THE ASTRONOMICAL JOURNAL VOLUME 112, NUMBER 6 DECEMBER 1996

BVRI LIGHT CURVES FOR 29 TYPE Ia SUPERNOVAE

MARIO HAMUY

National Optical Astronomy Observatories,[1] Cerro Tololo Inter-American Observatory, Casilla 603, La Serena, Chile and
University of Arizona, Steward Observatory, Tucson, Arizona 85721
Electronic mail: mhamuy@as.arizona.edu

M. M. PHILLIPS, NICHOLAS B. SUNTZEFF, AND R. A. SCHOMMER

National Optical Astronomy Observatories,[1] Cerro Tololo Inter-American Observatory, Casilla 603, La Serena, Chile
Electronic mail: mphillips@noao.edu, nsuntzeff@noao.edu, rschommer@noao.edu

JOSÉ MAZA,[2] ROBERTO ANTEZANA, AND MARINA WISCHNJEWSKY

Departamento de Astronomía, Universidad de Chile, Casilla 36-D, Santiago, Chile
Electronic mail: jose@calan.das.uchile.cl

GERALDO VALLADARES, CÉSAR MUENA, L. E. GONZÁLEZ, R. AVILÉS, L. A. WELLS,[3] R. C. SMITH,
MAURICIO NAVARRETE, RICARDO COVARRUBIAS, G. M. WILLIGER,[4] ALISTAIR R. WALKER,
A. C. LAYDEN, J. H. ELIAS, J. A. BALDWIN, MANUEL HERNÁNDEZ, HERNÁN TIRADO, PATRICIO UGARTE,
R. ELSTON, AND NELSON SAAVEDRA

National Optical Astronomy Observatories,[1] Cerro Tololo Inter-American Observatory, Casilla 603, La Serena, Chile

FELIPE BARRIENTOS, EDGARDO COSTA, PAULINA LIRA, M. T. RUIZ, CLAUDIO ANGUITA, XIMENA GÓMEZ,
AND P. ORTIZ

Departamento de Astronomía, Universidad de Chile, Casilla 36-D, Santiago, Chile

M. DELLA VALLE, J. DANZIGER, AND J. STORM

La Silla Observatory, European Southern Observatory, Casilla 19001, Santiago, Chile

Y-C. KIM, C. BAILYN, E. P. RUBENSTEIN, D. TUCKER,[5] S. CERSOSIMO, R. A. MÉNDEZ,[6] L. SICILIANO,
W. SHERRY,[7] BRIAN CHABOYER, AND R. A. KOOPMANN

Yale University, Department of Astronomy, P.O. Box 208101, New Haven, Connecticut 06520-8101

D. GEISLER, A. SARAJEDINI, AND ARJUN DEY

National Optical Astronomy Observatories,[1] Kitt Peak National Observatory, P.O. Box 26732, Tucson, Arizona 85726

N. TYSON

Department of Astrophysics Sciences, Princeton University, Peyton Hall, Princeton, New Jersey 08544

R. MICHAEL RICH AND R. GAL[8]

Department of Astronomy, Columbia University, Mail Code 5242, New York, New York 10027

ROBERT LAMONTAGNE

Département de Physique and Observatoire du mont Mégantic, Université de Montréal, C.P. 6128, Succ. Centre-Ville,
Montréal, Canada

N. CALDWELL

Fred Lawrence Whipple Observatory, P.O. Box 97, 670 Mt. Hopkins Road, Amado, Arizona 85645

PURAGRA GUHATHAKURTA

UCO/Lick Observatory, University of California, Santa Cruz, California 95064

A. C. PHILLIPS[9] AND P. SZKODY

Department of Astronomy, University of Washington, Seattle, Washington 98195

C. PROSSER AND LUIS C. HO

Harvard-Smithsonian Center for Astrophysics, 60 Garden Street, Cambridge, Massachusetts 02138

R. McMAHAN

Department of Physics and Astronomy, University of North Carolina, CB# 3255 Phillips Hall, Chapel Hill, North Carolina 27599-3255

G. BAGGLEY

Department of Astrophysics, University of Oxford, Keble Road, Oxford, OX1 3RH, England, United Kingdom

K.-P. CHENG

California State University, Fullerton, Department of Physics, Fullerton, California 92634

R. HAVLEN

Astronomical Society of the Pacific, 390 Ashton Avenue, San Francisco, California 94112

K. WAKAMATSU

Physics Department, Gifu University, Gifu, 501-11, Japan

K. JANES

Department of Astronomy, Boston University, 725 Commonwealth Avenue, Boston, Massachusetts 02215

M. MALKAN AND F. BAGANOFF

Division of Astronomy, University of California Los Angeles, California 90095-1562

P. SEITZER AND M. SHARA

Space Telescope Science Institute, 3700 San Martin Drive, Baltimore, Maryland 21218

C. STURCH

Computer Sciences Corporation, Space Telescope Science Institute, Homewood Campus, Baltimore, Maryland 21218

J. HESSER

Dominion Astrophysical Observatory, 5071 West Saanich Road, R.R. 5, Victoria, BC V8X 4M6, Canada

P. HARTIGAN[10] AND J. HUGHES

Five College Astronomy Department, University of Massachusetts, Amherst, Massachusetts 01003-4525

D. WELCH

Department of Physics and Astronomy, McMaster University, Hamilton, Ontario L8S 4M1, Canada

T. B. WILLIAMS

Department of Physics and Astronomy, Rutgers University, P.O. Box 849, Piscataway, New Jersey 08855-0849

H. FERGUSON[11]

Institute of Astronomy, University of Cambridge, Madingley Road, Cambridge, CB3 OHA, England, United Kingdom

P. J. FRANCIS

School of Physics, University of Melbourne, Parkville, Victoria 3052, Australia

L. FRENCH

Wheelock College, 200 The Riverway, Boston, Massachusetts 02215

M. BOLTE

Lick Observatory, University of California, Santa Cruz, California 95064

J. ROTH

Sky Publishing Corporation, 49 Bay State Road, Cambridge, Massachusetts 02138

S. ODEWAHN

School of Physics and Astronomy, University of Minnesota 116 Church Street, SE, Minneapolis, Minnesota 55455

S. HOWELL
Department of Physics and Astronomy, University of Wyoming, Laramie, Wyoming 82071

W. KRZEMINSKI
Carnegie Institution of Washington, Las Campanas Observatory, Casilla 601, La Serena, Chile

Received 1996 June 26; revised 1996 September 5

ABSTRACT

$BV(RI)_{KC}$ light curves are presented for 27 type Ia supernovae discovered during the course of the Calán/Tololo Survey and for two other SNe Ia observed during the same period. Estimates of the maximum light magnitudes in the B, V, and I bands and the initial decline rate parameter $\Delta m_{15}(B)$ are also given.

1. INTRODUCTION

The Calán/Tololo Supernova Survey was begun in 1990 as a collaboration between astronomers at Cerro Tololo Inter-American Observatory (CTIO) and the Cerro Calán Observatory of the University of Chile with the principal goal of examining the Hubble diagram for type Ia supernovae (SNe Ia) out to redshifts of ~0.1. During the course of the survey, which we completed in 1993 November, a total of 32 SNe Ia were discovered and spectroscopically confirmed. Of these, useful follow-up CCD photometry was obtained for 27 events. In addition, as part of the same program, light curves were obtained of 2 SNe Ia discovered at other observatories.

In this paper, we present the final reduced *BVRI* light curves for these 29 SNe Ia, along with estimates of the maximum-light magnitudes in *BVI* and the initial decline rate parameter $\Delta m_{15}(B)$ (Phillips 1993). Note that preliminary light curves for a few events have appeared in previous publications (Hamuy *et al.* 1993a, hereafter referred to as Paper I; Maza *et al.* 1994, hereafter referred to as Paper II; Hamuy *et al.* 1994, hereafter referred to as Paper III). In two accompanying papers, we use these data to examine (1) the absolute luminosities of the sample (Hamuy *et al.* 1996a, hereafter referred to as Paper V) and (2) the Hubble diagrams in *BVI* and the value of the Hubble constant (Hamuy *et al.* 1996b hereafter referred to as Paper VI).

2. OBSERVATIONS

The search phase of the Calán/Tololo Supernova Survey consisted of photographic observations of 45 fields taken with the Curtis Schmidt Camera, with observations carried out approximately twice a month over the 1990–93 period. The details of these observations were described in considerable detail in Paper I, and therefore will not be repeated here. The follow-up phase consisted of two parts: (1) classification via optical spectroscopy, and (2) photometric monitoring via direct CCD imaging in the $BV(RI)_{KC}$ system. Of the 50 SNe discovered in the course of the Survey for which classification spectra were obtained, 32 (64%) were found to be type Ia events. A complete listing of these SNe Ia is found in Table 1 which gives: the SN and host galaxy names, the morphology and heliocentric redshift of the host galaxy; the line-of-sight extinction due to our own Galaxy (Burstein & Heiles 1982); the SN equatorial coordinates derived from an early-epoch CCD image using reference stars measured from the digitized sky survey plates available from the Space Telescope Science Institute; the offset of the SN from the host galaxy nucleus; the estimated photographic magnitude of the SN on the discovery plate; the name of the discoverer; and the UT discovery date. A V band CCD image of each SN is reproduced in Fig. 1.

Follow-up photometry was obtained for as many of these events as proved practical. Spectra of three of the SNe (1992O, 1992ai, and 1993af) showed that these had been caught several weeks or months past maximum light; hence,

[1]Cerro Tololo Inter-American Observatory, Kitt Peak National Observatory, National Optical Astronomy Observatories, operated by the Association of Universities for Research in Astronomy, Inc., (AURA), under cooperative agreement with the National Science Foundation.
[2]Cátedra Presidencial de Ciencias (Chile), 1996–1997.
[3]Current address: University of Arizona, Steward Observatory, Tucson, Arizona 85721.
[4]Current address: Max-Planck-Institut für Astronomie, Königstuhl 17, D-69117 Heidelberg, Germany.
[5]Current address: Astrophysikalisches Institut Potsdam, An der Sternwarte 16, D-14482 Potsdam, Germany.
[6]Current address: European Southern Observatory, Karl-Schwarzschild-Straße 2, D-85748, Garching b. München, Germany.
[7]Current address: Astronomy Program, S.U.N.Y. at Stony Brook, Stony Brook, New York.
[8]Current address: Caltech, Mail Code 105-24, Pasadena, CA 91125.
[9]Current address: Lick Observatory, University of California at Santa Cruz, Santa Cruz, CA 95064.
[10]Current address: Department of Space Physics and Astronomy Rice University, Houston TX 77251-1892.
[11]Current address: Space Telescope Science Institute, 3700 San Martin Drive, Baltimore, MD 21218.

TABLE 1. Type Ia supernovae.

SN	Host Galaxy	Morph. Type	z_{helio}	E$(B-V)$ ±0.015	SN α (2000)	SN δ (2000)	Offset (±0″.1)		m_{pg} (±0.5)	Discoverer	Date (UT)
					Calán/Tololo						
1990T	PGC 63925	Sa	0.0404	0.030	19:59:02.28	−56:15:30.0	24.8E	1.9S	16.5	Antezana	Jul 21.11
1990Y	anonymous	E?	0.0391	0.000	03:37:22.64	−33:02:40.1	1.0E	5.0S	17.8	Wischnjewsky	Aug 22.36
1990af	anonymous	SB0	0.0506	0.015	21:34:58.12	−62:44:07.4	8.0W	7.4N	16.8	Antezana	Oct 24.07
1991S	UGC 5691	Sb	0.0546	0.000	10:29:27.79	+22:00:46.4	4.4E	17.3N	17.5	Antezana	Apr 10.09
1991U	IC 4232	Sbc	0.0317	0.070	13:23:22.20	−26:06:28.7	2.2W	5.8N	16.0	Antezana	Apr 18.20
1991ag	IC 4919	SBb	0.0141	0.015	20:00:08.65	−55:22:03.4	4.4W	22.1N	15.0	Antezana	Jun 9.19
1992J	anonymous	E/S0	0.0446	0.050	10:09:00.30	−26:38:24.4	11.9W	12.0N	18.5	Wischnjewsky	Mar 3.15
1992K	ESO 269-57	SBb	0.0103	0.120	13:10:04.20	−46:26:30.3	1.9W	15.4S	17.5	Antezana	Mar 3.32
1992O	anonymous	?	0.037	0.045	19:23:42.29	−62:49:30.1	7.0W	1.0N	18.5	Antezana	Mar 10.37
1992P	IC 3690	SBa	0.0252	0.018	12:42:48.95	+10:21:37.5	4.3W	9.8N	16.8	Antezana	Apr 3.20
1992ae	anonymous	E1?	0.0752	0.015	21:28:17.66	−61:33:00.0	2.1E	4.0N	18.0	Antezana	Jun 27.30
1992ag	ESO 508-67	S	0.0249	0.060	13:24:10.12	−23:52:39.3	···	···	16.5	Wischnjewsky	Jun 29.13
1992ai	anonymous	?	···	0.000	01:29:08.04	−32:16:30.0	2.5W	7.0S	17.5	Antezana	Jul 5.42
1992aq	anonymous	Sa?	0.1018	0.000	23:04:34.76	−37:20:42.1	2.4E	7.1S	19.0	Antezana	Jul 26.22
1992au	anonymous	E1	0.0614	0.000	00:10:40.27	−49:56:43.3	21.2E	8.9N	17.0	Antezana	Jul 29.25
1992bc	ESO 300-9	Sab	0.0202	0.000	03:05:17.28	−39:33:39.7	16.1E	2.0S	15.0	Antezana	Oct 4.36
1992bg	anonymous	Sa	0.0352	0.170	07:41:56.53	−62:31:08.8	3.4W	5.8N	17.8	Antezana	Oct 21.34
1992bh	anonymous	Sbc	0.0450	0.000	04:59:27.55	−58:49:44.2	1.9E	3.6S	17.3	Antezana	Oct 21.32
1992bk	ESO 156-8	E1	0.0581	0.000	03:43:01.90	−53:37:56.8	11.9E	21.1N	18.0	Wischnjewsky	Nov 19.23
1992bl	ESO 291-11	SB0/SBa	0.0437	0.000	23:15:13.25	−44:44:34.5	15.3E	21.8S	16.8	Antezana	Nov 20.07
1992bo	ESO 352-57	E5/S0	0.0189	0.000	01:21:58.44	−34:12:43.5	47.3W	54.7S	17.0	Antezana	Dec 20.06
1992bp	anonymous	E2/S0	0.0793	0.040	03:36:37.95	−18:21:13.7	5.4W	1.4S	18.0	Wischnjewsky	Dec 20.16
1992br	anonymous	E0	0.0882	0.000	01:45:44.83	−56:05:57.9	3.6E	6.3S	18.5	Wischnjewsky	Dec 27.09
1992bs	anonymous	SBb	0.0637	0.000	03:29:27.20	−37:16:18.9	9.0W	3.6N	18.0	González	Dec 28.17
1993B	anonymous	SBb	0.0696	0.080	10:34:51.38	−34:26:30.0	0.9E	5.4N	18.0	Antezana	Jan 17.22
1993H	ESO 445-66	SBb(rs)	0.0239	0.040	13:52:50.34	−30:42:23.3	1.0E	12.3N	16.5	Wischnjewsky	Mar 18.20
1993M	anonymous	?	0.090	0.045	19:13:01.53	−64:17:28.3	1.0W	3.0S	18.5	Antezana	Apr 28.33
1993O	anonymous	E5/S01	0.0510	0.035	13:31:07.87	−33:12:50.5	14.1W	8.4N	17.5	Antezana	May 18.16
1993T	anonymous	?	0.088	0.000	23:10:54.09	−44:58:48.6	18.5W	13.5N	18.0	Antezana	May 26.38
1993af	NGC 1808	Sbc	0.0034	0.015	05:08:00.71	−37:29:18.0	220.0E	94.0N	17.0	Wischnjewsky	Nov 15.30
1993ag	anonymous	E3/S01	0.0490	0.150	10:03:35.00	−35:27:47.6	5.0W	6.1S	18.5	Antezana	Nov 15.33
1993ah	ESO 471-27	S02	0.0297	0.000	23:51:50.27	−27:57:47.0	0.9W	8.1N	17.0	Wischnjewsky	Nov 16.13
					Other						
1990O	PGC 59955	SBa	0.0303	0.070	17:15:35.92	+16:19:25.8	21.8E	3.9S	17.0	Mueller	Jun 22
1992al	ESO 234-69	Sb	0.0146	0.000	20:45:56.45	−51:23:40.0	19.0E	12.0S	16.0	McNaught	Jul 27.6

the decision was made not to concentrate on obtaining follow-up photometry of these events. For two of the more distant SNe, 1993M and 1993T, an insufficient number of observations were secured to provide adequate coverage of the light curves. Hence, the final number of Calán/Tololo SNe Ia for which light curves were ultimately obtained was 27.

In addition to these 27 SNe, we obtained *BVRI* photometry of two other SNe Ia, 1990O and 1992al, which were discovered at other observatories during the course of the survey. Information for these two events is included at the end of Table 1, and *V* band CCD images are shown in Fig. 2. Thus, in this paper we present light curves for a total of 29 SNe Ia.

