Hypothesis

Search for Sources of Systematic Error in Astrometric Measurements of the Cosmological Constant

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Search for Sources of Systematic Error in Astrometric Measurements of the Cosmological Constant

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Abstract: Among the theoretical problems with the prevailing theory of cosmology, Lambda Cold Dark Matter (**λ**CDM), the most serious appears to be the twofold problem with the cosmological constant lambda: Dark Energy and Hubble Tension. Despite a two-decade search for systematic errors in astrometry the problems have not been resolved. This paper posits a potential source of error that may have affected astrometry related to the current and past measurements of lambda.

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1. Introduction

The results of the 1998 study published by Dr. Saul Perlmutter et al **[1]**, and the 2004 study from Dr. Adam Reis et al **[2]** presented a view of Big Bang cosmology that was, and remains, unsatisfying. Though both papers presented theoretically rigorous and well reasoned arguments for a "dark energy" acceleration of the universe, their conclusions published in their respective papers rest upon data from fewer than 80 type 1a Supernova (SNe 1a).

In statistical analysis, a result is only considered reliable if the sample data is representative of the population under study. Considering the literally universal size of the stellar population, 80 is a miniscule number of samples upon which to base such an important conclusion. To do so must rest on at least two simplifying assumptions:

1. The expansion of the universe is isotropic. Thus, a sample of any size must be representative of the full population spanning the same distance and age.
2. The velocity of the local reference frame is known and effectively constant throughout the span of history covered by the observations, or any change would be too small to affect the results and may be ignored.

The recently measured **[3],** roughly 4 kilometer per second **[4–6]** discrepancy between two rigorous measurements of lambda known as "The Hubble Tension" is similarly unsatisfying.

2. Methods

These widely acknowledged theoretical problems motivated a deeper look into astrometry concerning dark energy. To address the small dataset problem, we used as many of the stars listed in the SAI Supernova Catalog **[7]** as possible. To challenge the simplifying assumptions, we segregated the SNe 1a into directional cohorts by right ascension (RA) and compared the uncorrected red shift (RS)-magnitude relations.

Measurements of Sne 1a magnitude are acknowledged to be affected by multiple independent random variables. **[8]** The comparison of cohort samples assumes that the various random variables that affect the measurements of Sne 1a magnitude apply to the entire population of observations in SAI Catalog. The population is sufficiently large that the magnitudes of cohort Sne 1a samples are candidates for a comparative statistical analysis. Applying the Central Limit Theorem **[9]**, we posit that the sampling distribution of the cohort magnitudes may be compared with function-fit mean

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trend lines of magnitude-redshift plots. This allows direct comparison of supernova magnitude/redshift values at equal and regular redshift intervals.

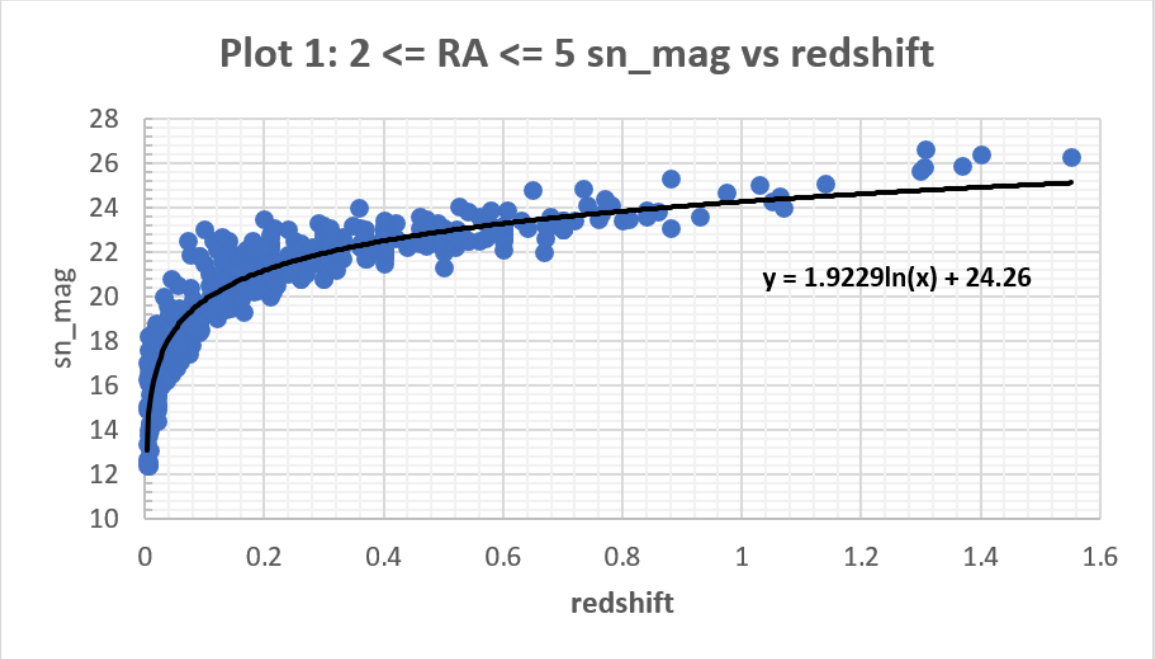
The local Earth, solar system, Milky Way **[10]** reference frame is known to be moving roughly toward the Shapley Galactic Supercluster **[11]**, and the more distant Great Attractor **[12]** with a velocity of approximately 630km/s **[13]**. We selected only confirmed SNe 1a from the catalog, then chose the RAs toward the Great Attractor (RAs 14-17), and those diametrically opposed (RAs 2-5) for the test comparison. For the control comparison we used two cohorts at right angle RAs 8-11 and 20-23. The data used to create the plots are found in the Data section.

3. Research

We plotted the redshift-magnitude relation for the RA 2-5 and RA 14-17 cohorts of the test group. The current positive velocity of the Milky Way of 630kps is additive to the distance from the low-RA cohort and subtractive to the distance from the high-RA stars. If the expansion of the universe is isotropic, and if the velocity of the Milky Way has been constant through the period under study, that would introduce a fixed offset to the redshift-magnitude (RSL) plots when compared. The plots should not converge.

However, if the Milky Way has positively accelerated on its current heading it would produce a plot with a larger difference in the RSL plots in the recent past that converges in the distant past. Conversely, a negative acceleration would produce a smaller difference in the RSL plots in the recent past.

The first pass through the data yielded similar, too-dense plots from data found here and here :



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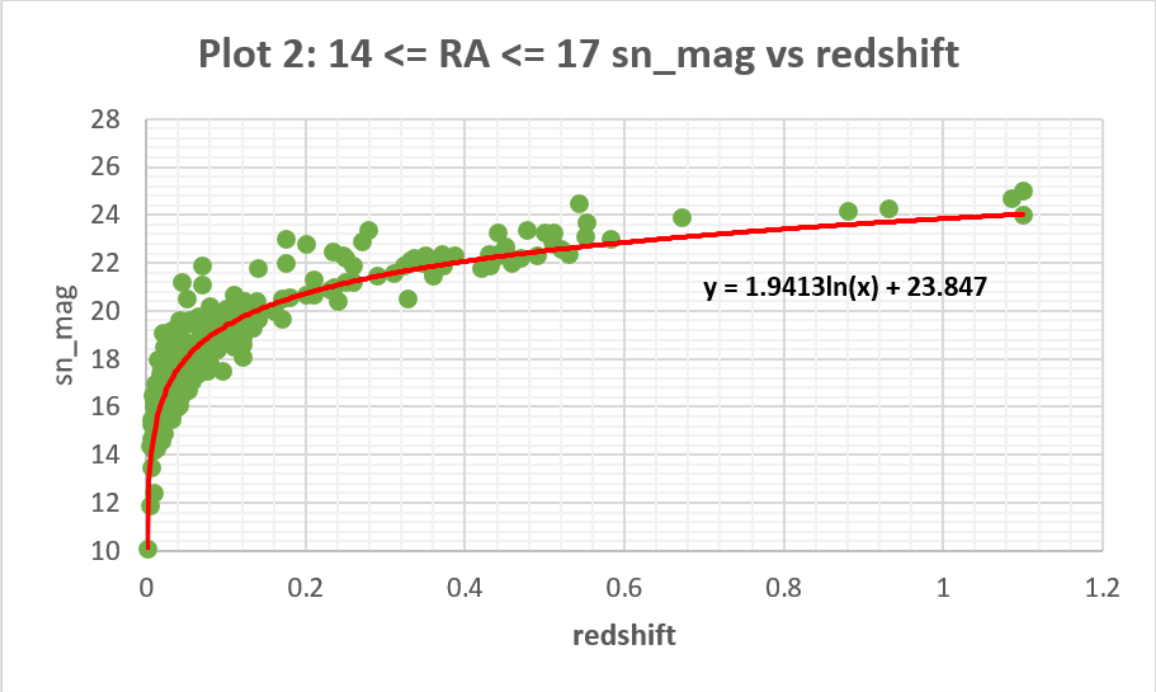

In plots 1 and 2 note that the low-RA plot trends 2 magnitudes higher (lower luminosity) than the high-RA plot at redshift (RS) near 0, but the two plots converge, possibly intersecting beyond redshift=1.6 as shown in Table 1. This pair of plots hypothetically illustrates a potentially consequential acceleration of our galaxy during the last 480 million years or more.

Table 1. Unfiltered Test Cohort Trendline Magnitudes calculated from SAI Supernova Catalog SNe 1a Measurements.

Index	14..17 sn_mag	2..5 sn_mag	diff
0.05	18.03138494	18.4995064	0.468121
0.1	19.37699156	19.8323591	0.455368
0.15	20.16412097	20.612028	0.447907
0.2	20.72259818	21.1652118	0.442614
0.25	21.15578676	21.5942946	0.438508
0.3	21.50972759	21.9448807	0.435153
0.35	21.80898031	22.241297	0.432317
0.4	22.0682048	22.4980646	0.42986
0.45	22.29685701	22.7245496	0.427693
0.5	22.50139338	22.9271473	0.425754
0.55	22.68641903	23.1104192	0.424
0.6	22.85533422	23.2777334	0.422399
0.65	23.01072112	23.4316475	0.420926
0.7	23.15458693	23.5741498	0.419563
0.75	23.28852279	23.7068161	0.418293
0.8	23.41381142	23.8309173	0.417106
0.85	23.531502	23.9474924	0.41599
0.9	23.64246363	24.0574023	0.414939
0.95	23.74742433	24.1613681	0.413944
1	23.847	24.26	0.413
1.1	24.03202565	24.4432719	0.411246
1.2	24.20094084	24.6105861	0.409645
1.3	24.35632775	24.7645002	0.408172

