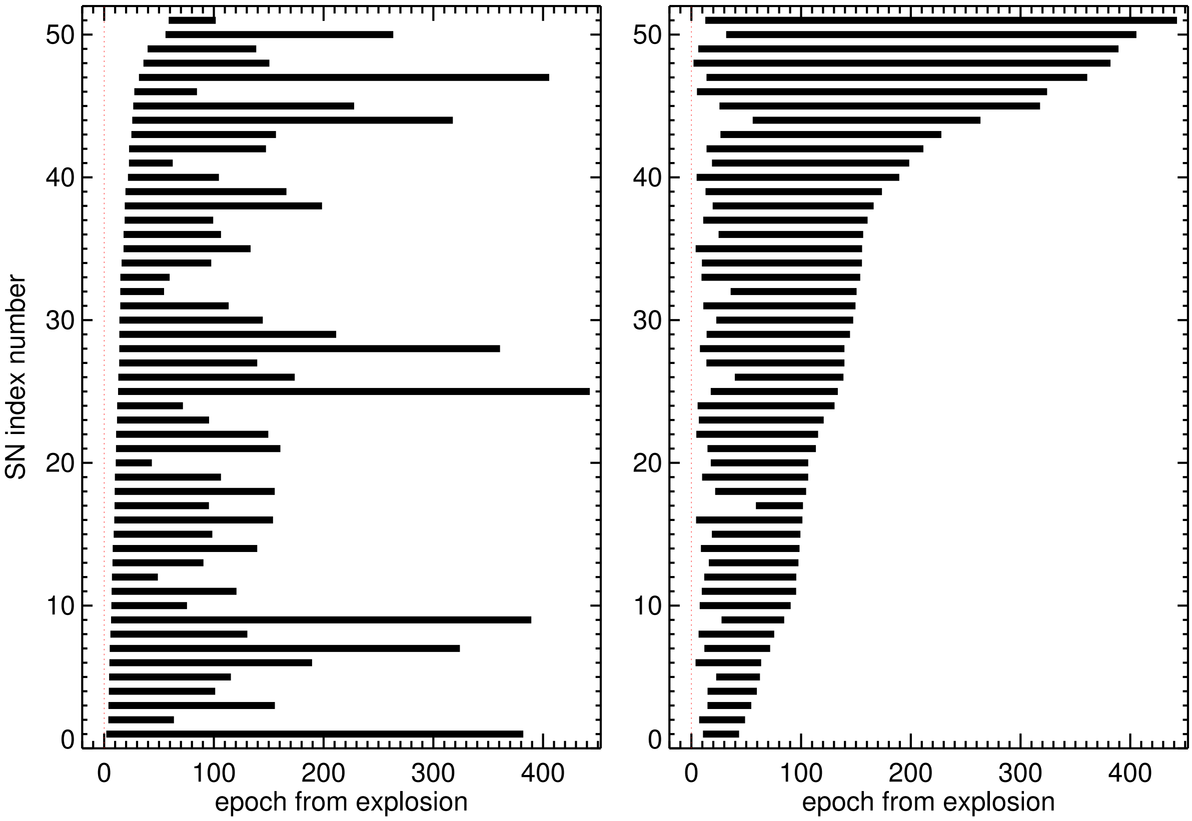

Fig. 4.— Light-curve coverage for the 51 SN II presented in this work, sorted by increasing first photometric observation (left) and by last photometric epoch (right), all measured from explosion. Each horizontal bar represents the coverage of one SN. The vertical red dotted line represents the explosion day. The average epoch of the first observation is 14.7 ± 11.1 days (median 11.7 days) and the last observation is 158.2 ± 98.7 days (median 139.5 days).