The follow-up photometry for all 29 SNe Ia was obtained with CCD detectors on a total of 302 nights between 1990 July 4 and 1995 February 11 thanks to the extensive collaboration of many visiting astronomers and CTIO staff members. The vast majority (94%) of these nights were at CTIO, with the remaining observations being carried out with the Las Campanas Observatory (LCO) 1.0-m telescope and four different telescopes at the European Southern Observatory (ESO). At CTIO, fully 90% of the data were taken with the 0.9-m telescope, with the remainder coming from the 1.5-m and 4.0-m telescopes.[12] A complete journal of the observations is given in Table 2, which contains the following information: the UT date, the telescope employed, the observatory, the identity of the CCD detector, and the observer(s).

3. PHOTOMETRIC REDUCTIONS

A detailed description of the procedures we followed to produce *BVRI* magnitudes from the individual CCD images of each SN has been given in Paper III. The various steps are summarized as follows:

(1) Several deep CCD images (in each color) were obtained of the SN field after the SN had faded from detection. These images were transformed geometrically to the same scale, and then coadded to produce a deep master image of the host galaxy.

(2) The master galaxy image was transformed and scaled to the flux scale of each individual SN image, and then sub-

[12]This project serves as an eloquent illustration of the capabilities of "small" telescopes equipped with state-of-the-art CCD detectors.

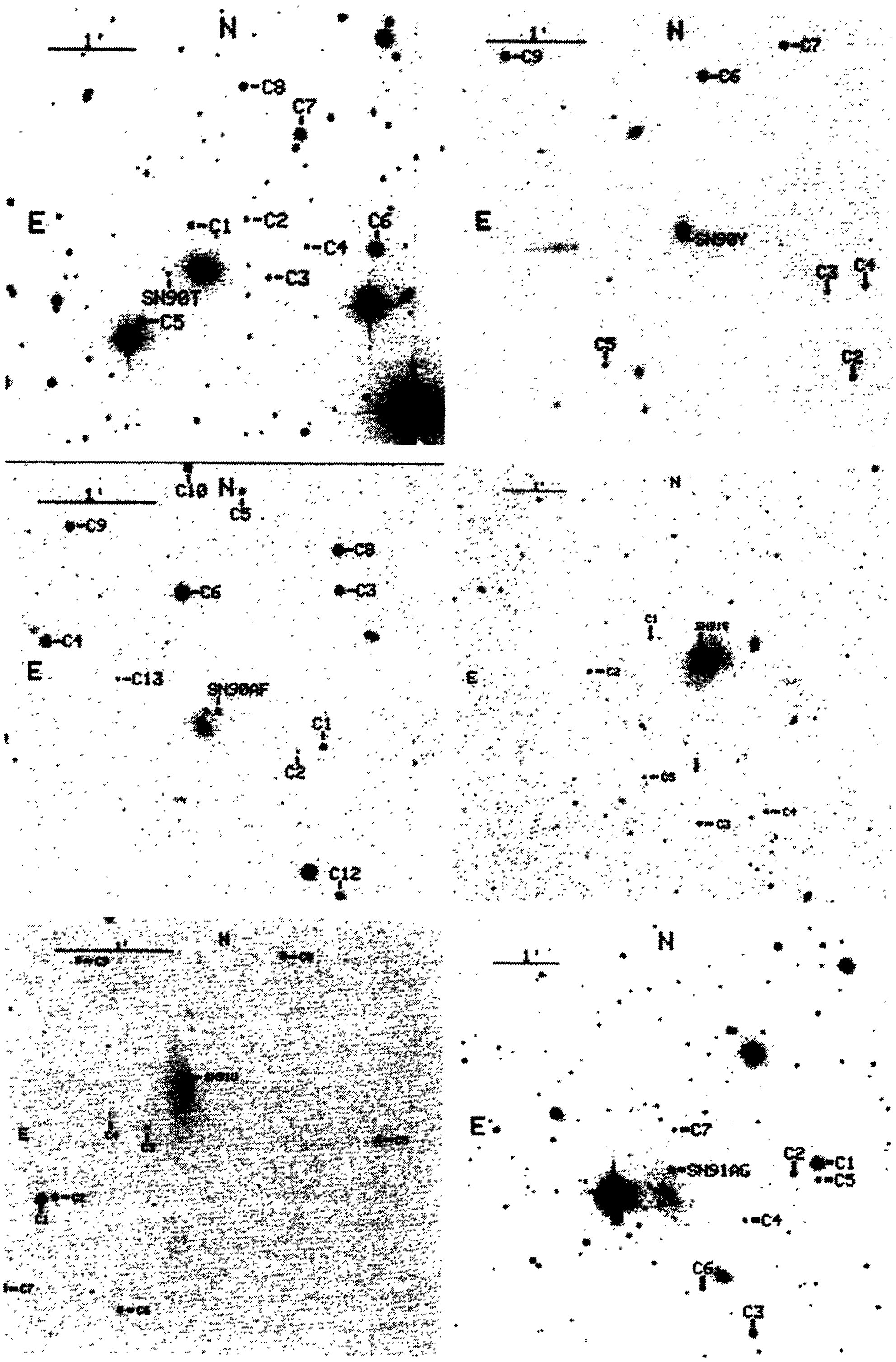

FIG. 1. *V* band CCD images of the 32 SNe Ia discovered in the course of the Calán/Tololo survey. The photometric sequence stars are labeled along with the SNe.

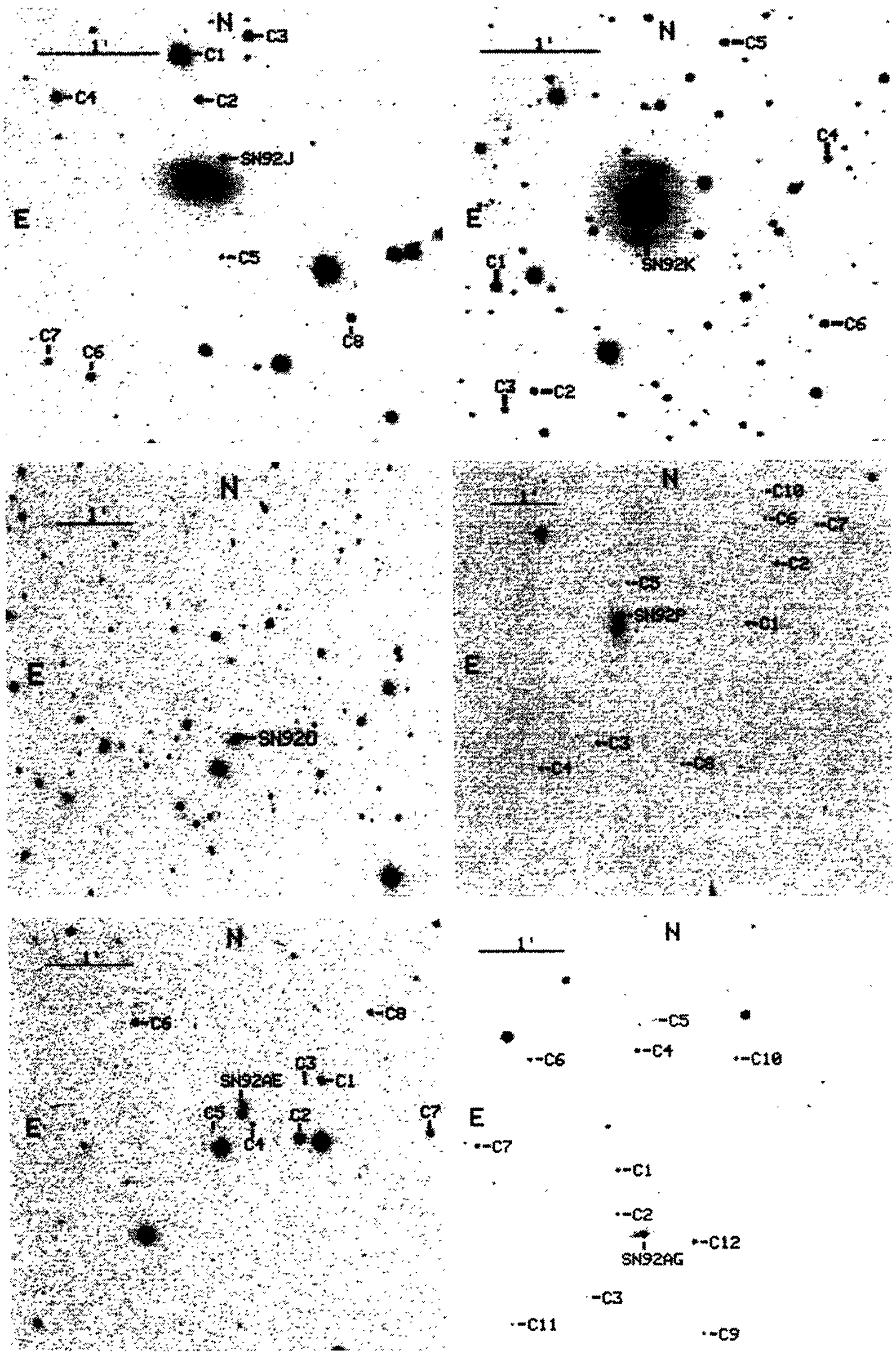

FIG. 1. (continued)

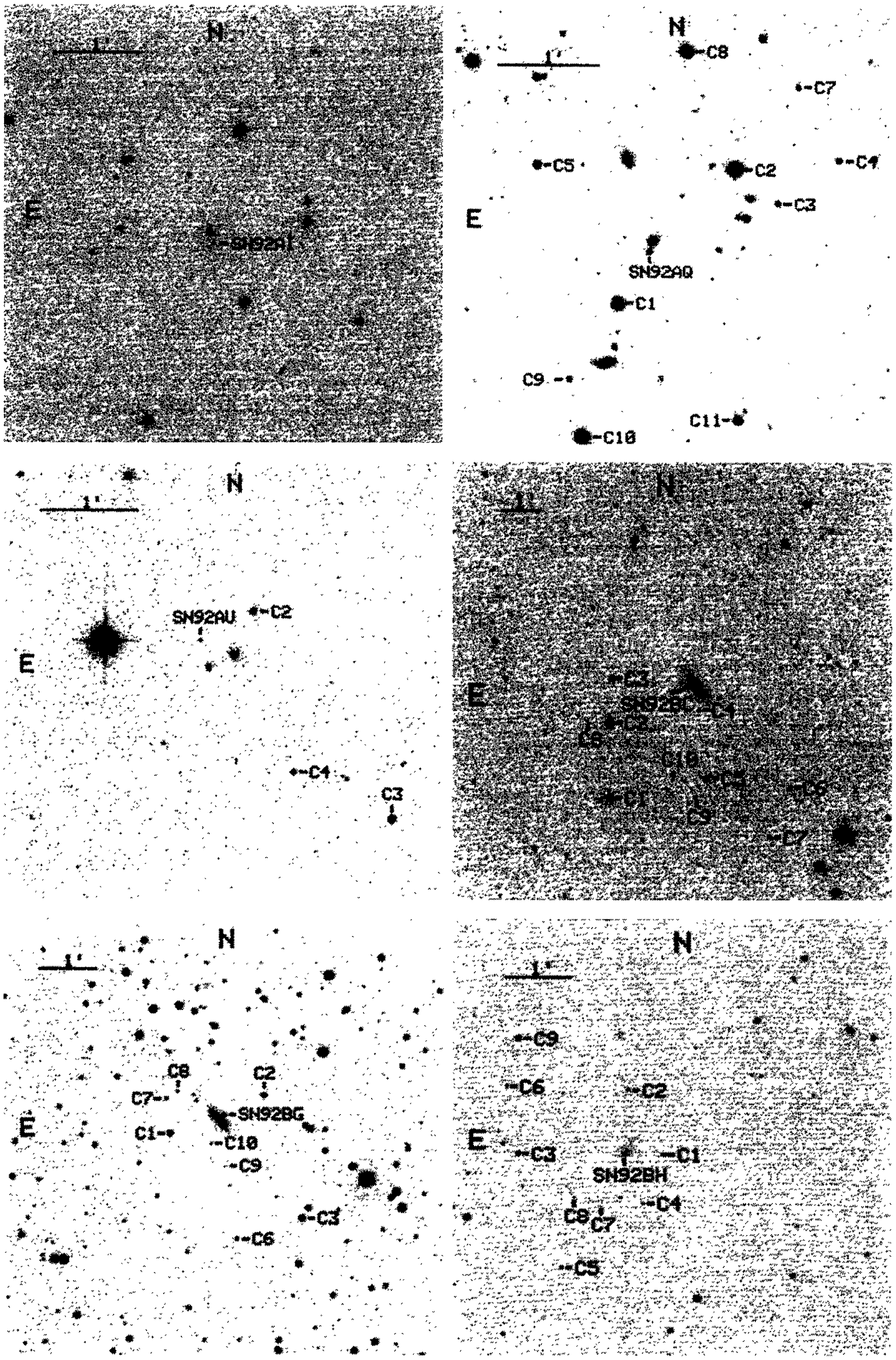

FIG. 1. (continued)

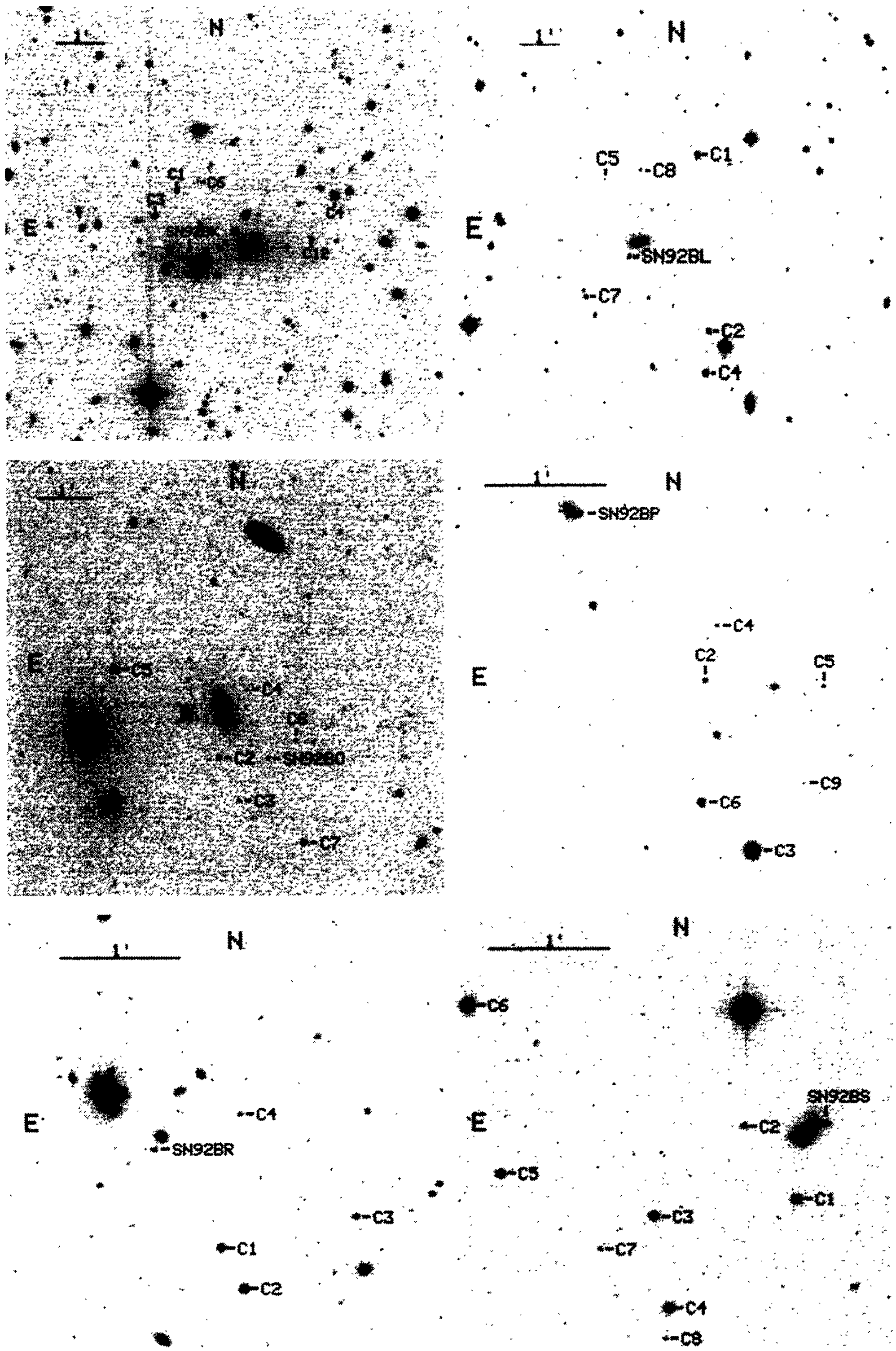

FIG. 1. (continued)