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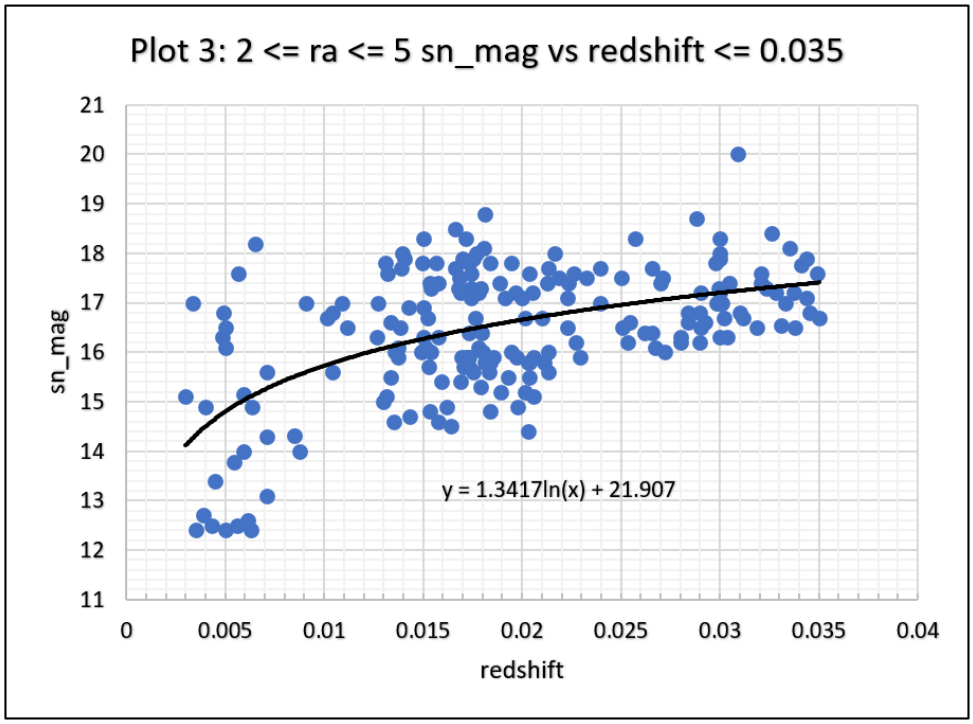
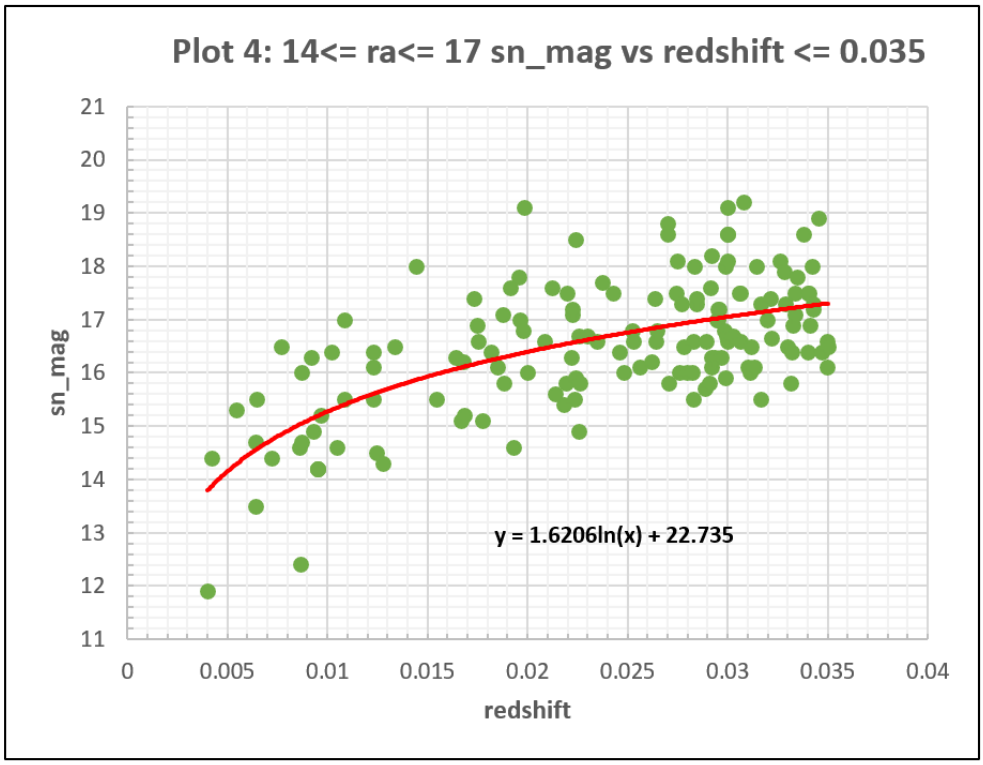
1.4	24.50019355	24.9070025	0.406809
1.5	24.63412941	25.0396689	0.405539
1.6	24.75941805	25.16377	0.404352

A sharper focus on low-redshift supernovae yielded these plots from data here and here:





Since lambda is common mode in these two plots, any difference must be due to motion of the local reference frame. We know that the Milky Way is moving away from the low-RA stars toward the high-RA stars which exaggerates the change over time by a factor of two. Since there is much more data in the low RA set, and it is difficult to line up individual stars for direct comparison, we used the mean trend lines to filter the data in both sets to the exemplars of each trend from data found here and here:

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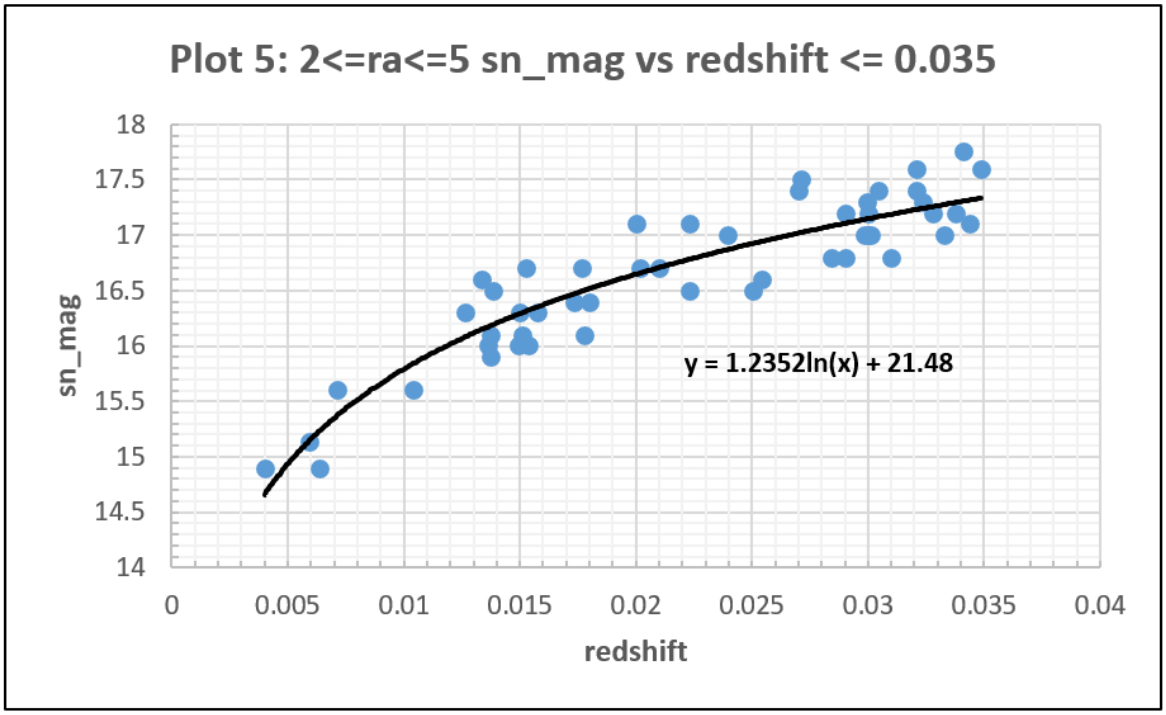

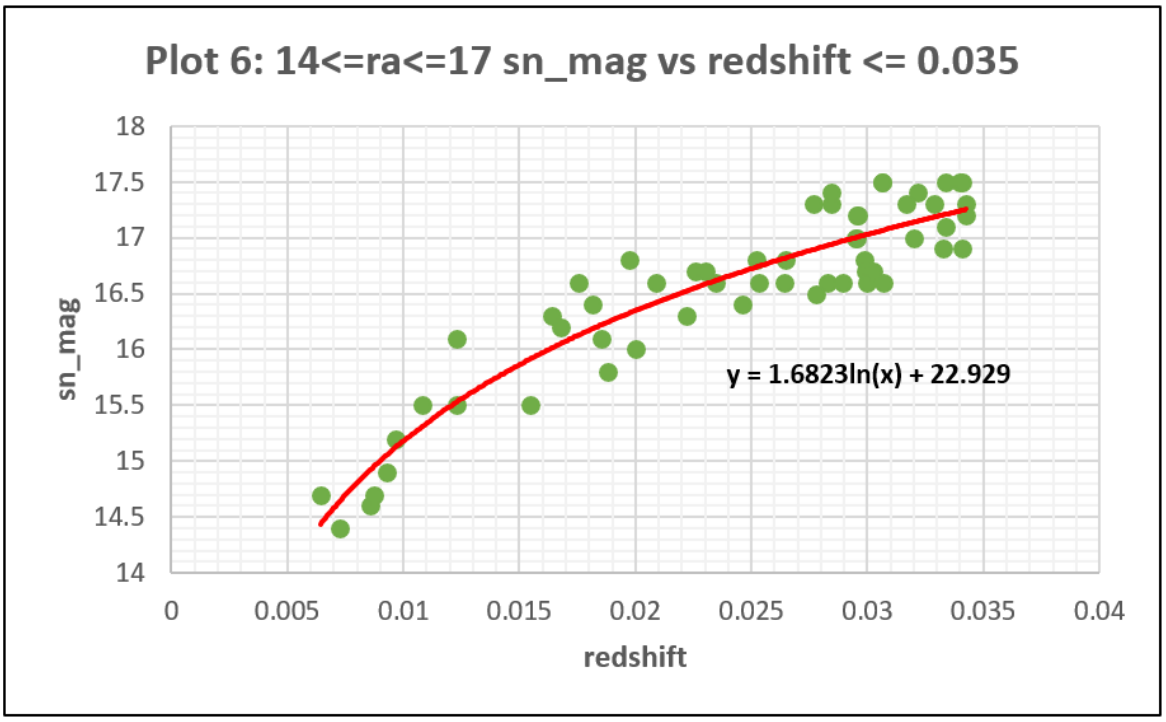

Note that though the trends appear to be quite similar, the high-RA trend begins 0.002 to the right on the X or redshift axis, yet the traces nearly converge at RS = 0.035 as shown in Table 2.

Table 2. Exemplar Trendline sn_mag vs redshift <= 0.035 calculated from SAI Supernova Catalog SNe 1a Measurements.

Index	RA 2-5 sn_mag	RA 14-1sn_mag	diff
0.005	14.93022007	14.01564069	0.914579
0.01	15.78708862	15.1817222	0.605366
0.015	16.28832458	15.86383615	0.424488
0.02	16.64395716	16.3478037	0.296153
0.025	16.91980722	16.72319809	0.196609