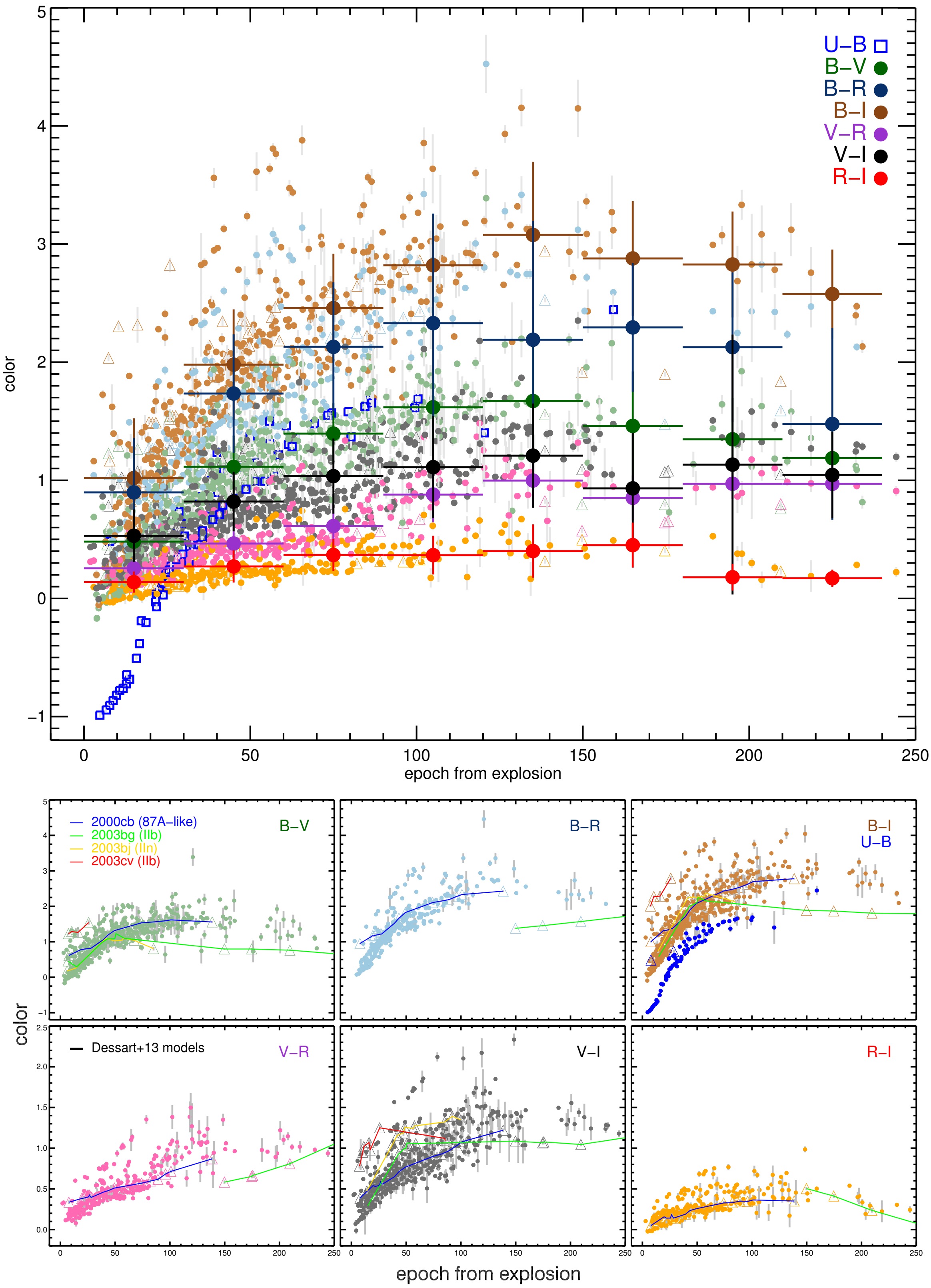

Fig. 5.— Color evolution diagrams. *Top:* Small dots represent individual measurements and big dots indicate average colors in bins of 30 days. All of them increase until reaching a maximum around 100-150 days from explosion, and then saturate or start decreasing. Blue open squares are the $(U - B)$ color data. *Bottom:* Individual color panels. Color measurements of the SN 1987A-like, IIb, and IIn are plotted with empty triangles, and in $(B - I)$ they are shown in solid lines.