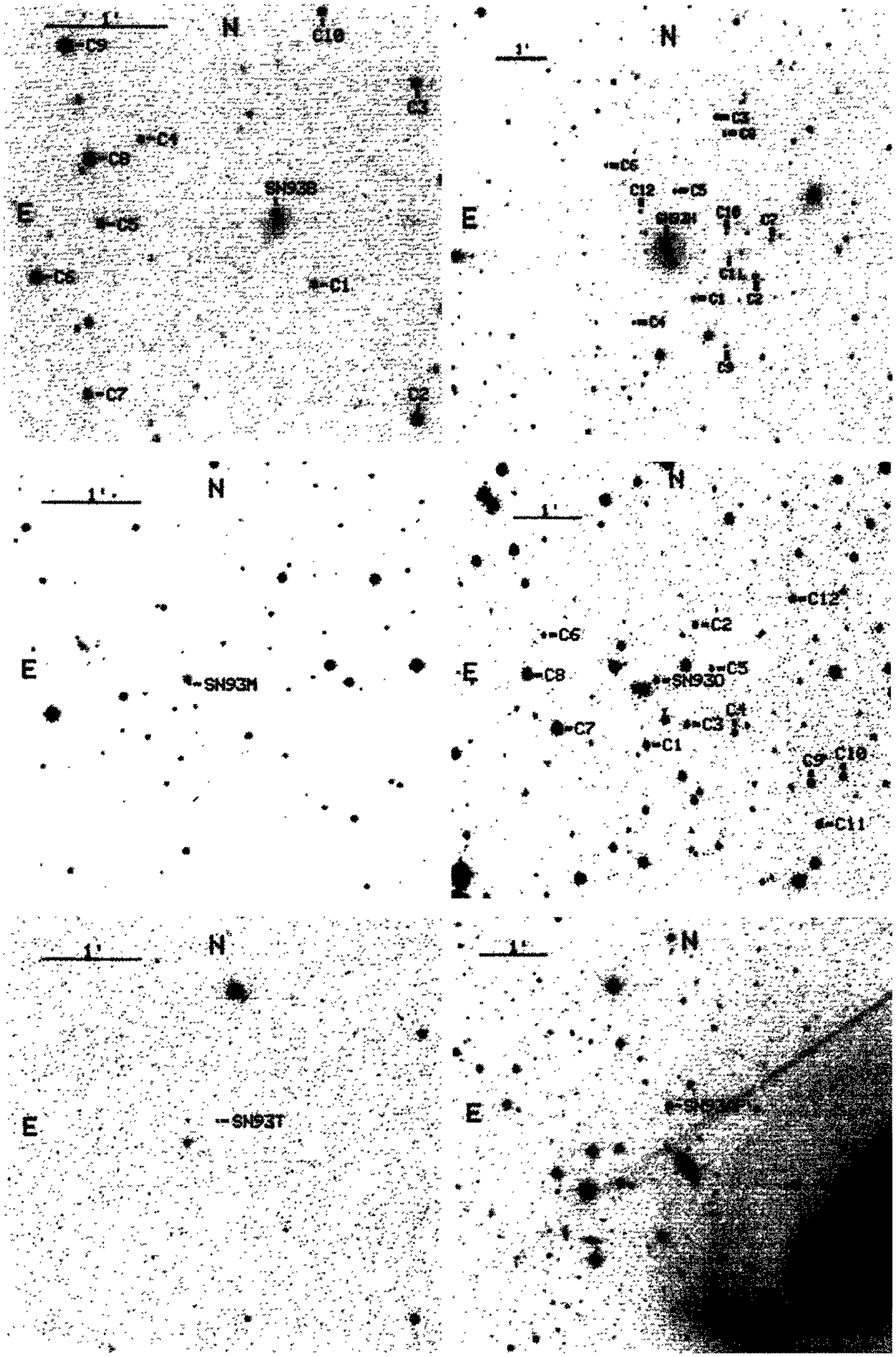

FIG. 1. (continued)

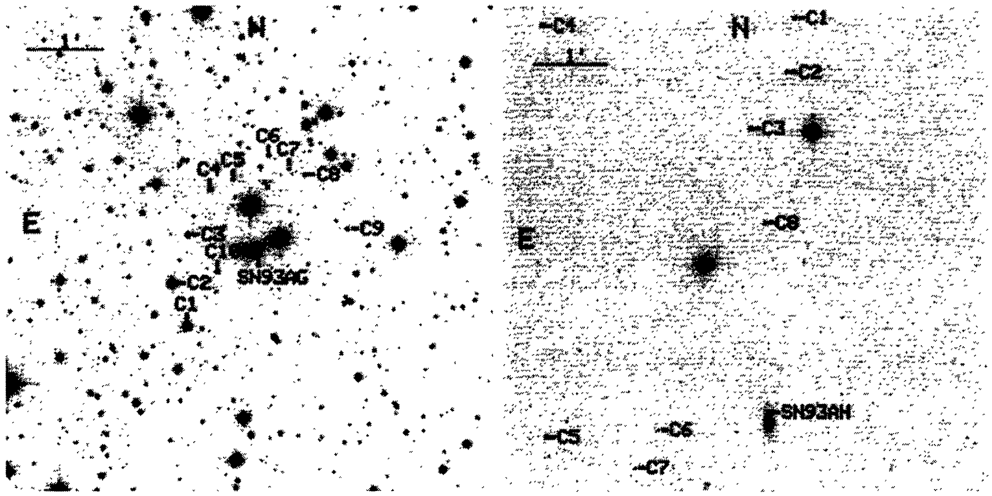

FIG. 1. (continued)

tracted. In order to save computing time, this galaxy subtraction was carried out over only a subset of the image centered on the SN (see Fig. 2 of Paper III).

(3) Instrumental magnitudes of the SN and several field local standard stars were then measured from the galaxy-subtracted images via point spread function fitting.

(4) Finally, the instrumental magnitudes were transformed to the standard $BV(RI)_{KC}$ system through the use of a photometric sequence set up in the same field surrounding the SN. (See Paper I for further details of the exact photometric transformations employed.) The photometric sequences for all 29 SNe are identified in the finder charts in Figs. 1 and 2. Only three stars lie outside the observed fields and could not be identified in these charts, namely: $c8$ in the field of SN 1990Y which is located about 130 arcsec west from star $c6$; $c10$ in the field of SN 1990Y which is located about 160 arcsec west and 35 arcsec south from star $c6$; and $c14$ in the field of SN 1990af which is located about 10 arcsec south and 40 arcsec east from star $c12$. The magnitudes for the photometric sequences are listed in Table 3. In every case, these sequences were derived from observations made on several (typically 4–6) photometric nights. The uncertainties quoted correspond to the standard error of the mean.

Table 4 (this table can be found in the AAS CD-ROM Series, Vol. 7, 1996) lists the final reduced photometry for each SN. Please note that these magnitudes supersede all previously published values (Papers I, II, and III) for the same SNe. The uncertainties quoted for each magnitude correspond to the sum in quadrature of the errors due to photon Poisson statistics and an *assumed* additional error of 0.03^m in each individual observation. The latter uncertainty was included in order to account for errors involved in the transformation from our instrumental system to the standard sys-

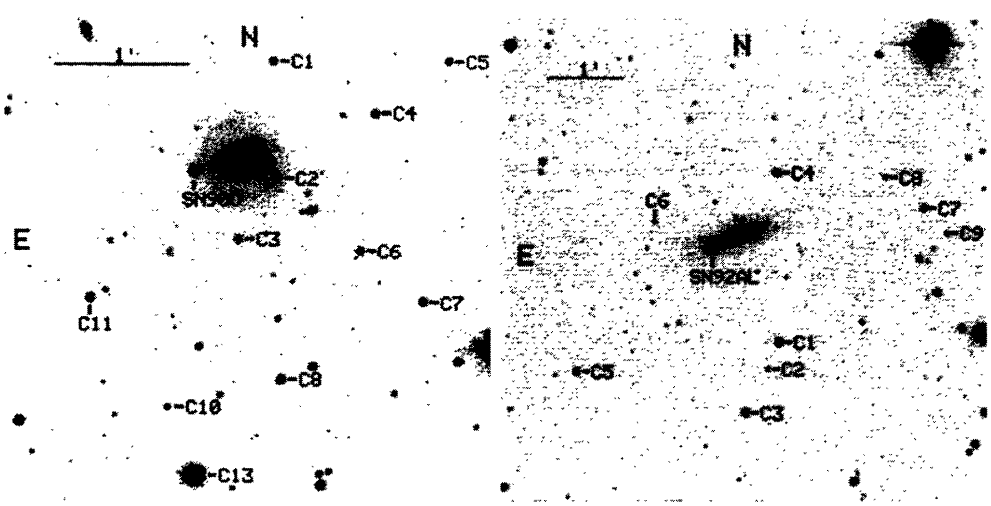

FIG. 2. *V* band CCD images of the two SNe Ia, 1990O and 1992al, discovered at other observatories and included in the Calán/Tololo follow-up photometric program. The photometric sequence stars are labeled along with the SNe.

TABLE 2. Journal of the observations.

Date (UT)	Telescope	Observatory	CCD	Observer(s)
1990 Jul 04	0.91-m	CTIO	TEK IV	N. Suntzeff
1990 Jul 12	0.91-m	CTIO	TEK IV	···
1990 Jul 23	0.91-m	CTIO	TI2	M. Rich/N. Tyson
1990 Jul 26	0.91-m	CTIO	TEK IV	T. Williams
1990 Jul 27	0.91-m	CTIO	TI3	S. Odewahn
1990 Jul 31	0.91-m	CTIO	TI3	R. Guhathakurta
1990 Aug 01	0.91-m	CTIO	TI3	N. Suntzeff
1990 Aug 12	0.91-m	CTIO	TI3	L. Wells
1990 Aug 21	0.91-m	CTIO	TI3	J. Elias
1990 Aug 22	0.91-m	CTIO	TI3	J. Elias
1990 Aug 24	0.91-m	CTIO	TI3	M. Navarrete
1990 Aug 29	0.91-m	CTIO	TI3	S. Howell/P. Szkody
1990 Aug 30	0.91-m	CTIO	TI3	C. Sturch
1990 Sep 01	0.91-m	CTIO	TI3	C. Sturch
1990 Sep 08	0.91-m	CTIO	TI1	H. Tirado
1990 Sep 10	1.0-m	LCO	TI1	J. Maza/F. Barrientos
1990 Sep 11	1.0-m	LCO	TI1	J. Maza/F. Barrientos
1990 Sep 13	1.0-m	LCO	TI1	J. Maza/F. Barrientos
1990 Sep 14	1.0-m	LCO	TI1	J. Maza/F. Barrientos
1990 Sep 15	0.91-m	CTIO	TI2	M. Hernández
1990 Sep 20	0.91-m	CTIO	TI2	J. Roth
1990 Sep 29	0.91-m	CTIO	TI3	···
1990 Oct 10	0.91-m	CTIO	TI2	N. Suntzeff
1990 Oct 14	4.0-m	CTIO	TEK IV	M. Navarrete
1990 Oct 20	0.91-m	CTIO	TI3	L. González
1990 Oct 24	0.91-m	CTIO	TI3	L. González
1990 Oct 28	0.91-m	CTIO	TI3	R. Lamontagne
1990 Oct 29	0.91-m	CTIO	TI3	R. Lamontagne
1990 Oct 30	0.91-m	CTIO	TI3	R. Lamontagne
1990 Oct 31	0.91-m	CTIO	TI3	R. Lamontagne
1990 Nov 01	0.91-m	CTIO	TEK IV	R. Schommer
1990 Nov 02	0.91-m	CTIO	TI2	F. Baganoff
1990 Nov 04	0.91-m	CTIO	TI2	F. Bagnoff
1990 Nov 06	0.91-m	CTIO	TEK IV	A. Phillips
1990 Nov 08	0.91-m	CTIO	TEK IV	A. Phillips
1990 Nov 11	1.5-m	CTIO	TEK IV	A. Phillips
1990 Nov 13	1.5-m	CTIO	TEK IV	A. Walker
1990 Nov 21	0.91-m	CTIO	TI3	B. Chaboyer
1990 Nov 22	0.91-m	CTIO	TI3	B. Chaboyer
1990 Nov 23	0.91-m	CTIO	TI3	M. Navarrete
1990 Dec 14	0.91-m	CTIO	THOM2	M. Navarrete
1991 Apr 07	0.91-m	CTIO	TEK2	P. Ugarte
1991 Apr 09	4.0-m	CTIO	TEK1	M. Navarrete
1991 Apr 13	1.0-m	LCO	FORD	D. Tucker
1991 Apr 14	1.0-m	LCO	FORD	D. Tucker
1991 Apr 16	1.0-m	LCO	FORD	D. Tucker
1991 Apr 17	0.91-m	CTIO	TEK IV	R. Guhathakurta
1991 Apr 18	0.91-m	CTIO	TEK IV	R. Guhathakurta
1991 Apr 19	0.91-m	CTIO	TI3	R. Schommer
1991 Apr 20	0.91-m	CTIO	TI3	L. González/J. Baldwin
1991 Apr 20	1.0-m	LCO	FORD	D. Tucker
1991 Apr 24	0.91-m	CTIO	TI3	C. Bailyn
1991 Apr 26	0.91-m	CTIO	TEK1	R. Schommer
1991 Apr 27	0.91-m	CTIO	TEK1	R. Schommer
1991 Apr 28	0.91-m	CTIO	TI3	L. Wells
1991 Apr 29	0.91-m	CTIO	TI3	L. Wells
1991 May 01	0.91-m	CTIO	TEK IV	N. Saavedra
1991 May 04	0.91-m	CTIO	TEK IV	G. Williger
1991 May 05	0.91-m	CTIO	TEK IV	G. Williger
1991 May 07	0.91-m	CTIO	TEK IV	M. Navarrete
1991 May 09	4.0-m	CTIO	TEK1	M. Navarrete
1991 May 10	0.91-m	CTIO	TI3	N. Tyson
1991 May 17	0.91-m	CTIO	TI3	L. González
1991 May 29	0.91-m	CTIO	TEK2	G. Williger
1991 Jun 07	4.0-m	CTIO	TI2	M. Navarrete
1991 Jun 12	0.91-m	CTIO	TEK2	A. Sarajedini
1991 Jun 13	0.91-m	CTIO	TEK IV	M. Navarrete

TABLE 2. (continued)

Date (UT)	Telescope	Observatory	CCD	Observer(s)
1991 Jun 21	0.91-m	CTIO	TEK IV	M. Shara
1991 Jun 29	0.91-m	CTIO	TEK1	P. Seitzer
1991 Jul 01	0.91-m	CTIO	TEK1	P. Seitzer
1991 Jul 02	0.91-m	CTIO	TI3	R. Schommer
1991 Jul 03	0.91-m	CTIO	TI3	R. Schommer
1991 Jul 04	0.91-m	CTIO	TI3	J. Baldwin
1991 Jul 05	0.91-m	CTIO	TI3	M. Navarrete
1991 Jul 06	0.91-m	CTIO	TEK2	L. Siciliano
1991 Jul 12	0.91-m	CTIO	TEK2	L. Siciliano
1991 Jul 21	0.91-m	CTIO	TEK2	A. Dey
1991 Aug 10	4.0-m	CTIO	TEK IV	M. Navarrete
1991 Aug 13	1.5-m	CTIO	TEK1	M. T. Ruiz
1991 Aug 27	0.91-m	CTIO	TEK2	G. Williger
1991 Sep 06	4.0-m	CTIO	TEK1	M. Navarrete
1991 Sep 09	0.91-m	CTIO	TEK2	N. Suntzeff
1991 Oct 08	0.91-m	CTIO	TI3	N. Suntzeff
1991 Oct 22	0.91-m	CTIO	TEK1	M. Hamuy
1991 Oct 23	0.91-m	CTIO	TEK1	M. Hamuy
1991 Oct 24	0.91-m	CTIO	TEK1	M. Hamuy
1991 Oct 25	0.91-m	CTIO	TEK1	M. Hamuy
1991 Oct 26	0.91-m	CTIO	TEK1	M. Hamuy
1991 Oct 30	0.91-m	CTIO	TEK1	G. Williger
1991 Nov 11	0.91-m	CTIO	TI3	H. Ferguson
1992 Feb 26	0.91-m	CTIO	TEK1	N. Suntzeff
1992 Mar 05	0.91-m	CTIO	TEK2	K. Janes
1992 Mar 06	4.0-m	CTIO	TEK2	N. Suntzeff
1992 Mar 08	0.91-m	CTIO	TEK1	K. Janes
1992 Mar 10	0.91-m	CTIO	TEK IV	M. Hamuy
1992 Mar 10	NTT	ESO	THOM18	J. Danziger
1992 Mar 12	0.91-m	CTIO	TEK1	C. Prosser
1992 Mar 13	0.91-m	CTIO	TEK2	C. Prosser
1992 Mar 19	0.91-m	CTIO	TEK IV	P. Hartigan/J. Hughes
1992 Mar 19	1.0-m	LCO	TEK	W. Krzeminski
1992 Mar 29	1.5-m	CTIO	TEK2	M. T. Ruiz
1992 Apr 04	0.91-m	CTIO	TEK2	C. Bailyn/Y-C. Kim
1992 Apr 05	0.91-m	CTIO	TEK2	C. Bailyn/Y-C. Kim
192 Apr 06	0.91-m	CTIO	TEK2	C. Bailyn/Y-C. Kim
1992 Apr 07	0.91-m	CTIO	TEK2	C. Bailyn/Y-C. Kim
1992 Apr 07	2.2-m	ESO	THOM19	M. Della Valle
1992 Apr 08	0.91-m	CTIO	TEK2	Y-C. Kim
1992 Apr 09	0.91-m	CTIO	TEK2	Y-C. Kim
1992 Apr 12	0.91-m	CTIO	TEK2	Y-C. Kim
1992 Apr 14	0.91-m	CTIO	TEK2	Y-C. Kim
1992 Apr 16	0.91-m	CTIO	TEK1	L. Wells
1992 Apr 19	0.91-m CTIO	TEK1	R. Schommer	
1992 Apr 20	0.91-m	CTIO	TEK1	R. Schommer
1992 May 11	NTT	ESO	THOM18	M. Della Valle
1992 May 20	0.91-m	CTIO	TEK2	G. Williger
1992 May 25	0.91-m	CTIO	TEK1	M. Hamuy/R. Avilés
1992 Jun 03	0.91-m	CTIO	TEK IV	L. Wells
1992 Jun 20	0.91-m	CTIO	TEK1	E. Rubenstein
1992 Jun 27	0.91-m	CTIO	TEK1	S. Cersosimo
1992 Jul 02	0.91-m	CTIO	TEK4	K. Wakamatsu/M. Malkan
1992 Jul 02	1.5-m	CTIO	···	C. Anguita
1992 Jul 03	0.91-m	CTIO	TEK1	K. Wakamatsu/M. Malkan
1992 Jul 03	3.6-m	ESO	TEK26	M. Della Valle
1992 Jul 04	0.91-m	CTIO	TEK1	M. Hamuy/R. Avilés
1992 Jul 05	0.91-m	CTIO	TEK3	J. Baldwin
1992 Jul 06	0.91-m	CTIO	TEK3	A. Walker
1992 Jul 09	0.91-m	CTIO	TEK3	A. Walker
1992 Jul 10	0.91-m	CTIO	TEK3	A. Walker
1992 Jul 12	1.0-m	LCO	FORD2	M. Hamuy/R. Avilés
1992 Jul 13	1.0-m	LCO	FORD2	M. Hamuy/R. Avilés
1992 Jul 15	1.0-m	LCO	FORD2	R. Avilés/F. Barrientos
1992 Jul 15	1.0-m	LCO	FORD2	R. Avilés/F. Barrientos
1992 Jul 19	0.91-m	CTIO	TEK1	E. Costa
1992 Jul 22	0.91-m	CTIO	TEK1	E. Costa