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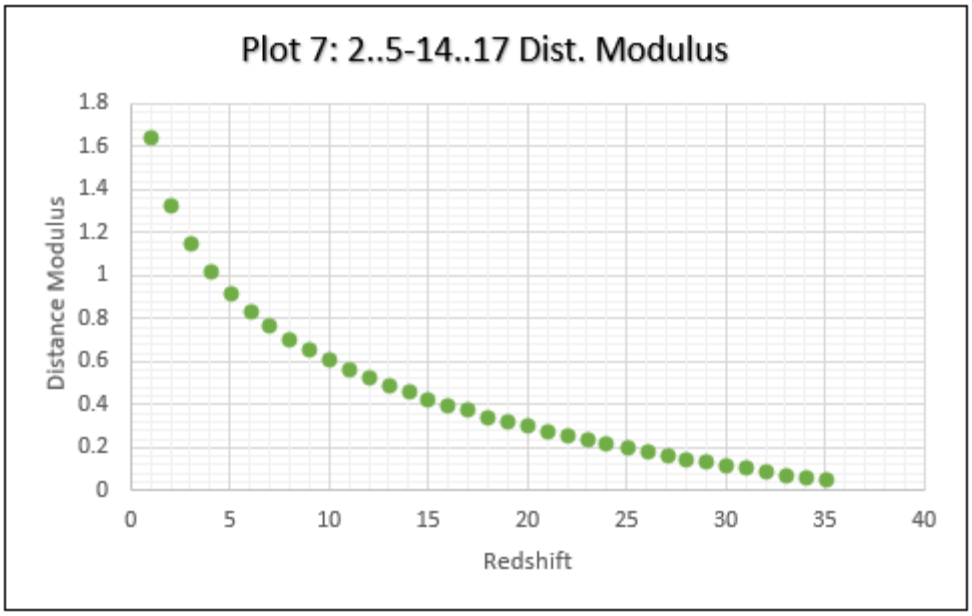
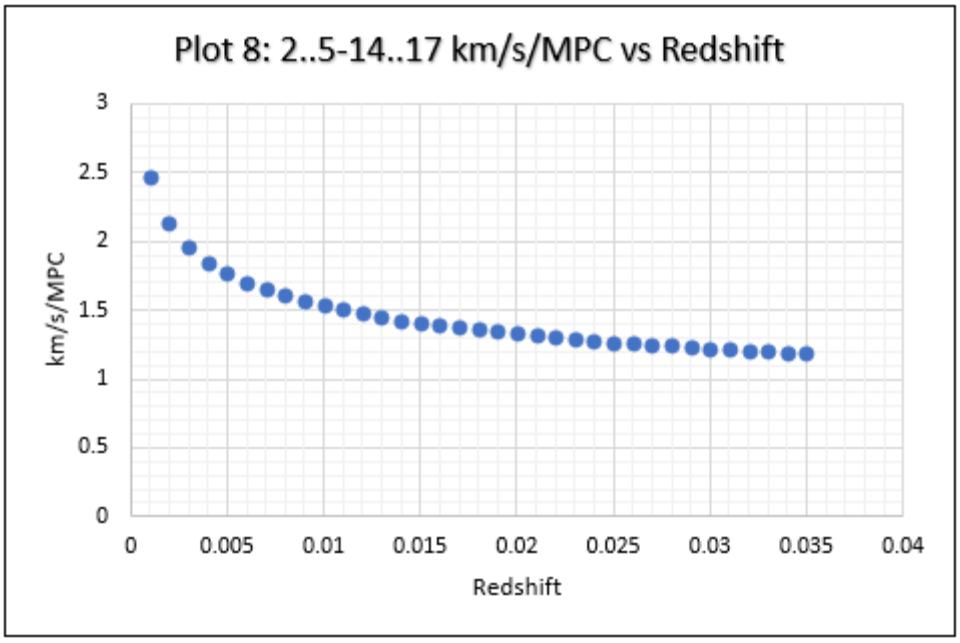
0.03	17.14519313	17.02991765	0.115275
0.035	17.3357542	17.28924534	0.046509

Stars still cannot be compared directly, but we can use the mean trend line equations to make straightforward comparisons at each redshift in the interval of interest. Each 0.001 of RS is equivalent to approximately 13.8 million years. By using the high-RA magnitude as the absolute magnitude, and the low-RA magnitude as the apparent magnitude at each 0.001 interval in the trendline equations we can obtain regular changes in distance measurements in approximately 13.8-million-year intervals over the last 480 million years with this formula:

$$d = 10^{\frac{m - M + 1}{5}}$$

Here are the plots of the distance modulus and computed acceleration from this data:





Plot 8 shows the computed change in velocity of the Milky Way on the RA 2-5, 14-17 vector during the last 480 million years. After correction for doubling of the separation distance, this plot

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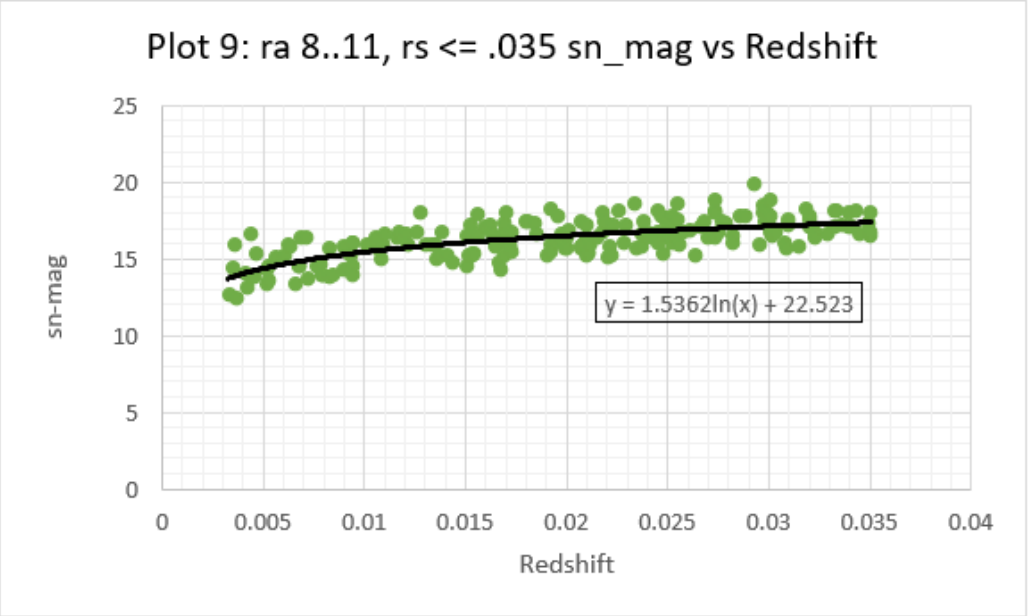
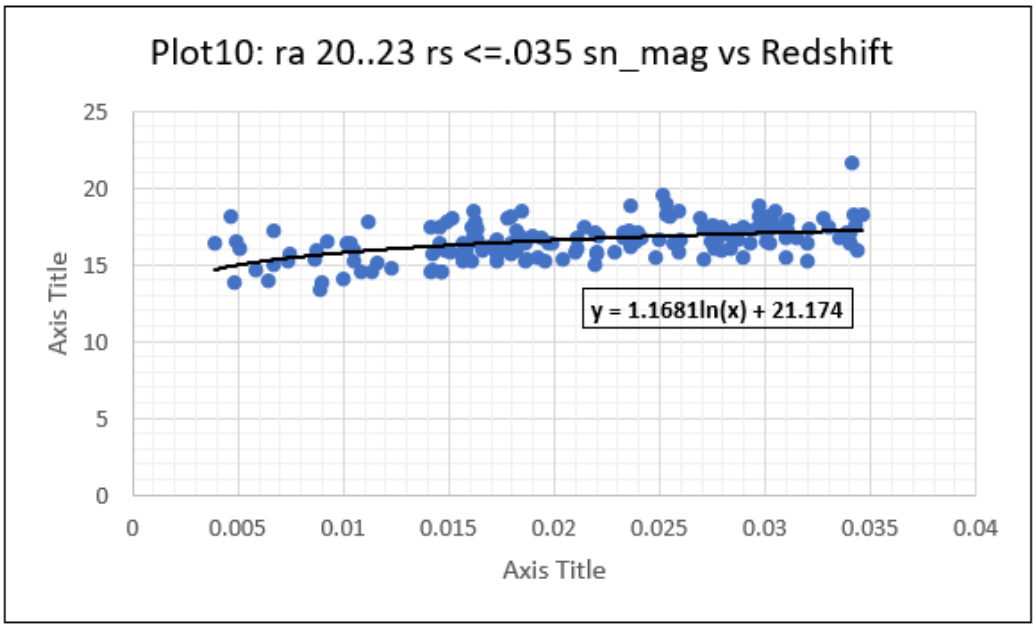
shows that over the most recent 13.8-million-year period the velocity of the Milky Way increased by an average of 2.43 km/s every 3.3 million years, and increasingly less in the past.

Plots of the control cohorts RA 8..11 and RA 20..23 are distinctly different in appearance than test plots 1 and 2 using date found here and here:





The 20..23 cohort contains no observations below redshift = 0.003, so to achieve representative plots for comparison we removed extreme outliers 2014J, 1999by, and 2011by from cohort ra8..11 cohort for the control comparison. The plots converge near redshift 0.025 as shown in Tables 3 and 4, and plot 11.

Table 3. Unfiltered Control Cohort RA<=0.035 Trendline Magnitudes calculated from SAI Supernova Catalog SNe 1a Measurements.

Index	20..23 sn_mag	8..11 sn_mag	diff
0.005	14.98503548	14.35469885	0.630337
0.01	15.79470071	15.43351312	0.361188
0.015	16.2683245	16.06457902	0.203745
0.02	16.60436593	16.51232739	0.092039

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0.025	16.86501991	16.85962802	0.005392
0.03	17.07798972	17.14339329	-0.0654
0.035	17.25805313	17.38331341	-0.12526

Plot 11 clearly displays the changes in the relative velocity of the means of the cohort samples. Note that the changes in slope of the mean trend lines differ, with the greatest differences from redshift 0.001 to 0.005. This is crucial to disambiguating apparent change in velocity due to an increase in the rate of expansion of spacetime from changes in velocity due to gravitational acceleration.

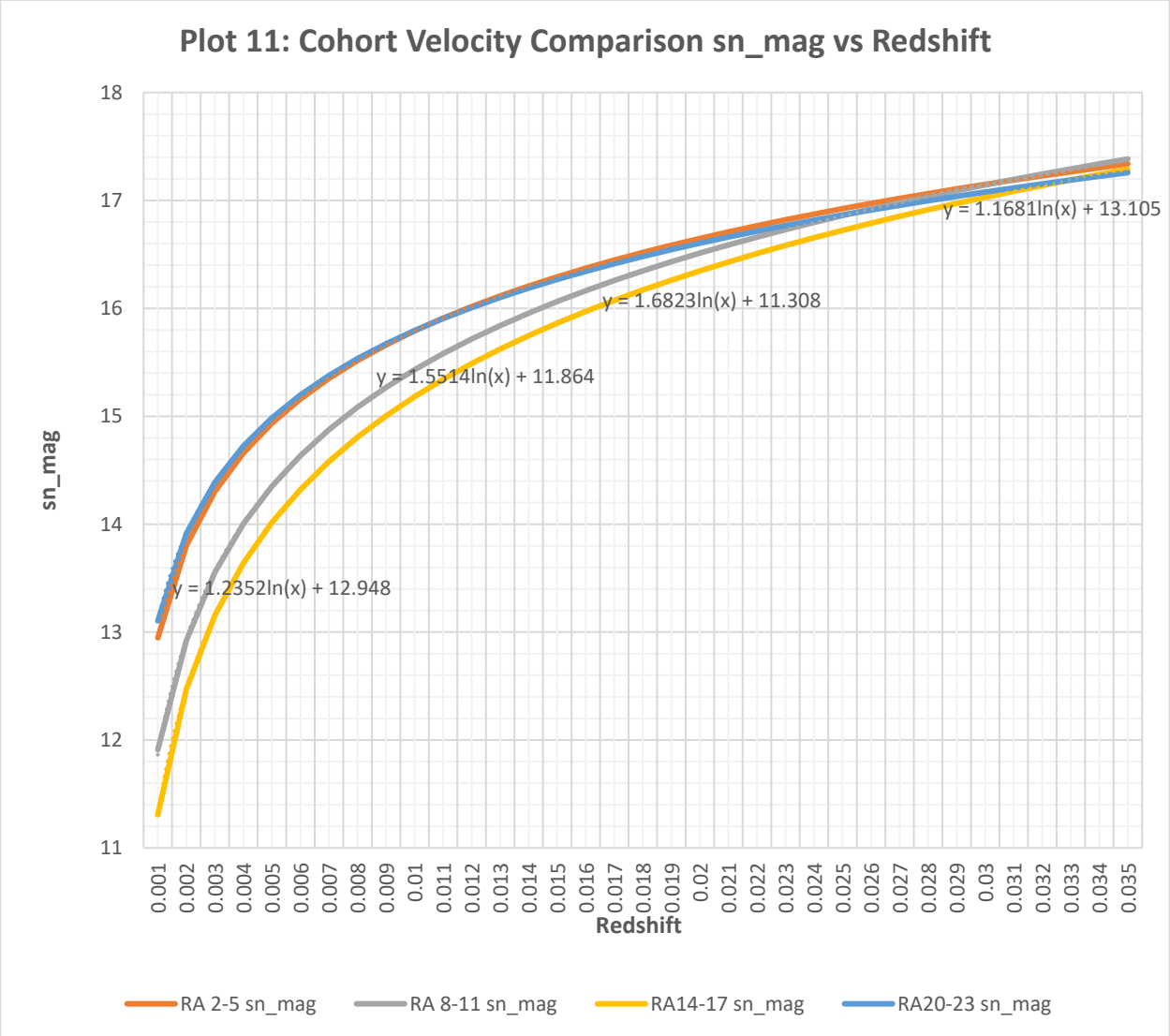

Table 4 displays the values of the changes in velocity displayed in plot 11. Note the differences in the rows of the Δv columns. Plot 11 and Table 4 were derived from the samples of SAI Supernova Catalog data found here:

Table 4. Cohort Mean Trendline Distance Modulus and Velocity Changes from Redshift 0.001 to 0.035.