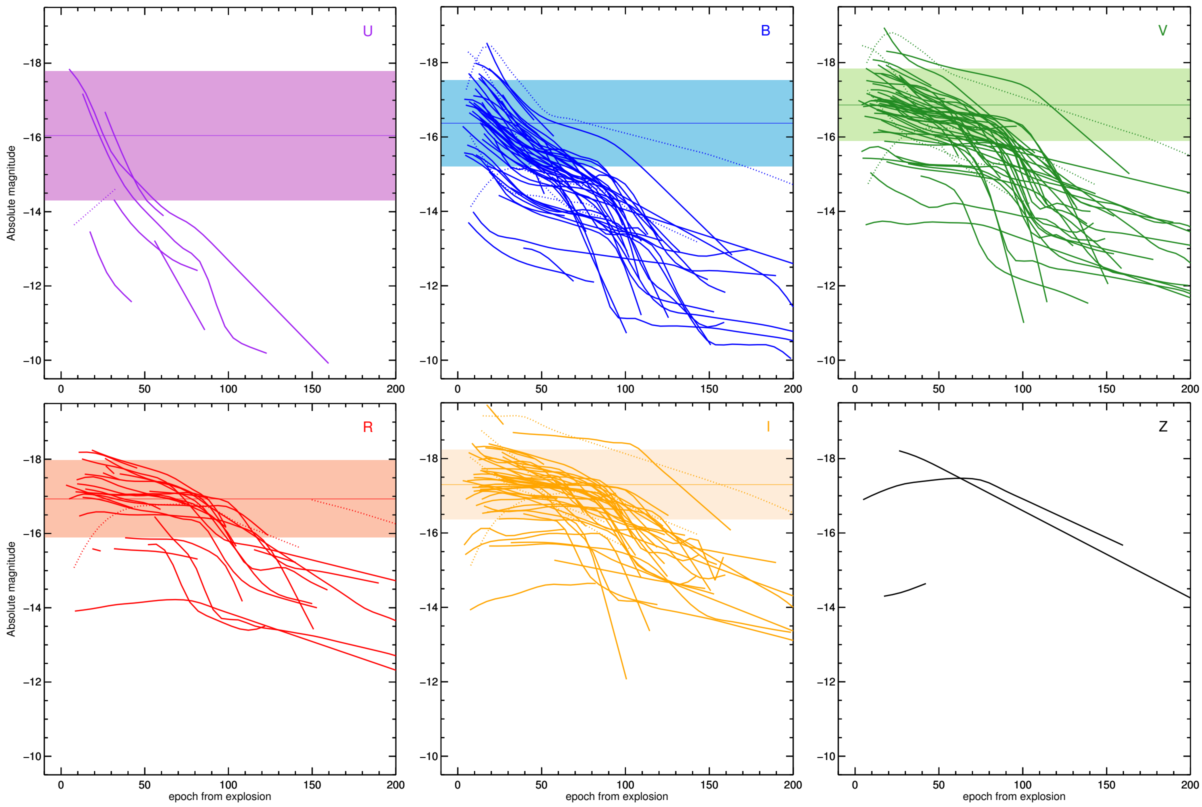

Fig. 6.— Absolute magnitude light-curves for all SN presented here overplotted in separate panels by different bands. Curves have been smoothed using 3rd order spline polynomials. Type IIb, IIn, and peculiar SN II are shown with dotted lines. The horizontal lines and the colored stripes correspond to the peak average absolute magnitudes and their 1σ deviations.

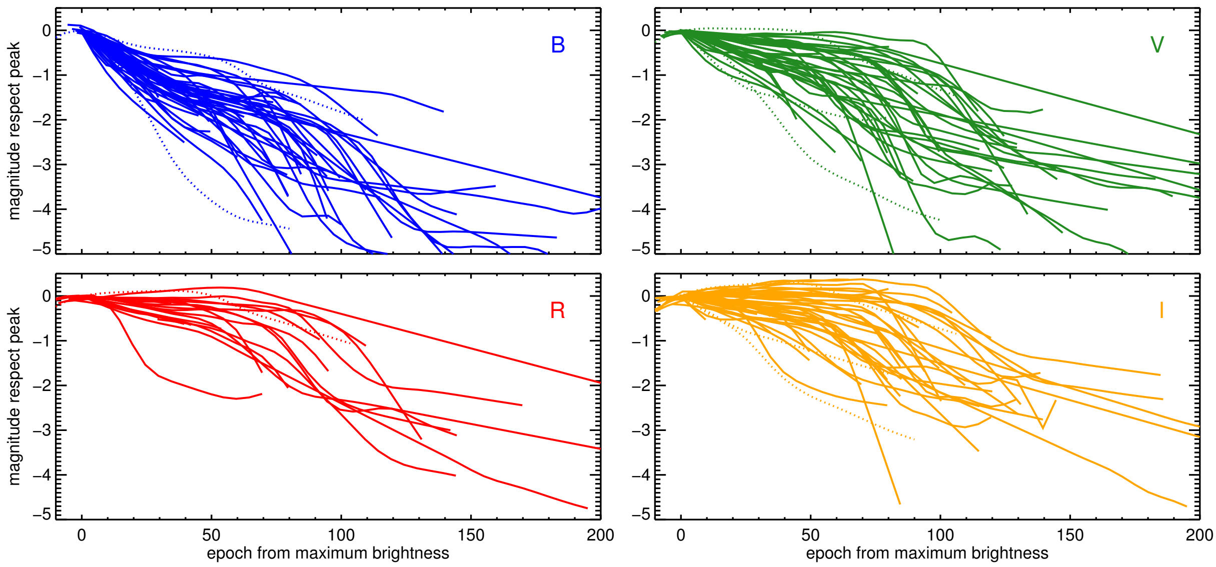

Fig. 7.— Magnitude light-curves referenced to the epoch of the maximum brightness and normalized to the peak. Type IIb, IIn, and peculiar SN II are plotted with dotted lines. All panels show a continuous distribution between fast and slow decliners in all bands.