TABLE 2. (continued)

Date (UT)	Telescope	Observatory	CCD	Observer(s)
1992 Jul 27	0.91-m	CTIO	TEK3	N. Tyson/R. Gal
1992 Jul 28	0.91-m	CTIO	TEK3	N. Tyson/R. Gal
1992 Jul 29	0.91-m	CTIO	TEK3	N. Tyson/R. Gal
1992 Jul 29	0.91-m	CTIO	TEK3	N. Tyson/R. Gal
1992 Jul 31	0.91-m	CTIO	TEK3	N. Tyson/R. Gal
1992 Aug 01	2.2-m	ESO	THOM19	M. Della Valle
1992 Aug 01	0.91-m	CTIO	TEK1	R. Avilés/C. Smith
1992 Aug 02	0.91-m	CTIO	TEK1	R. Avilés/C. Smith
1992 Aug 03	0.91-m	CTIO	TEK1	E. Rubenstein
1992 Aug 06	0.91-m	CTIO	TEK1	E. Rubenstein
1992 Aug 08	0.91-m	CTIO	TEK1	R. Avilés
1992 Aug 09	0.91-m	CTIO	TEK1	R. Avilés
1992 Aug 10	0.91-m	CTIO	TEK1	R. Avilés
1992 Aug 11	0.91-m	CTIO	TEK1	R. Avilés
1992 Aug 12	0.91-m	CTIO	TEK1	R. Avilés/M. Hamuy
1992 Aug 13	0.91-m	CTIO	TEK1	R. Avilés
1992 Aug 14	0.91-m	CTIO	TEK1	R. Avilés
1992 Aug 15	0.91-m	CTIO	TEK1	R. Avilés/F. Barrientos
1992 Aug 20	0.91-m	CTIO	TEK1	S. Cersosimo
1992 Aug 21	0.91-m	CTIO	TEK1	S. Cersosimo
1992 Sep 03	0.91-m	CTIO	TEK1	R. Avilés
1992 Sep 05	0.91-m	CTIO	TEK1	R. Avilés
1992 Sep 06	0.91-m	CTIO	TEK1	R. Avilés
1992 Sep 07	0.91-m	CTIO	TEK1	R. Avilés
1992 Sep 20	0.91-m	CTIO	TEK1	R. Avilés
1992 Sep 26	0.91-m	CTIO	TEK1	R. Avilés
1992 Oct 06	0.91-m	CTIO	TEK3	R. McMahan/G. Baggley
1992 Oct 07	0.91-m	CTIO	TEK3	R. McMahan/G. Baggley
1992 Oct 08	0.91-m	CTIO	TEK3	R. McMahan/G. Baggley
1992 Oct 09	0.91-m	CTIO	TEK1	R. Avilés/M. Hamuy
1992 Oct 10	0.91-m	CTIO	TEK1	R. Avilés/M. Hamuy
1992 Oct 11	0.91-m	CTIO	TEK3	C. Smith
1992 Oct 12	0.91-m	CTIO	TEK3	C. Smith
1992 Oct 13	0.91-m	CTIO	TEK1	R. Avilés
1992 Oct 17	0.91-m	CTIO	TEK IV	E. Costa
1992 Oct 19	0.91-m	CTIO	TEK IV	E. Costa
1992 Oct 20	0.91-m	CTIO	TEK IV	E. Costa/M. Hamuy
1992 Oct 20	1.5-m	CTIO	TI3	F. Barrientos
1992 Oct 21	0.91-m	CTIO	TEK IV	E. Costa
1992 Oct 24	4.0-m	CTIO	TEK1	M. Navarrete
1992 Oct 25	0.91-m	CTIO	TEK4	L. González/E. Costa
1992 Oct 27	0.91-m	CTIO	TEK IV	R. Avilés
1992 Oct 28	0.91-m	CTIO	TEK3	N. Caldwell
1992 Oct 29	0.91-m	CTIO	TEK3	N. Caldwell
1992 Oct 30	0.91-m	CTIO	TI3	G. Williger
1992 Oct 31	0.91-m	CTIO	TI3	G. Williger
1992 Nov 08	0.91-m	CTIO	TEK1	R. Avilés
1992 Nov 14	0.91-m	CTIO	TEK IV	R. Avilés
1992 Nov 15	0.91-m	CTIO	TEK IV	R. Avilés
1992 Nov 20	0.91-m	CTIO	TEK3	R. Avilés
1992 Nov 21	0.91-m	CTIO	TEK3	K-P. Cheng
1992 Nov 23	0.91-m	CTIO	TEK3	K-P. Cheng
1992 Nov 24	0.91-m	CTIO	TEK3	K-P. Cheng
1992 Nov 27	0.91-m	CTIO	TI3	A. Layden
1992 Nov 28	0.91-m	CTIO	TI3	J. Elias/F. Barrientos
1992 Nov 29	0.91-m	CTIO	TI3	J. Elias/F. Barrientos
1992 Nov 30	0.91-m	CTIO	TI3	J. Elias/F. Barrientos
1992 Dec 05	0.91-m	CTIO	TEK3	R. Schommer
1992 Dec 07	0.91-m	CTIO	TEK1	R. Avilés
1992 Dec 13	0.91-m	CTIO	TEK IV	R. Avilés
1992 Dec 19	0.91-m	CTIO	TEK IV	R. Avilés
1992 Dec 22	0.91-m	CTIO	TEK IV	R. Avilés
1992 Dec 23	0.91-m	CTIO	TEK IV	R. Avilés
1992 Dec 23	4.0-m	CTIO	TEK1	N. Suntzeff
1992 Dec 24	0.91-m	CTIO	TEK IV	R. Schommer
1992 Dec 26	0.91-m	CTIO	TEK3	N. Caldwell
1992 Dec 30	0.91-m	CTIO	TEK IV	R. Avilés

TABLE 2. (continued)

Date (UT)	Telescope	Observatory	CCD	Observer(s)
1992 Dec 31	0.91-m	CTIO	TEK IV	R. Avilés
1993 Jan 03	4.0-m	CTIO	TEK1	N. Caldwell
1993 Jan 03	0.91-m	CTIO	TEK3	R. Méndez
1993 Jan 04	0.91-m	CTIO	TEK3	R. Méndez
1993 Jan 07	0.91-m	CTIO	TEK1	R. Avilés
1993 Jan 10	0.91-m	CTIO	TEK1	R. Avilés
1993 Jan 11	0.91-m	CTIO	TEK1	R. Avilés
1993 Jan 12	0.91-m	CTIO	TEK1	R. Avilés
1993 Jan 20	1.5-m	CTIO	TEK1	C. Anguita
1993 Jan 24	0.91-m	CTIO	TEK IV	R. Avilés
1993 Jan 25	0.91-m	CTIO	TEK IV	R. Avilés
1993 Jan 26	0.91-m	CTIO	TEK IV	R. Avilés
1993 Jan 29	0.91-m	CTIO	TEK IV	R. Avilés
1993 Jan 30	0.91-m	CTIO	TEK IV	R. Avilés
1993 Feb 08	0.91-m	CTIO	TEK3	M. Hamuy/X. Gómez
1993 Feb 17	4.0-m	CTIO	TEK1	R. Schommer
1993 Feb 19	0.91-m	CTIO	TEK IV	R. Avilés
1993 Feb 20	0.91-m	CTIO	TEK IV	R. Avilés
1993 Feb 22	4.0-m	CTIO	TEK1	N. Suntzeff
1993 Mar 05	0.91-m	CTIO	TEK1	R. Koopmann
1993 Mar 07	0.91-m	CTIO	TEK1	R. Avilés
1993 Mar 17	0.91-m	CTIO	TEK3	R. Avilés
1993 Mar 21	0.91-m	CTIO	TEK3	D. Geisler
1993 Mar 22	0.91-m	CTIO	TEK3	D. Geisler
1993 Mar 23	0.91-m	CTIO	TI3	J. Baldwin
1993 Mar 24	0.91-m	CTIO	TEK3	R. Havlen
1993 Mar 25	0.91-m	CTIO	TEK3	R. Havlen
1993 Mar 26	0.91-m	CTIO	TEK3	R. Havlen
1993 Mar 27	0.91-m	CTIO	TEK3	R. Avilés
1993 Apr 01	0.91-m	CTIO	TEK1	R. Avilés
1993 Apr 06	0.91-m	CTIO	TEK3	C. Prosser
1993 Apr 07	0.91-m	CTIO	TEK1	R. Avilés
1993 Apr 11	0.91-m	CTIO	TEK1	A. Layden
1993 Apr 13	0.91-m	CTIO	TEK1	A. Layden
1993 Apr 20	0.91-m	CTIO	TEK3	R. Avilés
1993 Apr 20	4.0-m	CTIO	TEK2	N. Suntzeff
1993 Apr 26	0.91-m	CTIO	TEK1	G. Williger
1993 May 01	0.91-m	CTIO	TEK1	G. Williger
1993 May 02	0.91-m	CTIO	TEK1	R. Avilés
1993 May 17	0.91-m	CTIO	TEK3	R. Avilés
1993 May 19	0.91-m	CTIO	TEK3	R. Avilés
1993 May 20	0.91-m	CTIO	TEK3	A. Layden
1993 May 22	0.91-m	CTIO	TEK3	A. Layden
1993 May 25	0.91-m	CTIO	TEK3	A. Walker
1993 May 26	0.91-m	CTIO	TEK3	A. Walker
1993 May 28	0.91-m	CTIO	TEK1	R. Avilés
1993 Jun 01	0.91-m	CTIO	TEK1	L. French
1993 Jun 04	0.91-m	CTIO	TEK1	R. Avilés
1993 Jun 05	0.91-m	CTIO	TEK1	R. Avilés
1993 Jun 08	0.91-m	CTIO	TEK1	M. Hernández
1993 Jun 09	0.91-m	CTIO	TEK1	R. Schommer
1993 Jun 10	0.91-m	CTIO	TEK1	R. Schommer
1993 Jun 13	4.0-m	CTIO	TEK3	A. Walker
1993 Jun 14	0.91-m	CTIO	TEK1	R. Avilés
1993 Jun 16	0.91-m	CTIO	TEK1	R. Avilés
1993 Jun 19	0.91-m	CTIO	TEK1	M. Bolte/J. Hesser
1993 Jun 23	0.91-m	CTIO	TI3	E. Rubenstein/W. Sherry
1993 Jun 24	4.0-m	CTIO	TEK3	N. Suntseff
1993 Jul 08	0.91-m	CTIO	TEK1	W. Sherry
1993 Jul 11	0.91-m	CTIO	TEK1	R. Avilés
1993 Jul 16	0.91-m	CTIO	TEK2	R. Avilés
1993 Jul 17	0.91-m	CTIO	TEK2	R. Avilés
1993 Jul 18	0.91-m	CTIO	TEK2	R. Avilés
1993 Jul 19	0.91-m	CTIO	TEK2	R. Avilés
1993 Aug 03	0.91-m	CTIO	TEK2	R. Avilés
1993 Aug 22	0.91-m	CTIO	TEK2	R. Avilés
1993 Sep 09	4.0-m	CTIO	TEK3	M. Navarrete

TABLE 2. (continued)

Date (UT)	Telescope	Observatory	CCD	Observer(s)
1993 Sep 17	0.91-m	CTIO	TI3	P. Francis
1993 Sep 18	0.91-m	CTIO	TEK2	R. Avilés
1993 Nov 06	4.0-m	CTIO	TEK3	R. Avilés
1993 Nov 12	4.0-m	CTIO	···	J. Maza/P. Ortiz
1993 Nov 16	0.91-m	CTIO	TEK2	R. Avilés
1993 Nov 23	0.91-m	CTIO	TEK3	L. Ho
1993 Nov 24	0.91-m	CTIO	TEK3	L. Ho
1993 Nov 29	0.91-m	CTIO	TEK3	D. Welch
1993 Dec 01	0.91-m	CTIO	TEK3	A. Walker
1993 Dec 03	0.91-m	CTIO	TEK2	A. Layden
1993 Dec 05	0.91-m	CTIO	TEK2	A. Layden
1993 Dec 17	0.91-m	CTIO	TEK2	R. Avilés
1993 Dec 29	0.91-m	CTIO	TEK2	J. Storm
1993 Dec 30	0.91-m	CTIO	TEK2	J. Storm
1993 Dec 31	0.91-m	CTIO	TEK2	J. Storm
1994 Jan 01	0.91-m	CTIO	TEK2	J. Storm
1994 Jan 02	0.91-m	CTIO	TEK2	J. Storm
1994 Jan 02	4.0-m	CTIO	TEK3	R. Elston
1994 Jan 03	0.91-m	CTIO	TEK2	J. Storm
1994 Jan 14	0.91-m	CTIO	TEK2	R. Avilés/P. Lira
1994 Jan 22	0.91-m	CTIO	TEK2	R. Avilés
1994 Feb 05	0.91-m	CTIO	TEK2	R. Avilés/P. Lira
1994 Feb 06	0.91-m	CTIO	TEK2	R. Avilés/P. Lira
1994 Mar 14	0.91-m	CTIO	TEK2	R. Avilés/P. Lira
1994 Mar 17	4.0-m	CTIO	TEK3	N. Suntzeff/M. Phillips
1994 May 10	0.91-m	CTIO	TEK2	R. Avilés
1994 May 11	0.91-m	CTIO	TEK2	R. Avilés
1994 Jun 06	0.91-m	CTIO	TEK2	M. Hernández
1994 Jul 12	4.0-m	CTIO	TEK4	R. Avilés
1994 Jul 31	0.91-m	CTIO	TEK3	R. Avilés
1994 Sep 12	4.0-m	CTIO	TEK4	R. Avilés
1994 Nov 09	4.0-m	CTIO	TEK4	N. Suntzeff
1995 Feb 10	0.91-m	CTIO	TEK2	R. Avilés
1995 Feb 11	0.91-m	CTIO	TEK2	R. Avilés

tem, and also due to the subtraction of the underlying host galaxy.

4. MAXIMUM-LIGHT MAGNITUDES & DECLINE RATES

Figure 3 shows the BVI light curves of the 29 SNe Ia included in this study. Maximum-light magnitudes were derived for each SN in one of the following two methods:

(1) *Direct Measurement.* For 11 SNe (slightly more than one third of the sample), photometry was obtained at or before maximum light allowing direct measurement of the maximum-light magnitudes in B and V. However, for several of these objects (e.g., see the light curves of SN 1992ag in Fig. 3), coverage of the I light curve was insufficient to allow direct measurement of the maximum-light brightness in this band. In these cases, the best-fitting template (see below) was used, often adjusting this to the first I data point. The corresponding error in the peak magnitude was taken to be 0.03^m in those cases where the coverage of the light curve started before maximum, and 0.05^m when the observations started only one or two days before the peak.