Redshift	RA 2-5 Δdistmod	RA 8-11 Δdstmod	RA 14-17 Δdistmod	RA 20-23 Δdistmod	**RA 2-5 Δv kps**	**RA 8-11 Δv kps**	**RA 14-17 Δv kps**	**RA 20-23 Δv kps**
0.001	0	0	0	0	**0**	**0**	**0**	**0**
0.002	0.856175397	1.012226938	1.166081502	0.809665222	**3.431996899**	**3.687713685**	**3.958476834**	**3.359269537**

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0.003	0.500830502	0.631917371	0.682113951	0.473623793	**2.913921901**	**3.095246787**	**3.167631095**	**2.87764069**
0.004	0.355344896	0.44835251	0.48396755	0.336041429	**2.725089601**	**2.844345243**	**2.891380964**	**2.700972069**
0.005	0.275626915	0.347769225	0.375394396	0.260653982	**2.62686159**	**2.715599076**	**2.750367241**	**2.608810921**
0.006	0.225203587	0.284148146	0.306719555	0.21296981	**2.56656652**	**2.637190099**	**2.664745382**	**2.552147493**
0.007	0.19040692	0.240243835	0.259327689	0.180063409	**2.525766456**	**2.58440501**	**2.607217995**	**2.513763924**
0.008	0.164937976	0.208108675	0.224639862	0.15597802	**2.496315093**	**2.546440555**	**2.565900313**	**2.486035988**
0.009	0.145485606	0.183564861	0.198146401	0.137582364	**2.474052598**	**2.517820583**	**2.534784761**	**2.465064459**
0.01	0.130141309	0.164204364	0.177247995	0.123071618	**2.456631799**	**2.495471878**	**2.510506825**	**2.448646717**
0.011	0.117727134	0.148540915	0.160340315	0.111331821	**2.442627454**	**2.477536095**	**2.491035234**	**2.435444132**
0.012	0.107476453	0.135607231	0.14637924	0.101637989	**2.431123928**	**2.462823299**	**2.475070963**	**2.424596116**
0.013	0.098868753	0.12474656	0.134655847	0.093497887	**2.421506046**	**2.450536182**	**2.461744502**	**2.415524155**
0.014	0.091538167	0.115497275	0.124671842	0.086565522	**2.413345166**	**2.440120436**	**2.450451863**	**2.407824958**
0.015	0.085219995	0.10752539	0.116066708	0.080590573	**2.40633344**	**2.431178718**	**2.440760402**	**2.401208776**
0.016	0.079717981	0.100583285	0.108573154	0.075387447	**2.40024406**	**2.423418754**	**2.432352077**	**2.395462059**
0.017	0.074883533	0.094483473	0.101988801	0.070815621	**2.394906231**	**2.41662076**	**2.424987853**	**2.39042395**
0.018	0.070602073	0.089081388	0.0961576	0.066766743	**2.390188882**	**2.410616278**	**2.418484605**	**2.385970973**
0.019	0.066783832	0.084263764	0.090957286	0.063155921	**2.38598975**	**2.405274019**	**2.412699669**	**2.38200677**
0.02	0.063357477	0.079940599	0.086290709	0.059915697	**2.382227878**	**2.400490144**	**2.407520252**	**2.378455042**
0.021	0.060265611	0.076039471	0.082079693	0.056991791	**2.37883834**	**2.396181448**	**2.402856006**	**2.375254587**
0.022	0.057461523	0.072501444	0.078260622	0.05434003	**2.375768457**	**2.392280478**	**2.398633704**	**2.372355742**
0.023	0.054906817	0.069278072	0.0747812	0.051924104	**2.372975043**	**2.388731968**	**2.394793371**	**2.369717786**
0.024	0.052569636	0.066329159	0.071598039	0.049713886	**2.370422356**	**2.385490213**	**2.391285416**	**2.367307012**
0.025	0.050423328	0.063621078	0.068674841	0.047684172	**2.368080561**	**2.382517081**	**2.388068475**	**2.365095282**
0.026	0.048445425	0.061125481	0.065981006	0.045813715	**2.365924558**	**2.379780511**	**2.385107777**	**2.36305892**
0.027	0.046616853	0.058818301	0.063490554	0.044084477	**2.363933079**	**2.377253347**	**2.382373875**	**2.361177862**
0.028	0.044921314	0.056678973	0.061181288	0.042481045	**2.362087983**	**2.374912438**	**2.379841672**	**2.359434994**
0.029	0.043344798	0.054689822	0.059034127	0.040990171	**2.3603737**	**2.372737924**	**2.377489638**	**2.357815625**
0.03	0.041875197	0.052835568	0.05703258	0.039600403	**2.358776795**	**2.370712671**	**2.375299205**	**2.356307078**
0.031	0.040501989	0.051102939	0.055162319	0.038301792	**2.35728561**	**2.368821821**	**2.373254271**	**2.354898352**
0.032	0.039215992	0.049480346	0.053410835	0.037085655	**2.355889984**	**2.367052424**	**2.371340804**	**2.353579855**
0.033	0.038009153	0.04795763	0.051767161	0.035944374	**2.354581014**	**2.365393142**	**2.369546521**	**2.352343189**
0.034	0.03687438	0.046525843	0.05022164	0.034871246	**2.353350874**	**2.363834005**	**2.367860623**	**2.351180962**
0.035	0.035805406	0.045177076	0.048765733	0.033860342	**2.352192649**	**2.362366213**	**2.366273576**	**2.350086651**

4. Discussion

Our search of papers concerning dark energy and the Hubble tension provided no evidence that astrometric measurements of them did not implicitly assume that the local reference frame is inertial. While a purely statistical analysis that treats SNe 1a observations as a random population could not disprove that assumption, we believe that it does support a hypothesis to that effect.

If the sampled cohort data is taken at face value then the local reference frame is currently accelerating at nearly 2.5kps/MPC on the RA 2-5, 14-17, vector. This could it be consequential to the dark energy results if the data used in the Perlmutter and Reis papers contains a selection bias in favor of SNe 1a with RAs in the range 2..5. In fact, that is the case in the results from Perlmutter et al [1] and Reis et al [2]. Of the 60 SNe 1a in tables 1 & 2 in Perlmutter, 14 have right ascensions in the range 2..5, only 1 in the range 14..17. Of the 16 SNe 1a in Reis Table 1, fully half are in range 2..5, and none are from 14..17. Hypothetically, data from RA range 2..5 used in isolation under an assumption that the local reference frame is inertial would clearly present as an increase in lambda. As only a substantial fraction of the data in the Perlmutter, and Reis studies, they would bias the results more subtly.

If the changes in velocity as shown in Plot 11 and Table 4 were due to a change in the isotropic increase of the cosmological constant, then the velocity changes between the same redshift values in

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Table 4, and the curves in the cohort means in Plot 11 should be nearly identical. As they differ, one or more of the following must be true:

1. The rate of expansion of spacetime is not isotropic and/or
2. the nearby stars in the cohort sample are not inertial and/or
3. the local reference frame is not inertial.

However, this investigation is a relatively unsophisticated statistical analysis of raw, uncorrected SAI SNe 1a measurements. Though there is plenty of data, it is of unknown quality. The finding of recent acceleration could be due to noise in the data. Despite this, an acceleration of the local reference frame coupled with a very small data set and selection bias is a simpler explanation for the finding of acceleration of the expansion of spacetime than dark energy. We believe that acceleration of the local reference frame is the simplest explanation for the finding of a relatively recent increase in lambda and is sufficiently credible to merit further investigation.

5. Data

All data below is directly from or adapted from the SAI Supernova Catalog.

Plot 1 Data from The SAI Supernova Catalog

sn_name	redshift	sn_mag	sn_type	sn_ra	sn_dec
2006rv	0.11	19.5	Ia	02 00 00.71	56 15.0
2004fz	0.017308	15.9	Ia	02 01 06.41	52 44.2
1998dj	0.013602	16	Ia	02 01 06.92	- 6 49 04.8
2006nl	0.19	21.8	Ia	02 01 44.71	- 1 01 56.7
2004dt	0.019707	15.9	Ia	02 02 12.77	- 0 05 51.5
2011gk	0.044077	18	Ia	02 02 19.02	39 39.6
2007jw	0.136953	21.6	Ia	02 02 32.74	- 1 05 21.0
2006nw	0.16	21.3	Ia	02 02 55.95	- 0 32 01.9
2005gt	0.279997	22	Ia:	02 04 03.84	- 0 21 57.0
2006tg	0.52	22.2	Ia	02 04 14.17	- 4 40 18.7
2006ef	0.017894	15.3	Ia	02 04 19.51	- 8 43 42.2
2007uq	0.4	23	Ia	02 04 21.31	- 3 54 10.9
2007td	0.3	23	Ia	02 04 26.90	- 3 44 18.9
2004ha	0.499999	23	Ia	02 04 27.00	- 4 52 46.0
2008er	0.016648	18.5	Ia	02 04 36.27	56 10.4
2002jr	0.4	22.7	Ia	02 04 41.03	- 5 09 40.7
2005fs	0.329998	21.7	Ia	02 04 52.97	- 0 19 35.2
2004hz	0.142998	20.1	Ia	02 05 03.00	0 50 11.9
2007mn	0.076999	21.9	Ia	02 05 03.96	0 10 28.4
2003R	0.668	22	Ia	02 05 11.27	- 4 42 30.0
2007tv	0.3	23	Ia	02 05 13.33	- 5 01 42.5
2007tw	0.6	23	Ia	02 05 32.97	- 5 02 46.6
2006tn	0.67	23.2	Ia	02 05 36.03	- 5 08 46.3
2003Q	0.21	20	Ia	02 05 47.55	- 4 52 48.0
2007ni	0.21	21.8	Ia	02 05 50.39	- 0 19 54.7
2006mi	0.7	23.4	Ia	02 05 55.04	- 4 00 53.2
2012U	0.019772	14.9	Ia	02 06 04.33	-55 11 37.5
2007tm	0.5	23	Ia	02 06 04.74	- 3 32 29.3
2007uh	0.6	23	Ia	02 06 05.20	- 4 01 37.5
2007tg	0.5	23	Ia	02 06 10.51	- 4 42 23.2
2004ee	0.020509	17.2	Ia	02 06 14.62	-37 20 05.4
2006sn	0.4	23	Ia	02 06 18.25	- 4 51 33.1