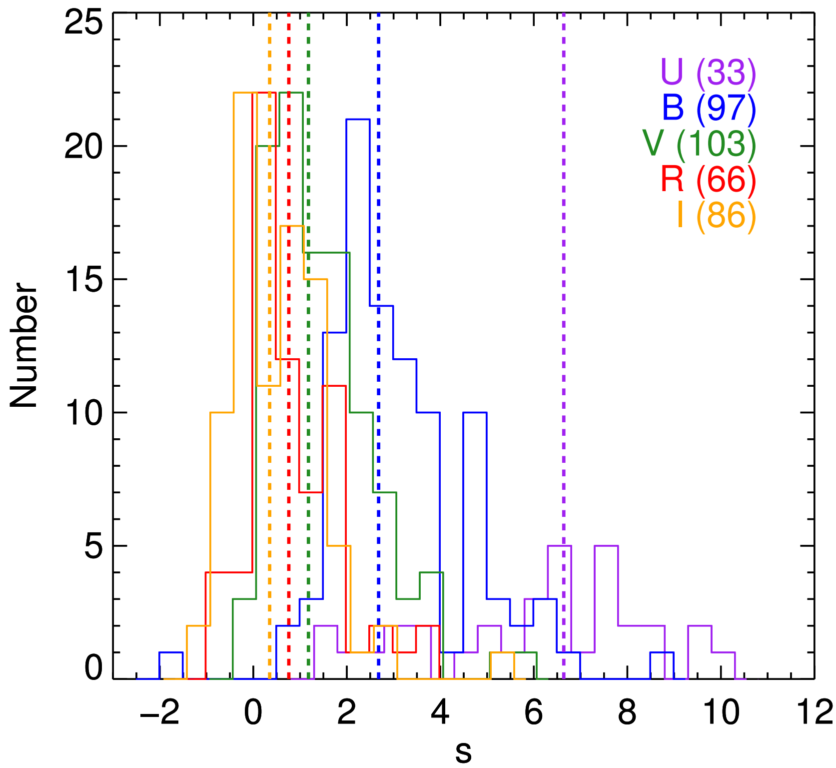

Fig. 8.— Distribution of the slopes of the plateau in each filter for the expanded sample of 114 SN II. The median of the distribution decreases with redder filters.

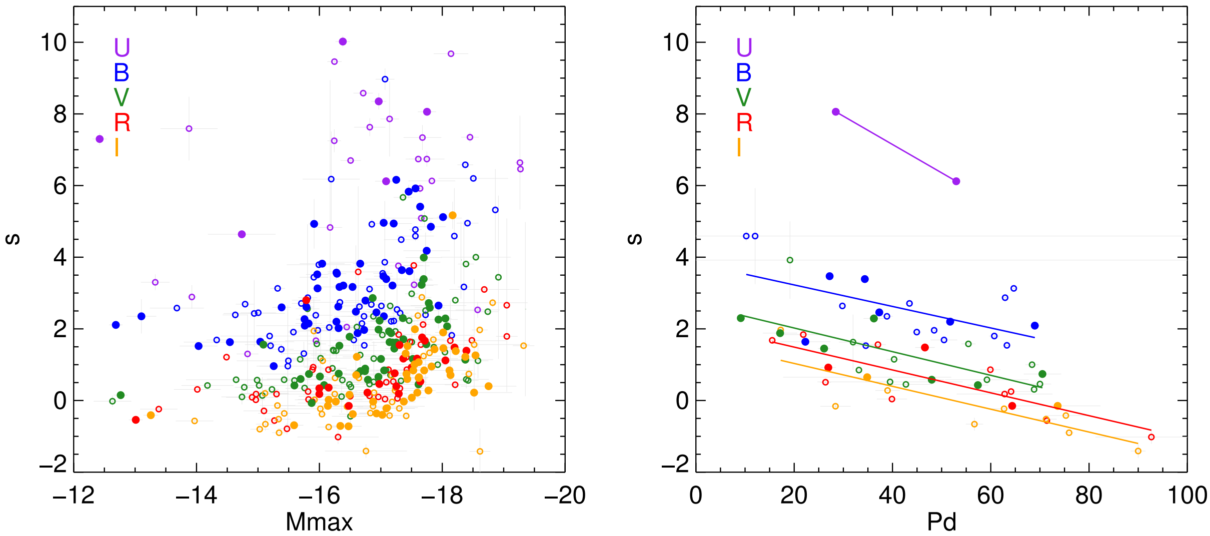

Fig. 9.— Left: Slope of the plateau vs. peak absolute magnitude for all *UBVRI* bands. Filled circles correspond to SN II presented in this work, while open circles are other objects from the literature. Peculiar objects such as SN IIb, IIn, and 1987A-like are excluded from this analysis. Right: Relation between the plateau duration and the post-maximum brightness decline. A trend can be seen in all bands indicating shorter plateaus for faster declining SN. Solid lines indicate linear fits to the points.