(2) *Template Fitting.* For the majority of the SNe in our sample, the light curve observations did not begin until after maximum light. To estimate peak magnitudes for these events, we employed a template fitting procedure similar to that utilized in Paper III and Hamuy *et al.* 1995 (hereafter referred to as Paper IV). As detailed in a separate paper (Hamuy *et al.* 1996c; hereafter referred to as Paper VIII), a family of six BVI light curve templates, representing the range of observed decline rates of SNe Ia, were produced from precise CCD photometry obtained at CTIO of seven well-observed events (1992bc, 1991T, 1992al, 1992A, 1992bo, 1993H, and 1991bg). These templates were fit to the observed photometry of each of the program SNe via a χ^2-minimizing technique which solved simultaneously for the time of B maximum and the peak magnitudes B_{MAX}, V_{MAX}, and I_{MAX}. (Note that in our previous papers, the I-band data was not included.) As detailed in Paper III, before performing these fits, the templates were first modified by the appropriate K terms (Hamuy *et al.* 1993b) and were also stretched to account for time dilation. For about half of the SNe, one of the templates provided a much better fit (as judged by the value of the reduced χ^2) than the others. An example is SN 1992ae (see Fig. 3) whose BVI light curves were found to be an excellent match to the SN 1992al templates. However, for many of the program SNe, the data were fit essentially equally well by two different templates. A good example of such an event is SN 1991ag (see Fig. 3), for which the 1991T and 1992bc templates yielded similar values of the reduced χ^2. Hence, we adopted the general rule that when the difference in the reduced χ^2 of two template fits was $\leqslant 1.5$, the peak magnitudes were obtained by aver-

TABLE 3. $BV(RI)_{KC}$ sequences.

Star	B	σ_B	V	σ_V	R	σ_R	I	σ_I
				SN 1990O				
c1	18.750	0.029	17.897	0.011	17.407	0.007	16.940	0.009
c2	19.556	0.059	18.395	0.027	17.622	0.018	16.905	0.021
c3	19.900	0.078	18.333	0.021	17.401	0.010	16.569	0.011
c4	19.178	0.038	18.103	0.014	17.434	0.008	16.878	0.011
c5	18.796	0.030	18.112	0.013	17.701	0.008	17.312	0.011
c6	19.193	0.040	18.414	0.017	17.994	0.012	17.605	0.022
c7	18.588	0.024	17.760	0.011	17.287	0.008	16.920	0.012
c8	18.295	0.019	17.434	0.008	16.916	0.005	16.450	0.008
c10	19.619	0.060	18.889	0.027	18.478	0.020	18.050	0.033
c11	18.387	0.020	17.415	0.008	16.811	0.004	16.281	0.006
c13	14.637	0.002	13.596	0.001	···	···	···	···
				SN 1990T				
c1	17.931	0.007	17.374	0.005	17.041	0.006	16.712	0.004
c2	19.742	0.023	18.561	0.004	17.846	0.004	17.208	0.004
c3	18.825	0.007	18.335	0.007	18.007	0.007	17.684	0.014
c4	19.577	0.013	19.018	0.007	18.705	0.007	18.322	0.016
c5	17.286	0.007	16.360	0.007	15.738	0.006	15.206	0.005
c6	15.425	0.006	14.535	0.004	14.043	0.004	13.609	0.004
c7	16.293	0.007	15.307	0.003	14.759	0.004	14.278	0.002
c8	17.303	0.005	16.691	0.004	16.328	0.003	15.968	0.004
				SN 1990Y				
c2	18.422	0.008	17.514	0.003	16.993	0.002	16.548	0.005
c3	20.214	0.031	18.636	0.007	17.540	0.003	16.236	0.004
c4	18.197	0.006	17.514	0.003	17.119	0.003	16.736	0.003
c5	20.034	0.024	18.595	0.007	17.630	0.002	16.547	0.003
c6	15.617	0.004	15.137	0.002	14.847	0.002	14.572	0.002
c7	17.484	0.005	16.710	0.002	16.285	0.003	15.896	0.002
c8	20.057	0.021	18.556	0.009	17.867	0.007	17.203	0.014
c9	16.553	0.006	15.904	0.003	15.535	0.002	15.181	0.002
c10	19.367	0.010	18.875	0.006	18.557	0.003	18.219	0.016
				SN 1990af				
c1	18.405	0.002	17.440	0.002	16.833	0.005	16.311	0.008
c2	20.110	0.005	19.629	0.006	19.346	0.047	19.086	0.091
c3	17.041	0.002	16.377	0.005	15.978	0.003	15.588	0.004
c4	16.270	0.007	15.670	0.005	15.284	0.002	14.918	0.003
c5	18.604	0.002	17.853	0.005	17.417	0.008	17.010	0.014
c6	···	···	14.597	0.005	14.200	0.001	13.836	0.001
c8	16.354	0.001	15.607	0.007	15.172	0.001	14.782	0.002
c9	17.902	0.002	16.528	0.005	15.619	0.002	14.911	0.002
c10	17.211	0.005	16.638	0.009	···	···	···	···
c12	17.362	0.012	16.156	0.010	···	···	···	···
c13	20.510	0.011	19.182	0.006	···	···	···	···
c14	20.556	0.011	19.055	0.002	···	···	···	···
				SN 1991S				
c1	18.502	0.020	18.029	0.008	17.703	0.007	17.398	0.007
c2	20.387	0.013	18.928	0.011	18.009	0.009	17.115	0.015
c3	18.271	0.017	17.583	0.007	17.179	0.008	16.789	0.006
c4	18.948	0.009	18.596	0.015	18.366	0.007	18.162	0.018
c5	19.560	0.029	19.103	0.012	18.810	0.015	18.487	0.026
				SN 1991U				
c1	15.966	0.004	15.015	0.002	14.439	0.002	13.906	0.013
c2	17.709	0.007	16.828	0.009	16.338	0.007	15.906	0.008
c3	18.756	0.038	17.888	0.009	17.372	0.007	16.894	0.009
c4	19.954	0.003	18.515	0.004	17.625	0.004	16.793	0.014
c5	17.987	0.002	17.208	0.002	16.764	0.002	16.340	0.008
c6	18.851	0.008	17.703	0.002	16.984	0.002	16.363	0.007
c7	17.402	0.002	16.630	0.005	16.171	0.002	15.714	0.008
c8	18.026	0.005	17.288	0.003	16.854	0.002	16.427	0.005
c9	18.011	0.011	17.321	0.002	16.901	0.004	16.507	0.008
				SN 1991ag				
c1	13.516	0.003	12.920	0.002	12.552	0.010	12.194	0.008
c2	16.472	0.004	15.619	0.007	15.117	0.003	14.679	0.008
c3	14.902	0.001	14.219	0.005	13.808	0.002	13.457	0.010
c4	17.394	0.003	16.749	0.006	16.359	0.002	15.988	0.008
c5	17.185	0.008	16.444	0.005	16.011	0.006	15.603	0.008

TABLE 3. (continued)

Star	B	σ_B	V	σ_V	R	σ_R	I	σ_I
c6	16.878	0.003	15.941	0.005	15.409	0.002	14.925	0.007
c7	18.070	0.015	17.546	0.008	17.192	0.007	16.843	0.011
				SN 1992J				
c1	15.341	0.005	14.449	0.001	···	···	13.385	0.005
c2	19.538	0.005	18.149	0.003	···	···	16.520	0.007
c3	18.258	0.008	17.305	0.001	···	···	16.164	0.005
c4	17.840	0.002	17.168	0.003	···	···	16.400	0.006
c5	21.701	0.018	20.027	0.003	···	···	17.544	0.016
c6	18.773	0.004	18.110	0.001	···	···	17.264	0.013
c7	20.381	0.009	18.905	0.004	···	···	17.060	0.011
c8	18.671	0.002	17.956	0.006	···	···	17.127	0.011
				SN 1992K				
c1	16.437	0.018	15.753	0.010	···	···	14.944	0.015
c2	17.639	0.008	16.990	0.007	···	···	16.229	0.007
c3	18.122	0.010	17.467	0.004	···	···	16.704	0.010
c4	17.798	0.010	17.134	0.002	···	···	16.368	0.001
c5	17.643	0.012	16.667	0.003	···	···	15.598	0.007
c6	17.139	0.010	16.490	0.002	···	···	15.738	0.011
				SN 1992P				
c1	16.985	0.004	16.335	0.008	···	···	15.631	0.008
c2	17.997	0.011	16.512	0.007	···	···	14.510	0.010
c3	16.881	0.028	16.117	0.016	···	···	15.266	0.015
c4	17.809	0.017	17.047	0.015	···	···	16.177	0.013
c5	19.646	0.007	18.541	0.014	···	···	17.202	0.005
c6	19.024	0.019	17.766	0.018	···	···	16.375	0.012
c7	18.711	0.012	18.265	0.013	···	···	17.647	0.017
c8	19.573	0.027	18.050	0.012	···	···	15.506	0.009
c10	20.313	0.038	19.321	0.022	···	···	18.154	0.012
				SN 1992ae				
c1	17.086	0.005	16.451	0.002	···	···	15.707	0.003
c2	15.720	0.009	14.782	0.006	···	···	13.789	0.005
c3	19.772	0.025	18.585	0.007	···	···	17.231	0.008
c4	19.097	0.014	18.381	0.008	···	···	17.557	0.010
c5	19.464	0.120	18.977	0.058	···	···	18.200	0.100
c6	17.347	0.006	16.617	0.002	···	···	15.769	0.003
c7	16.719	0.007	16.300	0.004	···	···	15.774	0.003
c8	18.469	0.009	17.722	0.009	···	···	16.873	0.006
				SN 1992ag				
c1	17.657	0.009	17.002	0.011	···	···	16.217	0.012
c2	18.203	0.009	17.465	0.010	···	···	16.594	0.024
c3	19.434	0.007	18.445	0.017	···	···	17.271	0.010
c4	17.218	0.014	16.490	0.006	···	···	15.647	0.034
c5	18.731	0.035	18.111	0.022	···	···	17.318	0.006
c6	17.726	0.007	16.819	0.006	···	···	15.750	0.011
c7	17.539	0.006	16.826	0.007	···	···	16.021	0.018
c9	18.445	0.016	17.938	0.010	···	···	17.221	0.016
c10	17.802	0.008	17.159	0.010	···	···	16.378	0.019
c11	18.607	0.011	17.921	0.013	···	···	17.081	0.014
c12	17.886	0.006	16.362	0.011	···	···	14.407	0.011
				SN 1992al				
c1	16.671	0.003	15.781	0.004	15.274	0.003	14.859	0.006
c2	18.290	0.002	17.650	0.001	17.270	0.001	16.916	0.002
c3	16.028	0.006	15.206	0.004	14.735	0.002	14.279	0.002
c4	16.096	0.003	15.490	0.003	15.124	0.001	14.780	0.003
c5	16.674	0.003	16.067	0.002	15.713	0.002	15.353	0.004
c6	19.006	0.001	17.570	0.001	16.652	0.002	15.744	0.003
c7	16.937	0.005	16.080	0.004	15.555	0.003	15.078	0.003
c8	18.464	0.002	17.683	0.001	17.204	0.001	16.751	0.002
c9	18.153	0.002	17.248	0.001	16.705	0.001	16.224	0.001
				SN 1992aq				
c1	15.748	0.003	15.138	0.004	···	···	14.422	0.005
c2	15.400	0.007	14.502	0.004	···	···	13.530	0.005
c3	20.677	0.019	19.114	0.006	···	···	17.092	0.003
c4	20.126	0.037	19.233	0.021	···	···	18.124	0.020
c5	18.994	0.013	17.626	0.004	···	···	15.985	0.002
c7	21.066	0.070	19.650	0.002	···	···	17.923	0.035
c8	16.590	0.010	15.146	0.010	···	···	13.735	0.004
c9	19.715	0.011	19.194	0.008	···	···	18.608	0.012

TABLE 3. (continued)

Star	B	σ_B	V	σ_V	R	σ_R	I	σ_I
c10	15.275	0.006	14.481	0.010	···	···	13.595	0.010
c11	17.277	0.010	16.645	0.010	···	···	15.910	0.003
				SN 1992au				
c2	17.421	0.020	16.030	0.006	···	···	14.117	0.005
c3	16.056	0.006	15.386	0.007	···	···	14.605	0.007
c4	19.131	0.013	17.698	0.004	···	···	15.666	0.003
				SN 1992bc				
c1	14.213	0.008	13.570	0.006	···	···	12.862	0.011
c2	14.297	0.005	13.645	0.004	13.280	0.001	12.909	0.008
c3	15.785	0.003	15.060	0.003	14.644	0.003	14.255	0.003
c4	17.756	0.005	17.288	0.005	16.986	0.003	16.682	0.007
c5	16.673	0.004	15.659	0.005	15.029	0.004	14.487	0.005
c6	17.087	0.026	16.422	0.012	16.028	0.010	15.647	0.004
c7	17.244	0.006	16.523	0.013	16.094	0.014	15.688	0.016
c8	20.514	0.089	19.052	0.025	17.990	0.031	16.660	0.024
c9	19.858	0.057	18.430	0.001	17.530	0.001	16.678	0.002
c10	21.214	0.083	19.878	0.039	19.156	0.005	18.491	0.076
				SN 1992bg				
c1	16.454	0.006	15.451	0.002	···	···	14.415	0.005
c2	16.830	0.006	16.173	0.005	···	···	15.399	0.003
c3	16.105	0.005	15.420	0.003	···	···	14.613	0.003
c6	18.897	0.020	17.797	0.011	···	···	16.566	0.003
c7	18.353	0.009	17.490	0.003	···	···	16.504	0.004
c8	19.386	0.016	18.362	0.003	···	···	17.288	0.005
c9	20.428	0.047	19.680	0.011	···	···	18.485	0.023
c10	20.345	0.038	19.094	0.007	···	···	17.708	0.011
				SN 1992bh				
c1	17.920	0.008	17.296	0.007	···	···	16.551	0.010
c2	19.202	0.012	17.913	0.006	···	···	16.411	0.009
c3	17.265	0.003	16.403	0.002	···	···	15.433	0.005
c4	18.937	0.007	18.618	0.006	···	···	18.178	0.021
c5	18.095	0.004	17.484	0.003	···	···	16.760	0.003
c6	18.543	0.014	17.807	0.003	···	···	16.930	0.006
c7	20.749	0.025	19.994	0.020	···	···	19.031	0.026
c8	20.621	0.021	19.324	0.014	···	···	17.766	0.008
c9	16.390	0.010	15.461	0.010	···	···	···	···
				SN 1992bk				
c1	18.003	0.006	17.410	0.008	···	···	16.685	0.004
c3	17.851	0.007	16.809	0.005	···	···	15.577	0.004
c4	15.430	0.007	14.708	0.016	···	···	13.894	0.010
c6	20.578	0.018	19.002	0.006	···	···	16.950	0.005
c12	18.764	0.010	17.669	0.009	···	···	16.381	0.010
				SN 1992bl				
c1	15.285	0.010	14.500	0.010	···	···	13.540	0.010
c2	16.400	0.003	15.608	0.005	···	···	14.766	0.002
c4	15.136	0.007	14.564	0.005	···	···	13.882	0.002
c5	19.746	0.002	19.187	0.003	···	···	18.504	0.009
c7	16.939	0.003	16.419	0.002	···	···	15.759	0.003
c8	18.820	0.008	18.220	0.003	···	···	17.506	0.002
				SN 1992bo				
c2	18.063	0.018	16.930	0.005	16.231	0.007	15.687	0.005
c3	19.882	0.025	19.365	0.006	18.992	0.012	18.634	0.016
c4	20.702	0.050	19.199	0.013	18.262	0.005	17.291	0.011
c5	15.348	0.011	14.470	0.007	13.973	0.006	13.545	0.007
c7	16.916	0.010	16.373	0.003	16.007	0.005	15.713	0.005
c8	20.752	0.059	19.930	0.016	19.530	0.017	18.949	0.026
				SN 1992bp				
c2	20.291	0.012	18.737	0.005	···	···	16.455	0.005
c3	14.344	0.015	13.691	0.012	···	···	···	···
c4	21.587	0.024	19.974	0.010	···	···	17.327	0.050
c5	21.756	0.032	20.540	0.016	···	···	18.848	0.023
c6	17.718	0.005	17.080	0.003	···	···	16.312	0.006
c9	21.014	0.017	20.512	0.017	···	···	20.010	0.028
				SN 1992br				
c1	18.042	0.004	17.316	0.004	···	···	···	···
c2	17.555	0.002	16.870	0.002	···	···	···	···
c3	19.428	0.005	18.728	0.007	···	···	···	···
c4	20.373	0.007	19.759	0.010	···	···	···	···

TABLE 3. (continued)