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2004hh	0.199998	21.4	Ia	02 06 25.01	- 4 38 04.0
2007hx	0.08	19.5	Ia	02 06 27.08	- 0 53 58.3
2006sb	0.3	20.8	Ia	02 06 30.31	- 4 05 30.6
2007uf	0.5	23	Ia	02 06 30.88	- 4 09 55.0
2006sq	0.2	23.5	Ia	02 07 11.63	- 3 57 10.9
2007ul	0.6	23	Ia	02 07 16.54	- 4 42 23.2
2006ia	0.174964	21	Ia	02 07 19.18	1 15 07.5
2007ub	0.5	23	Ia	02 07 24.14	- 3 51 55.2
2002jc	0.499999	23.1	Ia	02 07 27.28	- 3 50 20.7
2012hq	0.09	18.4	Ia	02 07 30.50	06 19.3
2006to	0.68	23.2	Ia	02 07 34.39	- 4 00 04.2
2007pt	0.18	20.5	Ia	02 07 38.51	- 0 19 26.4
2006od	0.17	22.1	Ia	02 07 54.31	- 0 32 07.4
2003ji	0.199998	20.9	Ia	02 07 54.84	- 3 28 28.4
2004hb	0.699997	23.4	Ia	02 08 09.70	- 4 41 51.8
2006sf	0.6	22.5	Ia	02 08 11.65	- 3 51 40.2
2006lw	0.2	21.5	Ia	02 08 33.67	- 3 57 12.9
2004hi	0.399996	22.4	Ia	02 08 38.82	- 5 08 11.7
2007ur	0.3	23	Ia	02 08 41.59	- 3 34 10.6
2004hd	0.499999	22.5	Ia	02 08 48.21	- 4 26 10.4
2006mj	0.7	23.1	Ia	02 09 03.04	- 3 28 27.8
2006sh	0.3	23.2	Ia	02 09 11.06	- 3 44 42.0
2006tp	0.72	23.4	Ia	02 09 14.04	- 4 37 12.2
2003kn	0.199998	21.3	Ia	02 09 15.55	- 3 35 41.4
2009le	0.017791	16.1	Ia	02 09 17.14	-23 24 44.8
2003em	0.017791	17.2	Ia	02 09 20.23	-23 24 53.0
2007te	0.4	23	Ia	02 09 29.40	- 3 35 35.0
2007qd	0.04313	20.8	IaPec	02 09 33.56	- 1 00 02.2
2004hs	0.399996	23.1	Ia	02 09 33.69	- 4 13 04.0
2004hp	0.499999	22	Ia	02 09 35.52	- 3 46 23.5
2007ug	0.7	23	Ia	02 09 36.85	- 4 51 52.2
2003kv	0.8	23.4	Ia	02 09 42.52	- 3 46 48.6
2005jp	0.209998	21.2	Ia	02 09 50.39	- 0 03 42.3
2006si	0.5	22.6	Ia	02 09 51.33	- 3 43 32.5
2000ea	0.42	23.3	Ia	02 09 54.02	- 5 28 17.8
2007up	0.6	23	Ia	02 09 56.07	- 4 28 57.4
2001ds	0.036435	16.2	Ia:	02 10 08.73	42 20.3
2007ti	0.5	23	Ia	02 10 09.84	- 4 39 49.3
2006sc	0.4	21.8	Ia	02 10 10.23	- 4 44 12.5
2007uc	0.6	23	Ia	02 10 15.53	- 4 04 06.5
2006ts	0.56	22.5	Ia	02 10 18.69	- 3 32 26.3
2003lh	0.499999	22.7	Ia	02 10 19.51	- 4 59 32.3
2006sj	0.7	23	Ia	02 10 22.42	- 3 33 09.3
2000eb	0.68	23.6	Ia	02 10 25.75	- 5 25 33.7
2006sk	0.3	21.6	Ia	02 10 33.80	- 4 04 03.9
2006tt	0.63	23.4	Ia	02 10 47.93	- 4 24 56.9
2003jy	0.3	22.7	Ia	02 10 53.98	- 4 25 49.8
2007th	0.5	23	Ia	02 10 57.57	- 5 00 24.9
2007tj	0.3	23	Ia	02 11 04.61	- 4 11 50.0
2003ko	0.4	21.7	Ia	02 11 06.48	- 3 47 56.1

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2006kp	0.29	23.3	Ia:	02 11 11.66	0 41 45.0
2003lk	0.4	22.8	Ia	02 11 12.82	- 4 13 52.1
2006na	0.32	22	Ia	02 11 19.07	- 0 59 53.7
2000ec	0.469998	22.7	Ia	02 11 32.03	- 4 13 56.1
2007je	0.16	21.2	Ia	02 11 47.31	- 0 54 44.8
1996bj	0.570001	22.6	Ia	02 11 49.53	1 24 51.0
2001ec	0.045361	17.8	Ia	02 12 00.43	32 43.8
2009fu	0.017066	15.7	Ia	02 12 09.10	33 55.1
1996bf	0.249999	21.5	Ia	02 12 15.39	1 27 48.9
2005ml	0.12	19	Ia	02 14 04.42	- 0 14 21.1
2013et	0.057159	17.4	Ia	02 14 17.04	7 35 12.1
2006kw	0.19	21.2	Ia	02 14 57.98	0 36 09.0
2006ot	0.052939	17.4	Ia	02 15 04.84	-20 45 58.2
2007sc	0.27	22.1	Ia	02 15 11.87	0 32 09.3
2009ns	0.05	16.9	Ia	02 15 37.60	- 3 25 41.0
2004ih	0.153999	20	Ia	02 15 54.31	1 04 09.9
2006ri	0.09	19.6	Ia	02 15 57.44	-21 54 19.4
2002km	0.605999	23.9	Ia	02 16 23.93	- 4 49 29.4
2007pn	0.31	22.5	Ia:	02 16 33.90	- 0 43 20.5
2006lq	0.32	22.2	Ia	02 16 35.88	- 0 09 18.5
2002kn	1.03	25	Ia	02 16 45.71	- 5 09 51.2
2002ko	0.569997	23.4	Ia	02 17 00.05	- 4 58 19.6
2005ey	0.129999	19.5	Ia	02 17 05.50	0 16 49.0
2005jd	0.319998	21.6	Ia	02 17 06.20	0 32 05.4
2002kr	1.063	24.5	Ia	02 17 34.51	- 4 53 46.6
2004ia	0.143721	19.5	Ia	02 18 02.30	- 0 33 32.4
2010kq	0.026596	16.4	Ia	02 18 10.92	05 42.4
2005ge	0.189998	21.2	Ia:	02 18 14.72	0 47 47.6
2002hu	0.03	16.3	Ia	02 18 20.06	27 58.8
2006ka	0.25	21.9	Ia	02 18 26.68	0 13 36.0
2000dx	0.030345	16.3	Ia	02 18 26.88	5 39 02.0
2005dm	0.016838	17.5	IaPec	02 18 39.25	- 6 54 10.8
2011hk	0.017554	15.6	IaPec	02 18 45.79	- 6 38 30.6
2007J	0.016788	17.3	IbPec:	02 18 51.70	43 43.3
2005ie	0.279997	21.5	Ia	02 19 02.54	- 0 16 22.2
2007ps	0.25	21.8	Ia	02 19 13.53	- 0 23 05.4
2002iv	0.199998	20.9	Ia	02 19 16.11	- 7 44 06.7
2010be	0.183	20.2	Ia	02 19 46.55	- 3 12 10.5
2002ju	0.3	21.6	Ia	02 20 11.00	- 9 04 37.5
2002js	0.4	22.9	Ia	02 20 35.39	- 9 34 43.9
2006km	0.3	22	Ia	02 20 37.93	0 20 54.2
2007pe	0.3	21.8	Ia	02 21 04.01	0 29 47.1
2006sy	0.21	22.6	Ia	02 21 05.20	0 49 42.2
2009kv	0.32	21.2	Ia	02 21 06.60	- 5 01 23.8
2009kx	0.23	21	Ia	02 21 13.75	- 3 54 35.8
2007rl	0.33	22.5	Ia	02 21 33.07	- 0 22 29.7
2007rm	0.3	22.7	Ia	02 21 45.09	0 51 52.1
2013A	0.033805	16.5	Ia	02 22 04.27	13 57.7
2006ra	0.13	19.8	Ia	02 22 24.92	5 22 01.3
2009kz	0.27	21	Ia	02 22 40.07	- 4 01 38.3

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2013fb	0.016939	15.9	Ia	02 22 42.07	16 01.0
2006ce	0.005026	12.4	Ia	02 22 54.63	-21 14 29.4
2007jr	0.09	18.8	Ia	02 22 57.28	1 01 32.7
2011H	0.021331	15.6	Ia	02 23 06.02	02 32.4
2006jw	0.25	22.5	Ia:	02 23 22.30	0 49 08.4
2010L	0.07	18.5	Ia	02 23 28.78	5 35 30.6
2007ou	0.113228	22.5	Ia	02 23 42.69	- 0 49 33.6
2012ie	0.048	18	Ia	02 24 22.35	51 03.2
2005ky	0.147999	21	Ia	02 24 36.25	- 4 10 54.9
2011ik	0.033758	17.2	Ia	02 25 04.09	12 51.9
2001kh	0.219998	21	Ia	02 25 15.56	- 5 23 20.0
2006rr	0.13	19.7	Ia	02 25 28.59	7 17 02.5
2008hs	0.017413	17.3	Ia	02 25 29.62	50 35.1
2007ng	0.4	23.2	Ia	02 25 38.10	0 42 34.5
2006em	0.018866	17.4	IaPec	02 25 44.30	56 31.8
2011ek	0.005031	16.1	Ia	02 25 48.89	31 59.8
2002eh	0.017974	16.4	Ia	02 26 08.45	54 45.2
2007E	0.022962	15.9	Ia	02 26 34.41	-15 50 36.5
2001il	0.208	20.4	Ia	02 26 41.35	- 0 57 31.7
2006nb	0.21	22.8	Ia	02 26 53.40	- 0 19 40.1
2010gy	0.06	18.4	Ia	02 27 12.04	- 4 32 04.9
2002gr	0.089998	21.8	Ia	02 27 13.22	0 53 57.8
2006pt	0.3	22.1	Ia	02 27 16.17	- 0 23 36.5
2000ee	0.469998	22.6	Ia	02 27 34.53	1 11 49.4
2003gs	0.004478	13.4	IaPec	02 27 38.36	- 1 09 35.4
2005eu	0.034897	17.6	Ia	02 27 43.26	10 36.6
2008id	0.26	20.8	Ia	02 27 46.80	- 4 34 47.1
2003li	0.499999	22.8	Ia	02 27 47.29	- 7 33 46.2
2001ga	0.129999	19.5	Ia	02 27 51.76	0 37 20.9
2007us	0.6	23	Ia	02 27 54.87	- 8 00 55.2
1999fh	0.359999	22.4	Ia	02 27 58.33	0 39 36.8
2004hm	0.199998	21.5	Ia	02 28 03.11	- 7 42 29.7
1999fi	0.779999	24.1	Ia	02 28 11.67	0 43 39.3
1999fj	0.81	23.5	Ia	02 28 23.72	0 39 09.6
2007ok	0.17	21.3	Ia	02 28 24.27	0 11 04.8
2009kt	0.27	21.5	Ia	02 28 28.37	- 4 04 44.1
2003jl	0.4	22.4	Ia	02 28 28.56	- 8 08 44.7
2006tr	0.58	23.2	Ia	02 28 29.54	- 7 53 28.5
2007jt	0.14	20.4	Ia	02 28 32.78	- 1 02 31.6
2007tx	0.7	23	Ia	02 28 33.31	- 8 35 25.7
2007ty	0.5	23	Ia	02 28 34.38	- 8 23 49.5
2004fr	0.199998	22.2	Ia	02 28 43.77	- 8 54 24.0
2003jm	0.499999	22.9	Ia	02 28 50.93	- 9 09 58.1
1999fk	1.05	24.3	Ia	02 28 53.88	1 16 24.2
2001if	0.037637	17.2	Ia	02 28 54.93	05 52.7
2001jh	0.880609	23.1	Ia	02 29 00.29	0 20 44.2
2000ga	0.140714	20	Ia	02 29 03.73	- 8 24 13.7
2003jn	0.299997	20.8	Ia	02 29 21.21	- 9 02 15.6
2007tq	0.1	23	Ia	02 29 23.34	- 7 52 27.7
2004hj	0.399996	21.5	Ia	02 29 41.93	- 8 43 49.4