Star	B	σ_B	V	σ_V	R	σ_R	I	σ_I
				SN 1992bs				
c1	16.801	0.005	16.234	0.004	···	···	···	···
c2	19.433	0.014	18.520	0.006	···	···	···	···
c3	17.038	0.005	16.211	0.004	···	···	···	···
c4	16.447	0.005	15.800	0.004	···	···	···	···
c5	17.589	0.007	16.708	0.004	···	···	···	···
c6	14.955	0.007	14.278	0.011	···	···	···	···
c7	20.912	0.033	19.580	0.019	···	···	···	···
c8	21.127	0.040	19.601	0.017	···	···	···	···
				SN 1993B				
c1	18.762	0.006	18.149	0.004	···	···	17.419	0.006
c2	16.590	0.005	15.650	0.004	···	···	14.617	0.004
c3	18.333	0.005	17.309	0.004	···	···	16.243	0.002
c4	19.222	0.006	18.090	0.003	···	···	16.853	0.003
c5	19.195	0.005	17.805	0.004	···	···	16.171	0.004
c6	16.116	0.004	15.657	0.003	···	···	15.011	0.004
c7	17.630	0.005	16.817	0.003	···	···	15.949	0.003
c8	15.968	0.003	15.289	0.003	···	···	14.523	0.003
c9	15.630	0.004	14.982	0.003	···	···	14.232	0.004
c10	18.536	0.007	17.629	0.005	···	···	16.591	0.006
				SN 1993H				
c1	15.891	0.012	15.265	0.005	14.928	0.020	14.552	0.005
c2	15.874	0.014	14.602	0.011	···	···	13.193	0.015
c3	15.468	0.016	14.745	0.013	14.372	0.010	13.977	0.008
c4	18.802	0.006	18.089	0.004	17.666	0.005	17.264	0.005
c5	19.148	0.003	17.719	0.005	16.834	0.006	15.968	0.005
c6	18.506	0.005	17.037	0.002	16.066	0.004	15.007	0.005
c7	17.277	0.007	16.334	0.004	15.831	0.011	15.358	0.006
c8	16.742	0.014	15.546	0.010	14.833	0.013	14.180	0.003
c9	17.223	0.007	16.677	0.003	16.326	0.005	15.979	0.003
c10	18.724	0.010	18.029	0.012	17.612	0.013	17.201	0.004
c11	19.952	0.010	19.082	0.015	18.535	0.010	18.032	0.008
c12	19.279	0.003	18.475	0.005	17.996	0.009	17.554	0.006
				SN 1993O				
c1	18.648	0.024	17.362	0.024	···	···	15.757	0.021
c2	18.728	0.015	18.045	0.023	···	···	17.211	0.021
c3	18.752	0.018	18.028	0.023	···	···	17.194	0.029
c4	19.141	0.023	18.143	0.018	···	···	17.046	0.023
c5	19.911	0.020	19.236	0.015	···	···	18.493	0.010
c6	19.719	0.022	18.671	0.029	···	···	17.430	0.010
c7	15.638	0.009	15.000	0.027	···	···	14.222	0.013
c8	16.260	0.013	15.306	0.038	···	···	14.187	0.014
c9	17.885	0.017	17.014	0.018	···	···	16.080	0.020
c10	18.105	0.006	17.327	0.004	···	···	16.441	0.016
c11	18.386	0.022	17.718	0.044	···	···	16.908	0.028
c12	18.468	0.026	17.814	0.026	···	···	16.960	0.026
				SN 1993ag				
c1	15.680	0.004	15.041	0.003	···	···	14.329	0.003
c2	15.415	0.004	14.672	0.003	···	···	13.878	0.003
c3	18.349	0.005	17.432	0.003	···	···	16.466	0.006
c4	18.710	0.007	17.880	0.004	···	···	16.988	0.006
c5	19.536	0.018	18.745	0.007	···	···	17.877	0.019
c6	20.138	0.022	18.626	0.005	···	···	16.311	0.005
c7	20.808	0.023	20.218	0.009	···	···	19.514	0.027
c8	20.643	0.024	19.181	0.007	···	···	16.975	0.006
c9	19.733	0.005	18.952	0.005	···	···	18.095	0.008
c10	18.728	0.007	17.843	0.005	···	···	16.855	0.006
				SN 1993ah				
c1	17.875	0.006	16.861	0.002	···	···	15.726	0.005
c2	19.672	0.005	18.164	0.003	···	···	16.122	0.001
c3	17.265	0.016	16.763	0.015	···	···	16.105	0.016
c4	18.538	0.008	17.089	0.001	···	···	15.085	0.001
c5	18.488	0.004	17.482	0.002	···	···	16.384	0.003
c6	19.518	0.002	18.586	0.003	···	···	17.503	0.004
c7	19.923	0.004	18.919	0.003	···	···	17.724	0.004
c8	18.369	0.005	17.657	0.001	···	···	16.859	0.002

TABLE 4. $BV(RI)_{KC}$ photometry for the 29 SNe Ia.*

JD 2440000+	B	σ_B	V	σ_V	R	σ_R	I	σ_I
				SN 1990O				
8076.71	16.600	0.030	16.532	0.030	16.413	0.030	···	···
8084.64	16.956	0.030	16.699	0.030	16.646	0.030	17.126	0.030
8095.67	18.019	0.036	17.278	0.033	17.196	0.031	17.435	0.034
8104.67	18.928	0.048	17.759	0.036	17.326	0.031	17.243	0.035
8104.67	18.929	0.053	···	···	···	···	···	···
8115.64	19.549	0.048	18.376	0.034	17.918	0.033	17.735	0.037
8126.48	19.760	0.068	18.681	0.041	18.302	0.036	18.216	0.055
8149.58	20.104	0.067	19.279	0.041	18.955	0.044	19.556	0.151
8163.52	20.402	0.233	19.400	0.100	···	···	···	···
8353.83	22.830	0.598	22.529	0.312	22.952	0.514	21.613	0.497
8355.86	22.747	0.155	22.965	0.160	23.155	0.184	22.471	0.215
8355.86	···	···	···	···	···	···	23.238	0.359
8383.88	···	···	22.886	0.316	23.629	0.785	22.368	0.817
				SN 1990T				
8098.50	18.401	0.033	17.809	0.032	17.834	0.033	18.175	0.050
8099.69	18.575	0.035	17.895	0.031	17.873	0.033	18.060	0.045
8103.69	···	···	18.088	0.036	···	···	17.968	0.045
8104.79	19.218	0.041	18.216	0.033	17.972	0.033	18.039	0.036
8104.79	19.165	0.034	18.194	0.031	17.963	0.031	18.022	0.034
8115.67	20.184	0.050	18.861	0.034	18.283	0.031	18.078	0.034
8124.54	20.496	0.060	19.347	0.042	18.831	0.040	18.683	0.054
8124.54	···	···	···	···	18.839	0.041	···	···
8125.54	20.513	0.049	19.393	0.036	18.870	0.033	18.679	0.041
8125.54	20.566	0.049	19.384	0.034	···	···	···	···
8127.67	20.504	0.048	19.398	0.036	18.958	0.034	18.723	0.038
8144.67	20.866	0.064	19.912	0.043	19.492	0.045	19.442	0.069
8144.67	···	···	···	···	19.494	0.043	19.472	0.082
8145.60	20.890	0.054	19.857	0.053	19.595	0.076	19.399	0.069
8145.60	···	···	···	···	19.524	0.085	···	···
8147.50	20.861	0.102	19.955	0.059	19.702	0.068	19.482	0.117
8149.67	20.915	0.133	19.965	0.045	19.593	0.050	···	···
8163.67	21.132	0.322	20.403	0.122	20.268	0.139	···	···
8174.50	21.174	0.203	20.438	0.100	20.327	0.077	20.388	0.302
8178.58	21.333	0.077	20.647	0.041	20.629	0.053	20.601	0.076
8184.56	21.520	0.091	20.760	0.067	20.810	0.113	···	···
8218.50	21.861	0.137	21.262	0.097	···	···	···	···
				SN 1990Y				
8132.90	18.926	0.044	17.986	0.034	17.807	0.048	···	···
8133.88	18.831	0.093	···	···	···	···	···	···
8133.88	18.924	0.051	17.967	0.046	···	···	···	···
8135.85	19.122	0.051	18.048	0.036	···	···	···	···
8142.90	19.971	0.048	18.539	0.036	···	···	···	···
8145.81	20.065	0.039	18.679	0.033	18.095	0.039	17.975	0.041
8148.83	20.387	0.053	18.900	0.036	18.357	0.044	18.124	0.048
8149.88	20.359	0.079	18.930	0.034	18.308	0.034	18.113	0.059
8154.85	20.449	0.150	19.286	0.045	18.639	0.048	18.444	0.089
8174.71	···	···	19.560	0.068	19.142	0.050	19.235	0.096
8178.83	21.072	0.048	···	···	19.578	0.036	19.669	0.050
8178.83	21.084	0.048	19.984	0.035	19.576	0.037	19.697	0.051
8178.83	21.052	0.065	19.923	0.033	19.579	0.037	19.682	0.051
8184.75	21.153	0.100	20.095	0.053	···	···	···	···
8188.81	21.392	0.095	20.305	0.050	19.997	0.056	20.142	0.113
8218.80	21.421	0.115	20.888	0.074	···	···	···	···
8218.80	21.554	0.142	···	···	···	···	···	···

*Table 4 can be found in the AAS CD-ROM Series. Only the first page is shown here for form and content.

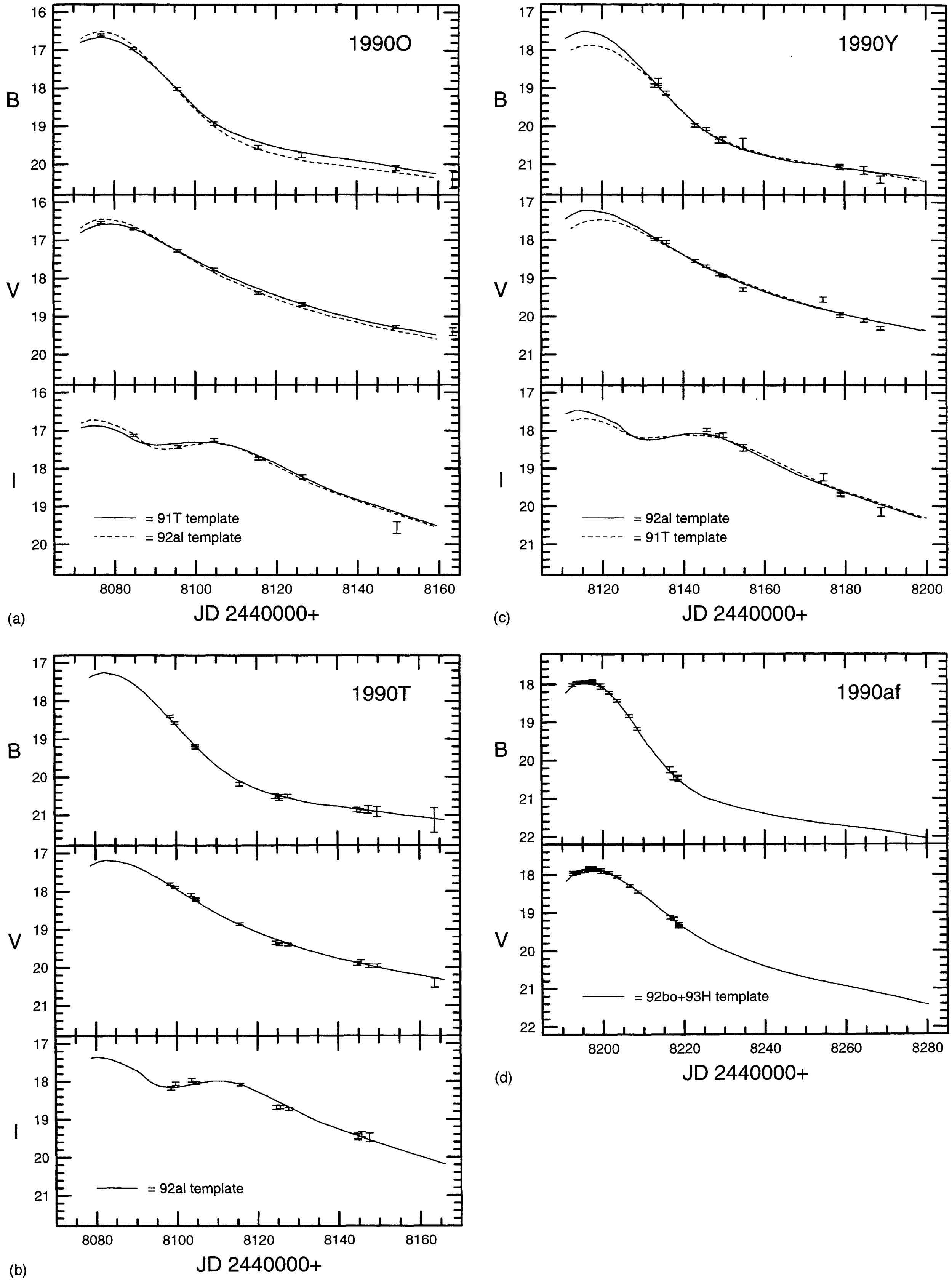

FIG. 3. B, V, and I light curves for the 29 SNe Ia. In all cases the solid lines correspond to the best-fitting template. The next-best fit is also shown as dashed lines when the difference in the reduced χ^2 between the two best fits was $\leqslant 1.5$.

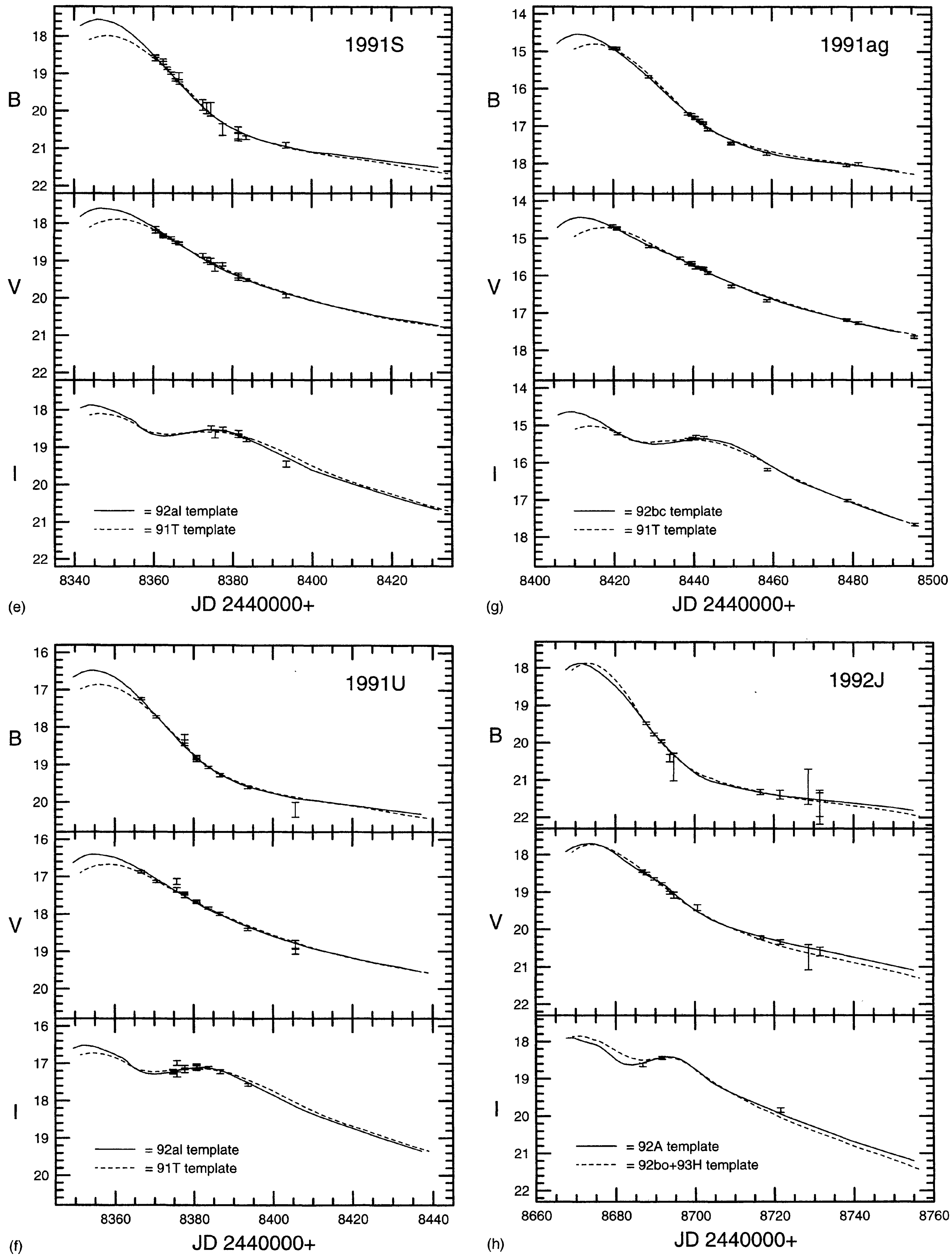

FIG. 3. (continued)

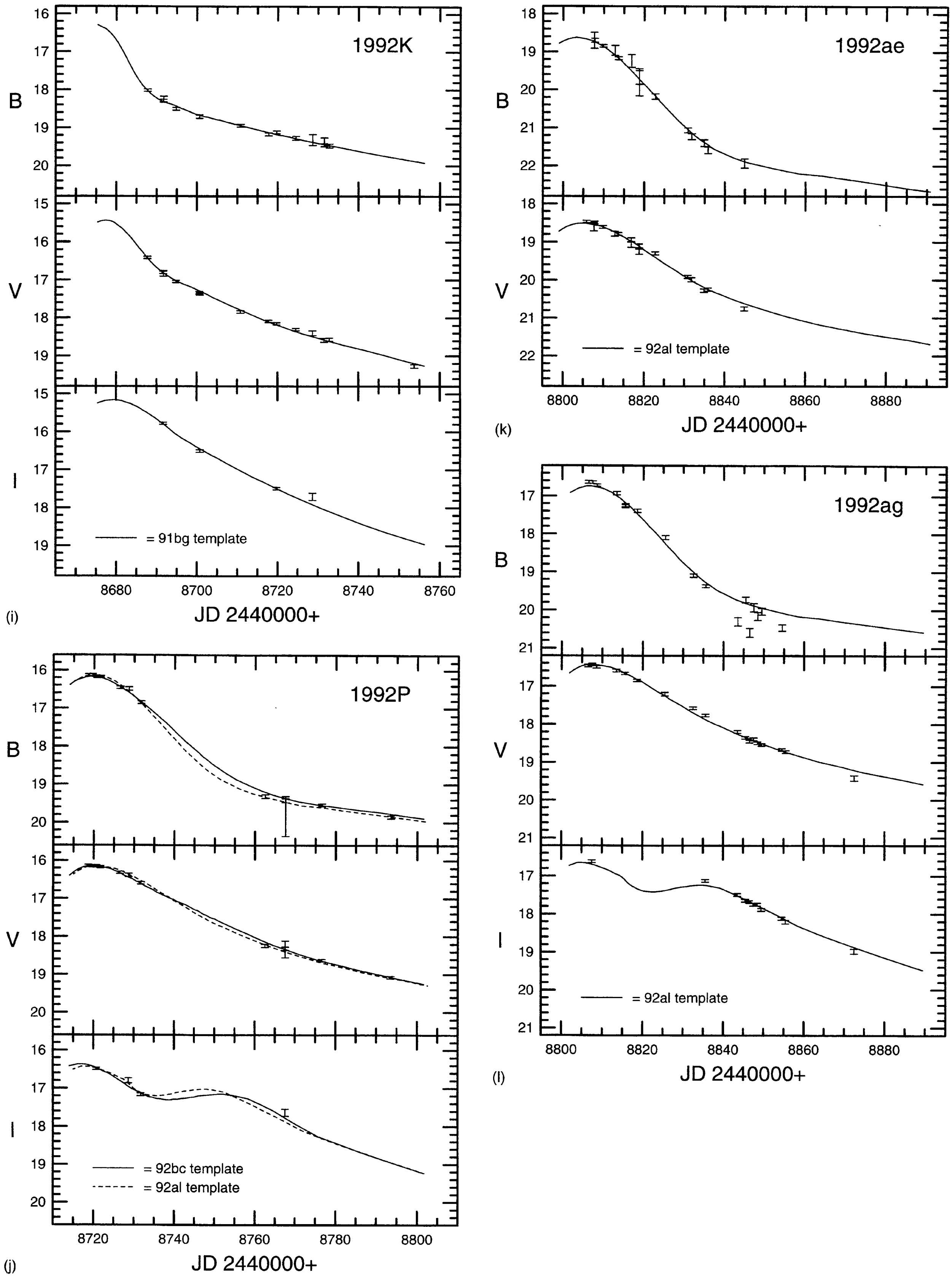

FIG. 3. (continued)

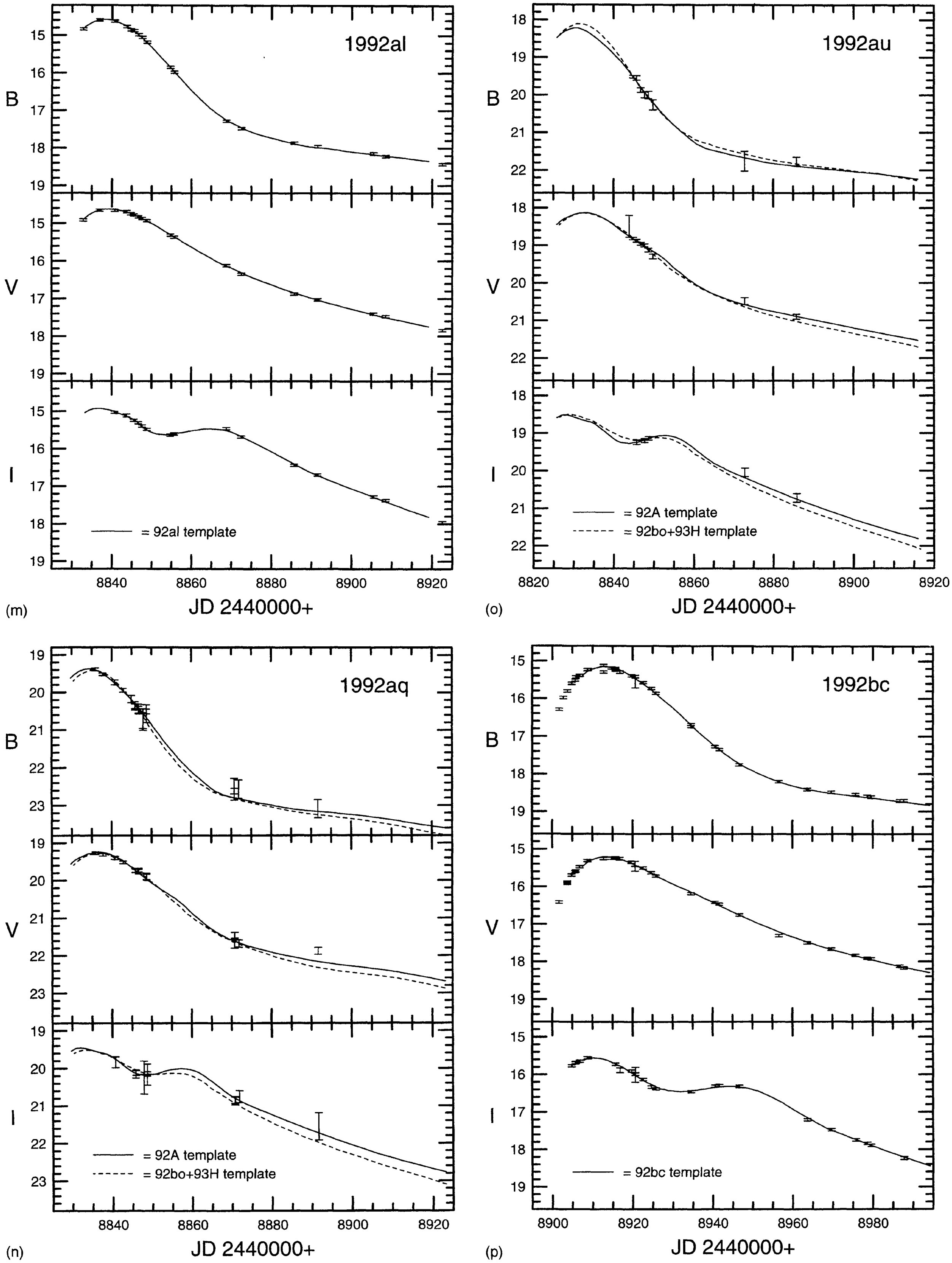

FIG. 3. (continued)

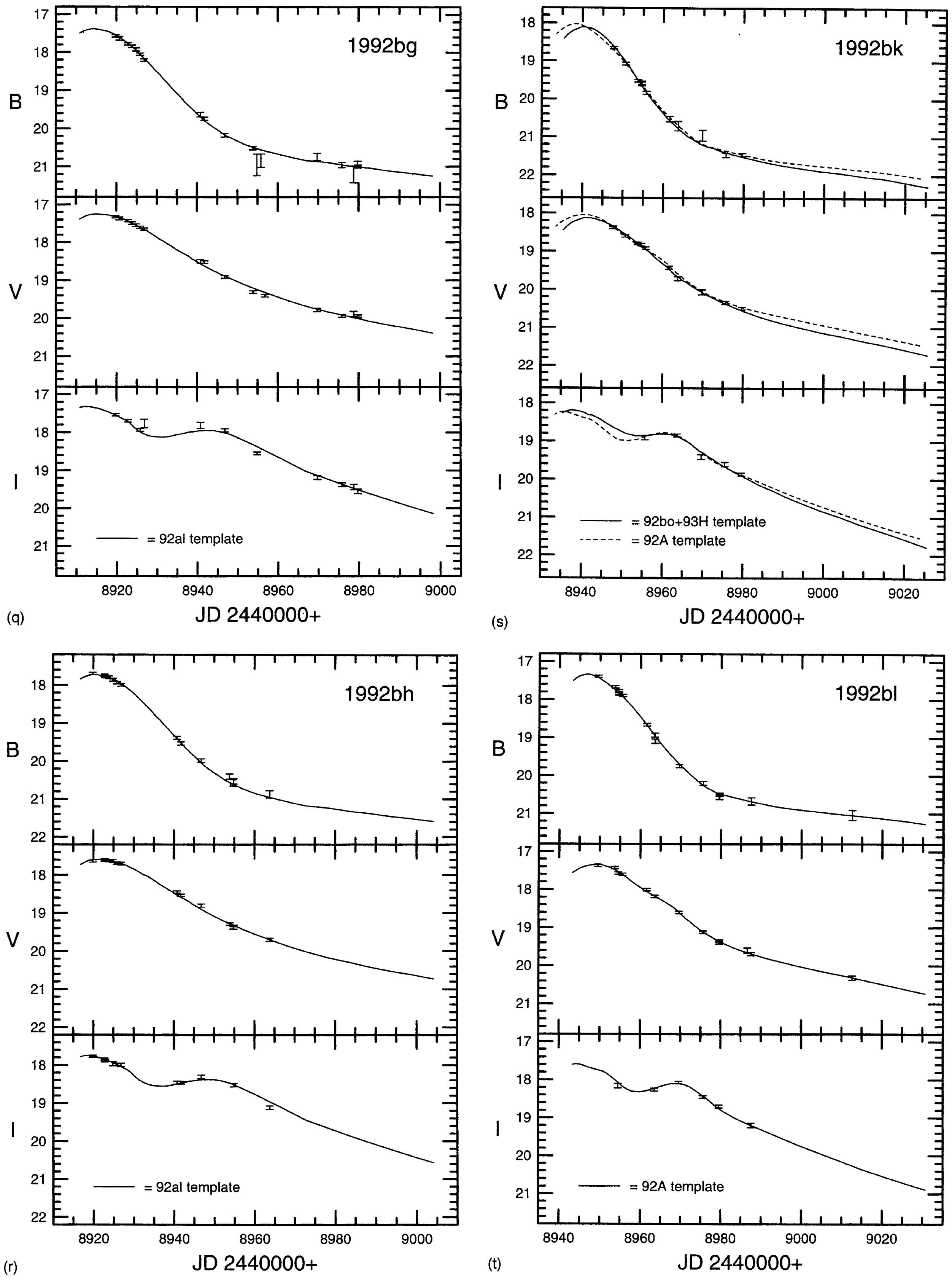

FIG. 3. (continued)

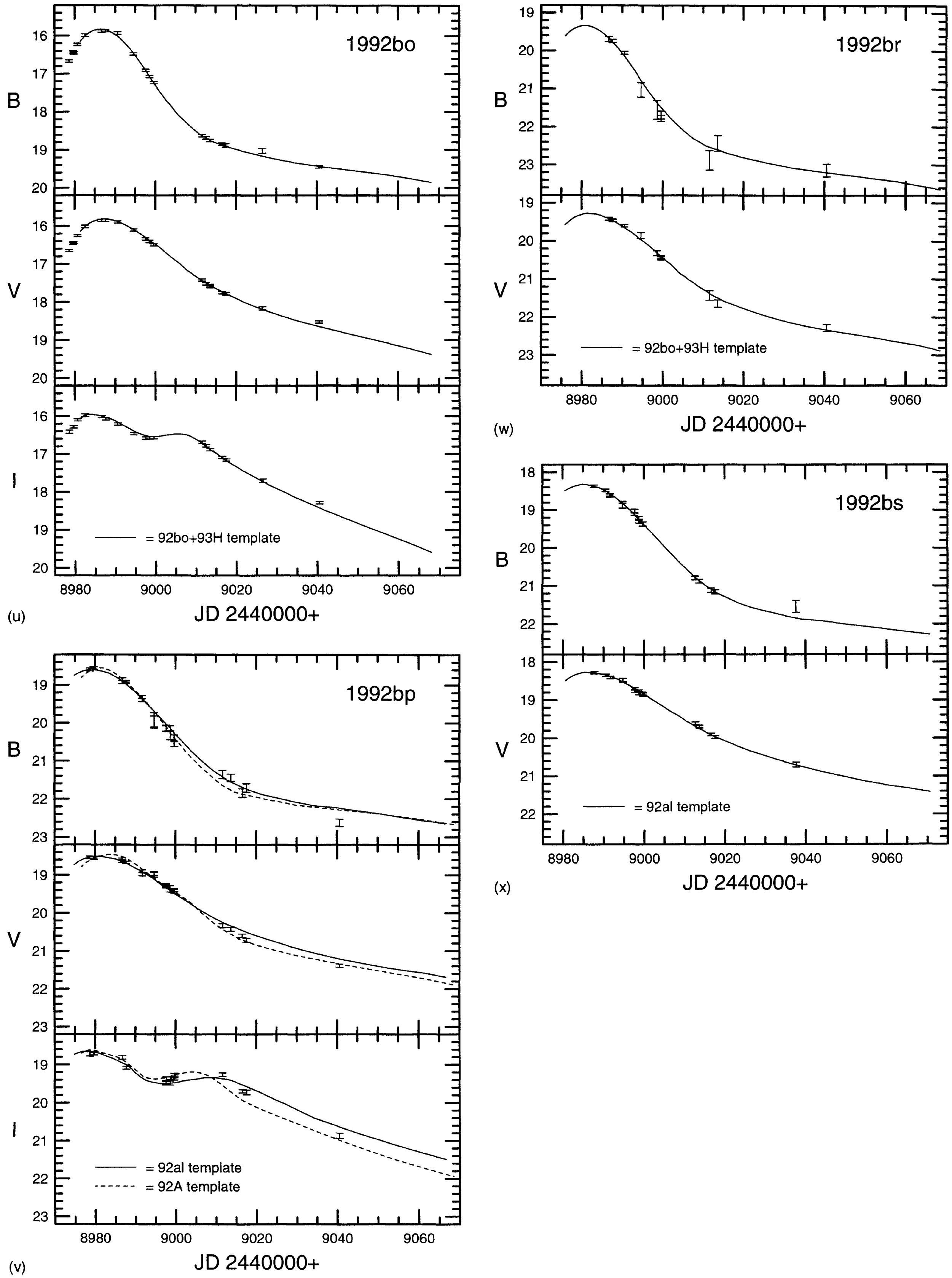

FIG. 3. (continued)