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2007to	0.6	23	Ia	02 29 42.06	- 9 02 05.2
2004he	0.599998	23	Ia	02 29 48.79	- 8 20 45.9
2003js	0.4	22	Ia	02 29 52.15	- 8 32 28.1
2006tu	0.44	22.2	Ia	02 29 56.54	- 7 59 50.8
2002jw	0.4	22.8	Ia	02 30 00.52	- 8 36 22.4
2007tz	0.5	23	Ia	02 30 07.15	- 8 43 09.3
2003km	0.3	21.8	Ia	02 30 09.00	- 9 04 35.9
2007uw	0.4	23	Ia	02 30 09.80	- 7 40 49.1
2006lx	0.3	22.3	Ia	02 30 10.38	- 8 06 54.0
2007ud	0.6	23	Ia	02 30 13.15	- 9 15 39.5
2006mk	0.3	22.4	Ia	02 30 16.91	- 8 40 47.3
2004hq	0.699997	23.1	Ia	02 30 18.04	- 8 22 25.0
2000eg	0.54	22.5	Ia	02 30 21.05	1 03 48.5
2007ut	0.4	23	Ia	02 30 23.64	- 9 12 20.0
2007tp	0.5	23	Ia	02 30 23.94	- 9 13 39.9
2007tk	0.3	23	Ia	02 30 24.61	- 8 17 54.4
1999fm	0.93	23.6	Ia	02 30 35.62	1 09 43.3
2006mf	0.2	20.9	Ia	02 30 37.32	- 7 57 04.4
2002iy	0.499999	21.3	Ia	02 30 40.00	- 8 11 40.5
2005A	0.019138	17.1	Ia	02 30 43.25	- 2 56 19.8
2012fk	0.035	16.7	Ia	02 30 52.04	28 45.9
2006mb	0.3	21.6	Ia	02 30 54.30	- 8 57 42.1
2006mv	0.17	21.9	Ia	02 30 55.46	0 56 46.7
2003kp	0.600001	22.1	Ia	02 31 02.64	- 8 39 50.8
2003kq	0.600001	22.6	Ia	02 31 04.09	- 8 10 56.6
2005ev	0.0154	16	Ia	02 31 04.93	42 06.5
2003jw	0.3	22.6	Ia	02 31 06.84	- 8 45 36.5
2004fs	0.499999	22.6	Ia	02 31 19.95	- 8 49 21.7
2002iz	0.399996	22.1	Ia	02 31 20.73	- 8 36 13.1
2003kr	0.399996	22	Ia	02 31 20.96	- 8 36 14.2
2003ks	0.499999	22.2	Ia	02 31 34.54	- 8 36 46.4
2006mg	0.4	21.9	Ia	02 31 37.75	- 8 06 40.2
1999gp	0.026744	16.1	Ia	02 31 39.15	22 52.3
2002gx	0.079998	19	Ia	02 31 44.69	16 39.5
2003jt	0.4	22	Ia	02 31 54.60	- 8 35 48.4
2004hf	0.399996	22	Ia	02 32 00.14	- 8 42 23.8
2009hn	0.021855	17.5	Ia	02 32 00.31	1 14 53.5
2006mc	0.4	22.3	Ia	02 32 02.61	- 9 07 21.2
2006sl	0.4	22.3	Ia	02 32 15.95	- 8 48 34.3
2006pa	0.25	22	Ia:	02 32 23.95	- 0 42 48.9
2010A	0.020334	15.8	Ia	02 32 39.46	0 37 10.2
1999es	0.069998	18.5	Ia	02 32 43.40	27 08.0
2007uj	0.3	23	Ia	02 33 19.03	- 8 32 30.2
2012E	0.020384	15.5	Ia	02 33 22.81	9 35 05.9
2012hm	0.036248	17.8	Ia	02 33 23.32	40 16.9
2006sm	0.6	22.6	Ia	02 33 29.49	- 8 30 11.9
2004ft	0.499999	22.4	Ia	02 33 32.63	- 8 09 34.1
2007ir	0.035304	17.4	Ia	02 33 41.90	40 08.2
2003kt	0.600001	22.8	Ia	02 33 47.01	- 8 36 22.1
2006so	0.1	21.5	Ia	02 33 49.16	- 8 59 15.8

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2005gv	0.359999	22.2	Ia	02 33 54.13	0 16 50.6
1999ff	0.460001	23.1	Ia	02 33 54.39	0 32 55.6
2002fi	0.057164	18.3	Ia	02 33 54.40	-21 02 29.4
1999dq	0.014329	14.7	IaPec	02 33 59.68	58 30.4
2008fk	0.072	18.4	Ia	02 34 05.06	1 23 42.5
1997dp	0.01496	17.8	Ia	02 34 06.48	56 13.4
2008J	0.015941	15.4	IInPec	02 34 24.20	-10 50 38.5
2002jf	0.078997	17.8	Ia	02 34 35.43	17 25.4
2006ly	0.3	21.9	Ia	02 34 42.38	- 8 30 39.9
2004hg	0.599998	22.7	Ia	02 34 55.19	- 8 30 43.6
2007ui	0.4	23	Ia	02 34 57.12	- 8 04 00.2
2005je	0.093939	19	Ia:	02 35 26.62	1 04 29.6
2006tv	0.76	23.5	Ia	02 35 34.23	- 8 34 22.0
2003ll	0.600001	23.2	Ia	02 35 41.19	- 8 06 29.6
2006hs	0.259999	22.4	Ia	02 36 04.86	- 0 59 39.0
2007ns	0.37	22.5	Ia	02 37 02.97	- 0 51 59.8
2007hf	0.051432	18.6	Ia	02 37 28.26	-23 32 04.7
2001eu	0.135093	19.4	Ia	02 37 58.80	- 1 01 40.1
2009ig	0.008773	14	Ia	02 38 11.61	- 1 18 45.1
2006lr	0.26	21.9	Ia	02 38 52.96	0 05 24.3
1994am	0.372	21.7	Ia	02 40 02.06	- 1 37 14.9
1994H	0.373998	21.9	Ia	02 40 04.73	- 1 34 06.6
1999eo	0.079998	19.6	Ia	02 40 13.20	4 54 53.3
2002gt	0.369999	21.7	Ia	02 40 29.78	- 0 22 46.0
2006nh	0.37	23	Ia	02 40 50.57	0 39 31.6
2005hi	0.074998	18.9	Ia	02 41 00.24	42 38.2
2007no	0.135	20.5	Ia	02 41 05.70	- 3 38 14.1
2007ov	0.32	22.3	Ia	02 41 08.76	0 08 40.0
2005lq	0.369999	22.3	Ia	02 41 36.04	0 12 18.1
2013ae	0.028	16.2	Ia	02 41 53.16	23 58.8
2005ft	0.159997	20.5	Ia	02 42 04.98	- 0 32 26.9
2006hh	0.239999	21.9	Ia	02 42 26.97	- 0 47 38.9
2007qq	0.24	23	Ia	02 42 30.21	- 0 58 16.1
2012hh	0.031185	16.7	Ia	02 42 39.56	31 54.6
2004fd	0.017323	15.7	Ia	02 43 15.25	25 25.6
2007kl	0.26	21.9	Ia	02 44 50.90	0 21 53.4
2005mh	0.39	22.4	Ia:	02 44 56.68	0 12 12.9
2009I	0.026177	16.4	Ia	02 45 10.40	- 4 42 49.4
2002go	0.235999	21.3	Ia	02 45 43.16	- 0 37 44.7
1995ak	0.02272	16.2	Ia	02 45 48.83	3 13 50.1
2006fj	0.189998	20.3	Ia	02 47 08.67	0 46 30.5
2007so	0.02983	17	Ia	02 47 43.13	15 14.8
2006gx	0.179997	21.2	Ia	02 48 14.08	- 0 20 49.3
2007km	0.25	21.1	Ia	02 48 20.07	- 0 17 17.3
2010kj	0.064	18	Ia	02 48 37.15	7 24 10.8
2011iq	0.015	18.3	Ia	02 48 49.60	- 8 04 30.0
2003hm	0.013915	17.7	Ia	02 48 58.39	3 10 07.6
2010he	0.028412	16.8	Ia	02 49 10.80	-14 26 59.8
2013I	0.035214	17.8	Ia	02 49 42.17	0 45 35.7
2003iv	0.034372	17.1	Ia	02 50 07.25	50 46.5

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2012gz	0.03	17.2	Ia	02 50 17.61	24 39.9
2007nh	0.27	21.8	Ia	02 50 27.69	- 0 33 04.2
2005fu	0.199998	20.6	Ia	02 50 32.09	0 48 28.1
2005jt	0.359999	23.1	Ia	02 50 40.16	- 0 03 57.5
2007he	0.12	19.8	Ia	02 51 40.17	-12 39 31.5
2008ey	0.018084	18.1	Ia	02 51 42.39	49 51.5
2007nj	0.15	21.9	Ia	02 52 27.45	0 15 06.6
2007qr	0.136027	20.5	Ia	02 52 29.23	- 1 08 22.3
2000dp	0.034523	16.8	Ia	02 52 44.41	-14 31 54.7
2006nt	0.28	22	Ia	02 53 58.91	0 59 13.1
2010lp	0.01014	16.7	IaPec	02 54 03.50	2 57 43.4
2005ls	0.021136	15.8	Ia	02 54 15.97	43 29.8
2006os	0.03281	17.2	Ia	02 55 01.01	00 34.8
2007jk	0.18	21.9	Ia	02 55 05.64	- 0 08 50.8
2006pz	0.33	22.7	Ia	02 55 08.24	0 14 05.2
2012fx	0.017652	16.7	IaPec	02 55 41.24	-27 25 26.7
2004go	0.02903	16.5	Ia	02 55 41.76	-14 14 14.5
2012fl	0.086	19.2	Ia	02 56 04.38	0 56 01.0
2006nk	0.2	21.7	Ia	02 56 16.61	- 0 24 38.8
2009mm	0.17	20.6	Ia	02 56 23.61	40 31.6
2005et	0.034377	17.9	Ia	02 56 30.53	56 12.8
1994ah	0.021664	18	Ia	02 56 37.75	-33 54 43.6
2011hh	0.015	16.9	Ia	02 57 04.61	47 43.3
1996bb	0.56	23.6	Ia:	02 57 06.06	- 2 42 17.4
2008ih	0.072	18.58	Ia	02 57 26.41	58 07.6
1995ao	0.240166	21.5	Ia	02 57 30.70	- 1 41 19.8
2011id	0.0631	18	Ia	02 57 40.49	-51 02 28.1
2009iv	0.0226	17.6	Ia	02 58 14.19	5 58 19.3
2009hp	0.021016	16.7	Ia	02 58 23.96	6 35 35.1
2012I	0.029	16.2	Ia	02 58 27.83	6 11 25.3
1998fc	0.107	20.5	Ia	02 59 12.61	3 29 39.0
2007jd	0.072633	22.5	Ia	02 59 53.37	1 09 38.6
2011el	0.048	17.6	Ia	03 00 18.20	5 49 24.9
2003kd	0.030187	16.7	Ia	03 00 45.80	27 13.0
2001dw	0.02544	16.6	Ia	03 00 47.88	46 27.5
2003ls	0.0434	16.5	Ia	03 01 00.39	-10 53 04.5
2006qa	0.4	23	Ia	03 01 09.73	- 0 01 34.5
2005gj	0.059998	17.2	IaPec	03 01 11.95	- 0 33 13.9
2005fb	0.159997	20.6	Ia	03 01 17.54	- 0 38 38.6
2005do	0.030471	17.4	Ia	03 02 00.42	34 34.2
1993ab	0.013931	18	Ia:	03 02 01.45	34 53.5
2013hk	0.017135	15.9	Ia	03 02 10.85	55 38.8
2008fu	0.052406	17.4	Ia	03 02 28.50	-24 27 21.5
1999fc	0.649999	24.8	Ia	03 02 30.41	0 10 14.0
2009km	0.018346	15.6	Ia	03 02 59.01	-14 49 01.9
1999fd	0.879998	25.3	Ia:	03 03 17.49	0 03 06.6
2014dd	0.023244	17.5	Ia	03 03 36.18	56 52.0
2013fe	0.02032	14.4	Ia	03 03 53.27	-39 24 20.3
2008R	0.013512	14.6	Ia	03 03 53.72	-11 59 39.3
2003hv	0.005619	12.5	Ia	03 04 09.32	-26 05 07.5