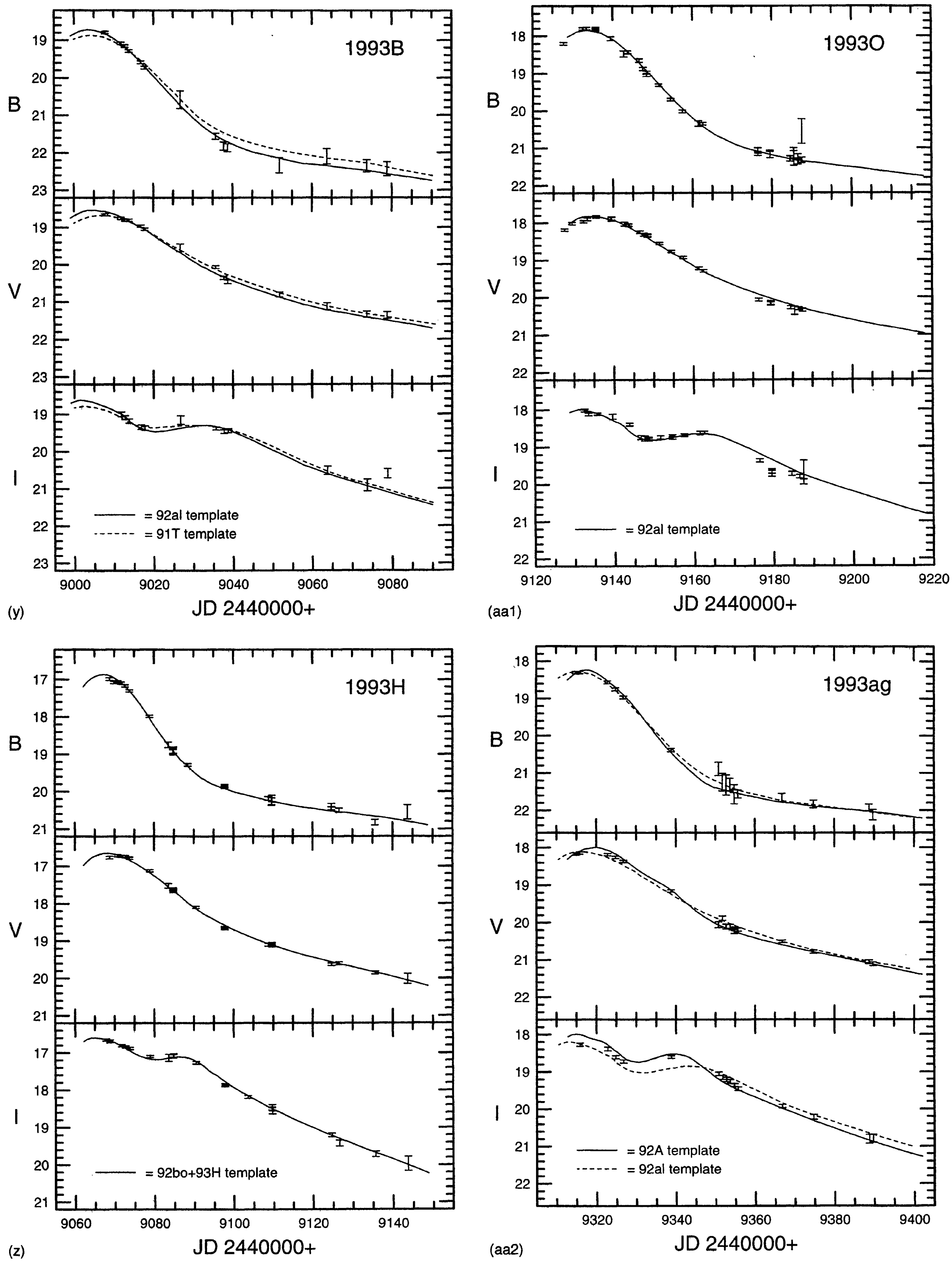

FIG. 3. (continued)

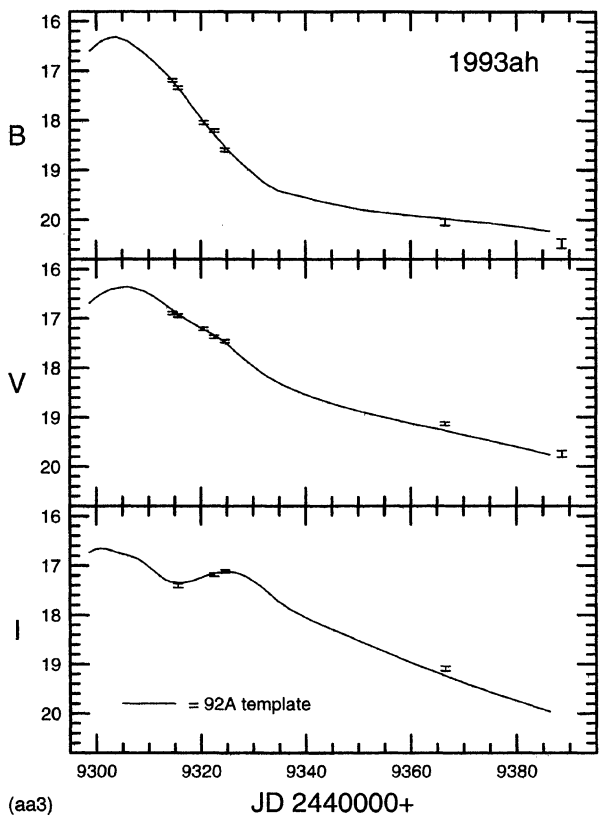

FIG. 3. (continued)

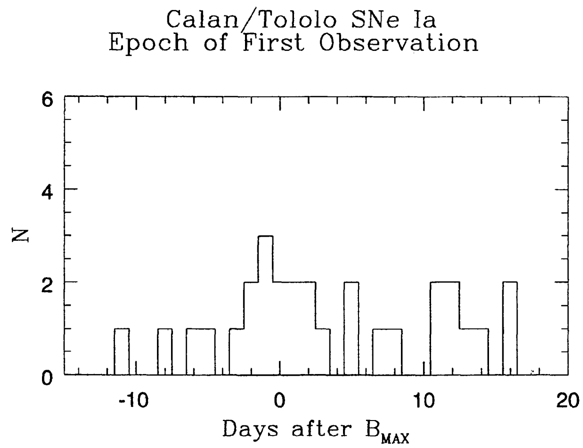

FIG. 4. Histogram showing the time with respect to B_{MAX} of the first photometric observation in B, V, or I. Note that for nearly one third of the SNe the photometric monitoring started before or at maximum light.

aging the results for the two templates. The corresponding errors were taken to be the greater of (a) half of the difference between the peak magnitude estimates of the two templates, (b) the 2σ formal errors of the χ^2 fits, or (c) 0.05^m. When the difference in the reduced χ^2 values was >1.5, the maximum-light magnitudes were taken from the single-best-fitting template, with the adopted error being the larger of the 2σ formal error of the χ^2 fit or 0.05^m. Although these rules produced reasonable error estimates in most cases, we found that the errors derived for some SNe whose first light curve observations did not begin until ~2 weeks after maximum were unrealistically low. Hence, in all cases where template fits indicated that the first photometry was not obtained until $\geqslant 10$ days after B maximum, we adopted the following error estimates: 0.2^m in B, 0.15^m in V, and 0.15^m in I.

For each of the 29 SNe in our sample, we also estimated the decline rate parameter $\Delta m_{15}(B)$ (Phillips 1993) which corresponds to the amount in magnitudes that the B light curve decreases in brightness during the first 15 days after maximum. This parameter could be measured directly for the five best-observed SNe in the sample (1990af, 1992al, 1992bc, 1992bo, and 1993O). For the remaining events, $\Delta m_{15}(B)$ was estimated by fitting a parabola to the reduced χ^2 values yielded by the six template fits (see Paper IV for further details of this procedure). Note that when the smallest value of the reduced χ^2 corresponded to either of the two extremes of the range of $\Delta m_{15}(B)$ represented by our templates (SN 1992bc with $\Delta m_{15}(B)=0.87$ and SN 1991bg with $\Delta m_{15}(B)=1.93$), we set the inferred value of $\Delta m_{15}(B)$ to the same value as the template rather than attempting to extrapolate a value.

Table 5 summarizes the resulting light curve parameters for all 29 SNe Ia. Specifically, we give the epoch of B maximum; the time with respect to B_{MAX} of the first photometric observation in B, V, or I; the decline rate parameter $\Delta m_{15}(B)$; the apparent maximum-light magnitudes in B, V, and I; and the method employed to estimate the peak magnitudes where *Data* means that the values were measured directly from the photometry, *Single Fit* indicates that the best-fitting template was used, and *Average* signifies that the results from the two best template fits were averaged. In Fig. 4 we plot a histogram of the time with respect to B_{MAX} of the first photometric observation in B, V, or I for the 29 Calán/Tololo SNe Ia.

In Table 6, we repeat the $\Delta m_{15}(B)$ values and give our final estimates of the peak magnitudes after correction for the extinction due to our own Galaxy (see Table 1) and the K term. The uncertainties in the corrected magnitudes include errors in the observed magnitude (listed in Table 5), foreground reddening (0.06^m in B, 0.045^m in V, and 0.03^m in I), as well as in the K term (assumed to be $\pm 0.02^m$). We also list the "color" of the SN, B_{MAX}-V_{MAX}. (Note that, strictly speaking, this is not a color since B_{MAX} and V_{MAX} occur at slightly different times.) The uncertainties in the color were estimated in the following manner: (a) for the 11 SNe for which the photometry started before maximum light we adopted an error of 0.03^m when the peak was very well observed (6 cases), or 0.05^m otherwise (5 cases), (b) when the coverage of the light curve started between days 1 and 10 (counted since B_{MAX}) the adopted error was the larger of half of the difference between the color estimates of the two templates or 0.05^m; if the single-best fitting template technique was used we adopted an error of 0.05^m, or (c) when the observations started after day 10 (counted since B_{MAX}) the adopted error was the larger of half of the difference between the color estimates of the two templates or 0.10^m; if the

TABLE 5. Light curve parameters.

SN	$T_{max}(B)$ 2440000+	1st Obs.	$\Delta m_{15}(B)$	B_{MAX}	V_{MAX}	I_{MAX}	Method
1990O	8076.96(43)	0	0.96(10)	16.59(08)	16.51(06)	16.80(08)	Average
1990T	8082.84(45)	+16	1.15(10)	17.27(20)	17.19(15)	17.36(15)	Single Fit
1990Y	8116.87(67)	+16	1.13(10)	17.69(20)	17.35(15)	17.57(15)	Average
1990af	8195.90(40)	−3	1.56(05)	17.91(03)	17.84(03)	⋯	Data
1991S	8348.04(118)	+13	1.04(10)	17.78(20)	17.75(15)	17.99(15)	Average
1991U	8355.60(91)	+11	1.06(10)	16.67(20)	16.54(15)	16.62(15)	Average
1991ag	8413.17(216)	+7	0.87(10)	14.67(13)	14.58(14)	14.83(19)	Average
1992J	8672.54(78)	+14	1.56(10)	17.88(20)	17.71(15)	17.88(15)	Average
1992K	8675.41(51)	+12	1.93(10)	16.30(20)	15.44(15)	15.16(15)	Single Fit
1992P	8719.68(49)	−1	0.87(10)	16.14(03)	16.15(03)	16.40(05)	Data[a]
1992ae	8804.40(102)	+1	1.28(10)	18.64(10)	18.51(06)	⋯	Single Fit
1992ag	8807.09(55)	−1	1.19(10)	16.64(05)	16.45(05)	16.50(05)	Data[b]
1992al	8838.36(40)	−5	1.11(05)	14.59(03)	14.64(03)	14.93(05)	Data[c]
1992aq	8835.58(46)	0	1.46(10)	19.39(07)	19.26(05)	19.48(08)	Average
1992au	8831.54(84)	+12	1.49(10)	18.17(20)	18.13(15)	18.51(15)	Average
1992bc	8912.62(40)	−11	0.87(05)	15.15(03)	15.23(03)	15.56(03)	Data
1992bg	8915.00(68)	+5	1.15(10)	17.39(05)	17.25(05)	17.32(05)	Single Fit
1992bh	8920.92(46)	−1	1.05(10)	17.68(05)	17.60(03)	17.75(05)	Data[c]
1992bk	8939.80(90)	+8	1.57(10)	18.07(08)	18.08(05)	18.21(05)	Average
1992bl	8947.75(43)	+2	1.51(10)	17.34(05)	17.34(05)	17.59(05)	Single Fit
1992bo	8986.44(40)	−8	1.69(05)	15.85(03)	15.84(03)	15.95(03)	Data
1992bp	8981.17(94)	−2	1.32(10)	18.53(03)	18.53(03)	18.68(05)	Data[b]
1992br	8981.32(120)	+5	1.69(10)	19.34(16)	19.27(09)	⋯	Single Fit
1992bs	8985.87(75)	+2	1.13(10)	18.33(06)	18.27(05)	⋯	Single Fit
1993B	9004.85(62)	+3	1.04(10)	18.81(09)	18.61(07)	18.71(09)	Average
1993H	9067.22(40)	+1	1.69(10)	16.99(05)	16.72(03)	16.60(05)	Data[c]
1993O	9133.98(40)	−6	1.22(05)	17.79(03)	17.84(03)	17.99(05)	Data[b]
1993ag	9316.91(116)	−2	1.32(10)	18.30(05)	18.12(03)	18.22(05)	Data[b]
1993ah	9303.87(86)	+11	1.30(10)	16.32(20)	16.36(15)	16.65(15)	Single Fit

[a]Average of two best template fits used to estimate I_{MAX}.
[b]Best-fitting template adjusted to first data point to estimate I_{MAX}.
[c]Best-fitting template used to estimate I_{MAX}.

TABLE 6. Final corrected magnitudes and colors.

SN	$\Delta m_{15}(B)$	B_{MAX}	V_{MAX}	I_{MAX}	$B_{MAX}-V_{MAX}$
1990O	0.96(10)	16.32(10)	16.31(08)	16.70(09)	0.01(05)
1990T	1.15(10)	17.16(21)	17.12(16)	17.35(15)	0.04(10)
1990Y	1.13(10)	17.70(21)	17.37(16)	17.61(15)	0.33(10)
1990af	1.56(05)	17.87(07)	17.82(06)	⋯	0.05(03)
1991S	1.04(10)	17.81(21)	17.77(16)	18.07(15)	0.04(10)
1991U	1.06(10)	16.40(21)	16.34(16)	16.52(15)	0.06(10)
1991ag	0.87(10)	14.62(14)	14.54(15)	14.86(19)	0.08(05)
1992J	1.56(10)	17.70(21)	17.58(16)	17.84(15)	0.12(10)
1992K	1.93(10)	15.83(21)	15.09(16)	14.94(15)	0.74(10)
1992P	0.87(10)	16.08(07)	16.11(06)	16.39(06)	−0.03(03)
1992ae	1.28(10)	18.62(12)	18.51(08)	⋯	0.11(05)
1992ag	1.19(10)	16.41(08)	16.28(07)	16.41(06)	0.13(05)
1992al	1.11(05)	14.60(07)	14.65(06)	14.94(06)	−0.05(03)
1992aq	1.46(10)	19.45(09)	19.35(07)	19.77(09)	0.10(05)
1992au	1.49(10)	18.21(21)	18.16(16)	18.41(15)	0.05(10)
1992bc	0.87(05)	15.16(07)	15.24(06)	15.58(05)	−0.08(03)
1992bg	1.15(10)	16.72(08)	16.76(07)	17.04(06)	−0.04(05)
1992bh	1.05(10)	17.70(08)	17.62(06)	17.80(06)	0.08(05)
1992bk	1.57(10)	18.11(10)	18.11(07)	18.31(06)	0.00(05)
1992bl	1.51(10)	17.36(08)	17.36(07)	17.64(06)	0.00(05)
1992bo	1.69(05)	15.86(07)	15.85(06)	15.97(05)	0.01(03)
1992bp	1.32(10)	18.41(07)	18.46(06)	18.78(06)	−0.05(05)
1992br	1.69(10)	19.38(17)	19.34(10)	⋯	0.04(05)
1992bs	1.13(10)	18.37(09)	18.30(07)	⋯	0.07(05)
1993B	1.04(10)	18.53(11)	18.41(09)	18.70(10)	0.12(05)
1993H	1.69(10)	16.84(08)	16.61(06)	16.55(06)	0.23(05)
1993O	1.22(05)	17.67(07)	17.76(06)	17.99(06)	−0.09(03)
1993ag	1.32(10)	17.72(08)	17.69(06)	18.01(06)	0.03(05)
1993ah	1.30(10)	16.33(21)	16.37(16)	16.68(15)	−0.04(10)

single-best fitting template technique was used we adopted an error of 0.10^m.

This paper was possible thanks to grant 92/0312 from Fondo Nacional de Ciencias y Tecnología (FONDECYT--Chile). M.H. acknowledges support provided for this work by the National Science Foundation through grant number GF-1002-96 from the Association of Universities for Research in Astronomy, Inc., under NSF Cooperative Agreement No. AST-8947990 and from Fundación Andes under project C-12984. J.M. and M.H. acknowledge support by Cátedra Presidencial de Ciencias 1996-1997.

REFERENCES

Burstein, D., & Heiles, C. 1982, AJ, 87, 1165
Hamuy, M., *et al.* 1993a, AJ, 106, 2392 (Paper I)
Hamuy, M., Phillips, M. M., Wells, L. A., & Maza, J. 1993b, PASP, 105, 787
Hamuy, M., *et al.* 1994, AJ, 108, 2226 (Paper III)
Hamuy, M., Phillips, M. M., Maza, J., Suntzeff, N. B., Schommer, R. A., & Avilés, R. 1995, AJ, 109, 1 (Paper IV)
Hamuy, M., Phillips, M. M., Schommer, R. A., Suntzeff, N. B., Maza, J., & Avilés, R. 1996a, AJ, 112, 2391 (Paper V)
Hamuy, M., Phillips, M. M., Suntzeff, N. B., Schommer, R. A., Maza, J., & Avilés, R. 1996b, AJ, 112, 2398 (Paper VI)
Hamuy, M., Phillips, M. M., Suntzeff, N. B., Schommer, R. A., Maza, J., Smith, R. C., Lira, P., & Avilés, R. 1996c, 112, 2438 (Paper VIII)
Maza, J., Hamuy, M., Phillips, M. M., Suntzeff, N. B., & Avilés, R. 1994, ApJ, 424, L107 (Paper II)
Phillips, M. M. 1993, ApJ, 413, L105