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2005ij	0.109999	20.1	Ia	03 04 21.26	- 1 03 46.6
2010ly	0.04	17.9	Ia	03 05 03.56	-19 40 38.8
1992bc	0.020163	15.2	Ia	03 05 17.28	-39 33 39.7
2005fv	0.118411	19.8	Ia	03 05 22.43	0 51 30.1
2003V	0.044997	18.2	Ia	03 05 43.05	- 1 24 12.8
1994al	0.42	22.6	Ia	03 06 22.45	18 33.7
2007mg	0.16	21.1	Ia	03 06 33.83	0 47 35.9
2006np	0.107344	21	Ia	03 06 39.48	0 03 50.5
2007nt	0.21	22.1	Ia	03 06 43.80	- 0 45 14.5
2004il	0.107207	19.5	Ia	03 07 02.69	- 0 00 40.1
2005ez	0.129999	20.3	Ia:	03 07 10.97	1 07 10.3
1997ee	0.166114	20.5	Ia	03 07 24.82	- 3 10 26.7
2006tc	0.21	22.3	Ia	03 08 01.96	0 56 36.4
2000fs	0.02884	18.7	Ia	03 08 26.24	4 06 39.9
2014de	0.05	17.2	Ia	03 08 31.86	25 30.2
2006qw	0.03	17.9	Ia	03 08 46.88	56 26.0
2005eq	0.029026	17.2	IaPec	03 08 49.31	- 7 01 59.7
2001kl	0.126202	20.4	Ia	03 08 51.44	- 1 10 24.1
2007hd	0.09	18.9	Ia	03 08 56.43	-11 16 22.6
2009bt	0.014263	16.9	Ia	03 08 56.99	33 35.1
2009aq	0.031	16.8	Ia	03 09 19.79	05 05.3
2013gv	0.03412	17.76	Ia	03 09 57.30	12 48.3
2008gy	0.029	16.8	Ia	03 10 00.95	13 23.1
2007pp	0.26	22.2	Ia	03 11 01.16	0 21 24.3
2007qs	0.29	21.5	Ia	03 11 46.03	0 05 30.9
2007nu	0.28	21.8	Ia	03 11 50.18	- 0 41 32.7
1996bc	0.460001	22.5	Ia	03 12 06.58	0 38 17.1
2011ag	0.032343	17.3	Ia	03 12 26.55	15 06.4
1995ap	0.300207	21.5	Ia	03 12 28.13	0 41 43.4
1996au	0.519999	22.5	Ia	03 12 47.79	0 45 11.9
2006hw	0.139996	22.5	Ia	03 13 03.44	- 0 28 17.9
2012eu	0.029937	17.3	Ia	03 13 04.16	- 8 23 31.7
2007lm	0.21	21.4	Ia	03 13 40.44	0 37 47.9
2012ic	0.040898	17.1	Ia	03 13 53.71	58 03.7
2013hi	0.025367	16.2	Ia	03 14 24.72	10 49.1
2007mh	0.13	19.9	Ia	03 14 31.77	0 16 11.4
2007kh	0.05	18.1	Ia	03 15 12.10	10 13.0
2006ib	0.179997	22.1	Ia	03 16 11.83	- 0 36 03.4
2007gn	0.03	18.3	Ia	03 16 31.37	27 40.7
2006dr	0.015124	16.1	Ia	03 17 14.19	-32 34 31.8
2008L	0.019483	17.8	Ia	03 17 16.65	22 57.6
2005hr	0.119999	19.5	Ia	03 18 33.83	0 07 24.1
2008fg	0.010884	17	Ia	03 18 44.10	28 57.2
2006P	0.015364	17.4	Ia:	03 19 17.90	-12 06 18.3
2006lb	0.18	20.9	Ia	03 19 28.19	- 0 19 04.9
2005mz	0.017678	18	IaPec	03 19 49.88	30 18.6
2003if	0.00566	17.6	Ia	03 19 52.61	-26 03 50.5
2008fh	0.01	17.1	Ib:	03 20 18.62	21 44.5
2005fy	0.199998	20.9	Ia	03 20 21.70	- 0 53 08.0
1991bc	0.021351	16	Ia	03 20 45.66	- 1 02 47.2

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2011fw	0.016896	17.2	Ia	03 20 54.21	52 05.0
2007nk	0.22	21.5	Ia	03 20 56.52	1 03 29.3
1998dz	0.089998	18.5	Ia	03 20 58.18	-41 05 22.8
2011iz	0.038	17.2	Ia	03 21 36.48	33 46.1
2012Z	0.007127	15.6	IaPec	03 22 05.35	-15 23 15.6
2002fk	0.007127	13.1	Ia	03 22 05.71	-15 24 03.2
2006dd	0.005922	14	Ia	03 22 41.62	-37 12 13.0
2006mr	0.005922	15.14	Ia	03 22 42.84	-37 12 28.5
2008gp	0.033523	18.1	Ia	03 23 00.73	1 21 42.8
2007mi	0.13	19.9	Ia	03 23 31.52	0 40 00.0
2002es	0.017992	16	IaPec	03 23 47.23	33 53.5
2006kj	0.21	20.9	Ia:	03 24 32.81	1 01 20.5
1994aa	0.009059	17	Ia	03 24 49.40	- 3 02 33.6
2006mw	0.12	22.1	Ia:	03 25 08.47	- 0 02 26.1
2007nz	0.47	22.8	Ia:	03 25 11.35	- 0 06 22.5
2007ry	0.048	17.9	Ia	03 25 43.16	14 41.6
2010ka	0.166	19.3	Ia	03 26 01.99	- 0 49 48.0
2013gp	0.233872	21.6	Ia	03 26 55.51	-28 46 45.8
2008hm	0.019664	17.2	Ia	03 27 10.90	56 39.6
2006pg	0.32	22.1	Ia	03 27 20.71	1 05 22.8
2013go	0.076	20.4	IaPec	03 27 44.64	-28 29 13.6
2006qb	0.33	22.3	Ia	03 28 14.65	- 0 12 03.5
2005jo	0.229999	21.3	Ia	03 28 21.68	- 0 19 33.9
1997cu	0.062289	18.2	Ia	03 29 03.00	-52 41 41.1
2005hs	0.299997	21.8	Ia	03 29 22.06	- 1 05 40.9
2007qt	0.31	22.7	Ia	03 29 25.41	- 0 38 46.7
1992bs	0.063377	18.3	Ia	03 29 27.20	-37 16 18.9
2007py	0.21	22.4	Ia	03 29 31.60	0 30 56.0
2011gy	0.016881	15.4	Ia	03 29 35.30	52 03.3
2010ip	0.052	17.6	Ia	03 29 48.50	6 32 55.3
2006ta	0.29	22	Ia	03 29 50.42	0 17 42.3
2007jg	0.037131	18.4	Ia	03 29 50.82	0 03 24.6
2009ku	0.08	19.9	IaPec	03 29 53.23	-28 05 12.2
2005if	0.067088	18.8	Ia	03 30 12.87	- 0 58 28.5
2007pz	0.13	20.9	Ia	03 30 25.18	1 00 33.9
2005fw	0.159997	19.9	Ia	03 30 49.04	- 1 14 17.1
2001ip	0.54	23.8	Ia	03 31 13.03	-27 50 55.5
1993Y	0.020009	17.1	Ia	03 31 24.41	45 02.6
2012gv	0.57	23.3	Ia	03 31 37.09	-27 21 18.1
2006lk	0.31	23.1	Ia	03 32 04.60	- 0 06 00.6
2002fx	1.4	26.41	Ia	03 32 06.80	-27 44 34.4
HST04Mcg	1.37	25.9	Ia	03 32 10.02	-27 49 50.0
1999gt	0.273999	22.1	Ia	03 32 10.28	-28 06 16.0
HST04Rak	0.74	24.1	Ia	03 32 18.15	-27 44 10.6
HST04Gre	1.14	25.1	Ia	03 32 21.49	-27 46 58.3
2002kd	0.735	24.86	Ia	03 32 22.34	-27 44 26.9
2002hr	0.526	24.07	Ia	03 32 22.57	-27 41 52.2
2002hp	1.305	25.8	Ia	03 32 24.79	-27 46 17.8
HST04Omb	0.975	24.7	Ia	03 32 25.34	-27 45 03.0
2012fq	0.67	22.6	Ia	03 32 32.90	-27 51 21.1

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2002kc	0.216	23.06	Ia	03 32 34.72	-27 39 58.3
HST04Kur	0.359	24	Ia	03 32 36.03	-27 51 17.7
2002fw	1.3	25.63	Ia	03 32 37.52	-27 46 46.6
2003aj	1.307	26.62	Ia	03 32 44.33	-27 55 06.4
HST05Zwi	0.521	23	Ia	03 32 45.65	-27 44 24.3
2003ak	1.551	26.3	Ia	03 32 46.90	-27 54 49.3
2012gt	0.491	23.3	Ia	03 33 08.76	-28 05 04.2
2009im	0.013164	15.1	Ia	03 33 22.08	- 4 59 56.8
2012fr	0.005462	13.78	Ia	03 33 36.23	-36 07 35.4
2012gs	0.525	22.5	Ia	03 33 38.18	-27 20 20.8
2005jf	0.299997	21.8	Ia:	03 33 40.76	- 0 06 43.5
2005gq	0.369999	22.6	Ia	03 33 48.97	0 42 33.6
2006hu	0.139996	22	Ia	03 34 22.72	- 1 07 23.5
2009ky	0.26	20.8	Ia	03 34 28.80	-27 54 30.3
2007mj	0.12	20.4	Ia	03 34 44.44	0 21 19.9
2012fa	0.4	23.4	IaPec	03 34 59.02	-27 51 55.4
2005ke	0.004879	16.3	Ia	03 35 04.35	-24 56 38.8
2012ez	0.348	23.2	Ia	03 35 16.37	-27 29 49.2
2013S	0.018576	15.9	Ia	03 35 30.29	16 59.3
2007po	0.29	22.1	Ia	03 35 32.23	0 42 12.1
2003in	0.021331	17.7	Ia	03 35 33.31	5 03 52.7
2007jh	0.040769	19.2	Ia	03 36 01.54	1 06 12.2
2010kf	0.040769	17.5	Ia	03 36 03.53	1 06 04.0
1992A	0.006152	12.6	Ia	03 36 27.43	-34 57 31.5
2005gr	0.239999	21	Ia	03 36 37.49	1 04 45.0
1992bp	0.079001	18.5	Ia	03 36 37.95	-18 21 13.7
2014H	0.015	16.3	Ia	03 37 01.41	05 01.0
2011dx	0.013854	16.5	IaPec	03 37 05.61	- 5 01 56.3
2006jq	0.13	22.7	Ia	03 37 06.50	0 00 33.7
2010jd	0.039033	17.4	Ia	03 37 22.20	-33 02 39.7
1990Y	0.039033	17.7	Ia	03 37 22.64	-33 02 40.1
2010hk	0.032102	17.6	Ia	03 37 52.61	4 56 52.2
2006rw	0.08	19.4	Ia	03 38 09.57	2 26 05.6
2009kw	0.24	21.3	Ia	03 38 23.39	-28 15 11.8
2006pv	0.21	21.4	Ia	03 38 29.47	- 0 40 32.1
2007on	0.006338	14.9	Ia	03 38 50.90	-35 34 30.0
2011iv	0.006338	12.4	Ia	03 38 51.34	-35 35 31.8
2005ew	0.002998	15.1	Ia	03 39 23.74	02 49.0
2007hy	0.19	20.9	Ia	03 39 42.33	1 05 32.2
2006jr	0.18	22.5	Ia	03 39 47.15	0 59 34.2
2007ln	0.09	21.8	Ia:	03 40 43.21	1 00 11.0
2010jf	0.023949	17.7	IaPec	03 40 43.47	1 03 34.0
2013D	0.027119	17.5	IaPec	03 41 15.13	23 03.9
1991bj	0.018132	18.8	Ia	03 41 30.48	- 4 39 49.6
2010ey	0.004906	16.8	Ia	03 41 31.50	-19 54 00.4
2006kf	0.021251	17.4	Ia	03 41 50.48	8 09 25.0
2010it	0.013754	15.9	Ia	03 41 57.50	- 4 42 21.1
2005gp	0.129999	20.2	Ia	03 41 59.29	- 0 46 57.6
2006kx	0.16	21.1	Ia	03 42 14.67	0 28 41.8
2013gy	0.014069	17.9	Ia	03 42 16.88	- 4 43 18.5

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2007rk	0.2	22.2	Ia	03 42 17.43	1 03 47.3
2007kk	0.041027	17.6	Ia	03 42 23.26	14 30.4
2006es	0.041027	17	Ia	03 42 24.48	14 31.0
1992bk	0.058413	18.1	Ia	03 43 01.90	-53 37 56.8
2007ia	0.13099	20	Ia	03 43 10.06	0 06 08.9
2001el	0.003902	12.7	Ia	03 44 30.59	-44 38 23.6
2003lb	0.018105	15.8	Ia	03 45 05.67	45 39.3
2008hy	0.008538	14.3	Ia	03 45 08.45	39 55.5
2006tb	0.3	22.3	Ia	03 45 15.49	- 0 07 42.8
2010jm	0.022362	17.4	Ia	03 46 03.55	42 15.5
2006rz	0.03092	20	Ia	03 46 06.78	0 23 23.1
2014dg	0.004005	14.9	Ia	03 48 19.88	07 54.2
2006pn	0.13	21.6	Ia	03 49 02.85	- 0 31 58.0
2005mo	0.28	22.2	Ia	03 50 12.90	- 0 14 24.8
2006ro	0.11	19.8	Ia	03 51 16.85	50 05.4
2012B	0.017341	16.4	Ia	03 51 34.52	04 42.9
1990ac	0.063377	18	Ia	03 53 09.26	-29 44 37.8
2010kk	0.213	20.2	Ia	03 53 23.23	9 54 33.3
1991bb	0.026563	17.7	Ia	03 53 37.51	06 19.3
2012hp	0.019456	16	Ia	03 54 17.37	30 38.7
2009D	0.025053	16.5	Ia	03 54 22.83	-19 10 54.2
2010ia	0.017909	17.3	Ia	03 56 56.20	8 30 45.1
2011ha	0.094	18.5	Ia	03 57 40.87	09 55.2
1996bx	0.060001	18.3	Ia	03 59 16.45	-53 22 26.3
1991bd	0.012731	17	Ia	04 02 49.66	1 58 26.3
2010iv	0.074	17.4	Ia	04 03 52.23	-43 25 38.5
2012en	0.017295	17.8	Ia	04 07 25.20	1 45 32.9
2003ay	0.073	19.1	Ia	04 07 26.25	07 55.4
2014dm	0.033116	16.55	Ia	04 08 07.13	- 8 49 37.0
2008ge	0.003502	12.4	IaPec	04 08 24.68	-47 53 47.4
2007hg	0.03	18	Ia	04 08 32.65	2 22 43.7
2006ig	0.039997	19.2	Ia	04 10 21.09	28 24.4
2005hh	0.064998	19.3	Ia	04 13 05.51	-25 04 00.5
2011U	0.01335	16.6	Ia	04 13 33.94	32 36.7
1999fn	0.469998	23.5	Ia	04 14 03.88	4 17 55.0
1999fo	1.07	24	Ia	04 14 45.75	6 38 34.3
2000eh	0.489998	22.4	Ia	04 15 02.44	4 23 18.1
2004ea	0.006517	18.2	Ia	04 16 13.20	-16 45 20.5
2009ab	0.011171	16.5	Ia	04 16 36.39	2 45 51.0
2005df	0.004319	12.5	Ia	04 17 37.85	-62 46 09.5
1997ej	0.022302	16.5	Ia	04 17 53.49	-56 36 58.2
2014dn	0.022302	17.1	IaPec	04 17 54.28	-56 36 45.2
2010el	0.005004	16.5	IaPec	04 19 58.83	-54 56 38.5
2011gs	0.027	17.4	Ia	04 21 09.99	28 04.4
2013fh	0.029803	17.8	Ia	04 21 38.29	-17 55 41.4
2009la	0.020385	15.8	Ia	04 22 45.81	-40 36 49.3
2013fz	0.020607	15.1	Ia	04 23 46.44	-51 35 46.3
2014cd	0.020607	15.9	Ia	04 23 47.24	-51 36 02.9
2011do	0.018392	14.8	Ia	04 25 47.56	-67 48 40.7
2001gi	0.199998	21	Ia	04 28 07.06	-36 21 45.2

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2001eb	0.012652	16.3	Ia	04 30 45.10	0 52 17.9
1997A	0.058473	18.5	Ia	04 31 33.39	-61 07 10.4
1998ea	0.057456	19.5	Ia	04 33 46.59	-61 35 20.4
2012fu	0.060502	17.5	Ia	04 37 19.13	-69 08 25.4
2006lf	0.013208	17.6	Ia	04 38 29.49	02 01.5
2008gw	0.064	18.8	Ia	04 39 26.21	9 08 31.6
2001fs	0.840001	23.9	Ia	04 39 30.68	- 1 28 21.9
2010kg	0.016646	17.7	Ia	04 40 08.40	7 21 00.0
1999ep	0.060001	18.9	Ia	04 41 04.76	- 3 00 39.6
2004B	0.01565	17.8	Ia	04 42 04.72	- 7 12 07.8
2011bx	0.058	17.1	Ia	04 42 12.57	-48 44 12.6
2012id	0.015748	16.3	Ia	04 42 41.13	34 59.8
2003ah	0.03	17	Ia	04 43 08.54	0 46 00.4
1995bd	0.015393	17.3	IaPec	04 45 21.24	04 02.5
2011jv	0.082	18.6	Ia	04 48 02.55	- 4 08 22.6
2010ll	0.066	18.1	Ia	04 50 29.81	-10 44 17.0
2009ic	0.015347	14.8	Ia	04 53 18.03	- 3 00 59.6
2005ec	0.029263	16.6	Ia	04 54 19.17	1 38 27.6
1997F	0.580001	23.9	Ia	04 55 14.27	- 5 51 44.8
2004gb	0.219998	20.5	Ia	04 55 22.30	-67 30 44.3
1997ek	0.860001	23.8	Ia	04 56 11.63	- 3 41 26.0
1998eo	0.840001	23.6	Ia	04 56 15.47	- 3 46 38.7
1997el	0.639999	23.1	Ia	04 56 41.21	- 3 27 54.7
1997em	0.460001	23.6	Ia	04 56 50.44	- 3 51 37.1
1997en	0.769999	24.4	Ia:	04 56 57.21	- 4 11 46.0
1997ey	0.580001	22.9	Ia	04 56 58.19	- 2 37 36.7
2001ep	0.013012	15	Ia	04 57 00.26	- 4 45 40.2
1997ep	0.460001	22.4	Ia	04 57 48.59	- 3 42 44.7
1997G	0.762997	23.7	Ia	04 58 30.23	- 3 16 04.0
1997eq	0.54	22.5	Ia	04 58 56.32	- 3 59 29.4
2009F	0.013337	15.5	Ia	04 59 23.56	-11 07 50.1
1992bh	0.045001	17.7	Ia	04 59 27.55	-58 49 44.2
1997H	0.529999	22.8	Ia	04 59 36.57	- 3 09 34.6
1997I	0.180001	20.9	Ia	04 59 37.31	- 3 09 01.6
1997fc	0.054037	20.5	Ia	04 59 58.81	-38 55 04.3
1997er	0.469998	22.3	Ia	05 00 38.56	- 3 59 32.2
2010kt	0.053	16.8	Ia	05 00 39.19	-38 40 46.1
2011M	0.017425	17.1	Ia	05 00 41.55	14 38.6
2006le	0.017425	17.6	Ia	05 00 41.99	15 19.0
2012he	0.055968	18.2	Ia	05 00 50.07	-38 39 11.4
2011hq	0.025721	18.3	Ia	05 00 56.13	-13 24 57.9
1997fb	0.053101	18.6	Ia	05 01 14.60	-38 38 12.7
2012hx	0.028	16.3	Ia	05 01 29.88	-13 43 46.4
2011gl	0.040444	17.7	Ia	05 01 43.07	-15 23 24.7
2006hb	0.01527	15.7	IaPec	05 02 01.28	-21 07 55.1
2009ad	0.028387	16.6	Ia	05 03 33.38	6 39 35.7
2006aw	0.01617	14.9	Ia	05 04 18.18	-63 34 57.3
2011kk	0.043113	17.4	Ia	05 07 37.90	7 15 24.6
1993af	0.003345	17	Ia:	05 08 00.71	-37 29 18.0
2004gw	0.01701	17.9	Ia	05 08 48.41	26 20.7

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2011kj	0.038894	16.7	Ia	05 11 21.23	-25 53 05.9
2003F	0.017271	15.9	Ia	05 11 33.01	03 28.4
2014aj	0.020395	17.6	Ia	05 11 43.91	29 29.1
2005el	0.01493	16	Ia	05 11 48.72	5 11 39.4
2011ka	0.016408	14.5	Ia	05 14 28.23	-62 10 19.3
2011jq	0.032604	18.4	IaPec	05 16 41.55	6 29 30.2
2012H	0.031852	16.5	Ia	05 20 14.94	-25 18 56.4
2004gc	0.032088	17.4	Ia	05 21 49.95	6 40 33.7
2010fy	0.049	17.1	Ia	05 24 52.46	-46 46 37.1
1998Z	0.03858	19.6	Ia	05 24 58.78	-31 21 38.1
2013ex	0.01043	15.6	Ia	05 32 46.62	-14 02 45.4
2010ko	0.01043	16.8	Ia	05 32 49.44	-14 05 45.9
2004N	0.050001	17.9	Ia	05 35 20.37	-69 27 18.3
1999J	0.033299	17	IaPec	05 35 32.27	-69 29 52.1
1999ek	0.017522	17.9	Ia	05 36 31.60	38 17.8
2013az	0.037332	17.1	Ia	05 39 52.13	-40 30 28.1
2009jz	0.023959	17	IaPec	05 40 05.29	-55 32 04.0
2002B	0.142998	20.5	Ia	05 40 46.06	-71 51 15.1
2010ju	0.015244	16.7	Ia	05 41 55.99	29 51.0
1998eb	0.013119	17.8	Ia	05 42 12.02	22 26.3
2014I	0.03012	17	Ia	05 42 19.80	-25 32 39.9
1993ac	0.049	18.4	Ia:	05 46 23.60	22 07.0
2004J	0.025	17.5	Ia	05 46 32.18	-17 46 53.0
2003hx	0.007098	14.3	Ia	05 46 46.97	-16 47 00.6
2003hz	0.020173	16.7	Ia	05 48 07.86	15 22.8
1997eh	0.045127	18.5	Ia	05 49 04.59	-24 29 01.6
2006ke	0.017181	18.3	Ia	05 52 37.38	49 00.5
2011ah	0.027198	16	Ia	05 53 50.77	-32 44 44.2
2009J	0.015783	17.4	IaPec	05 55 21.13	-76 55 20.8
2009iw	0.015783	14.6	Ia	05 55 25.63	-76 55 15.9
2001gc	0.01929	15.5	Ia	05 55 26.14	54 34.2
2003ij	0.018382	17.8	Ia	05 55 41.18	54 21.7
2006nr	0.018382	15.8	Ia	05 56 23.51	54 38.8
1996by	0.013722	16.1	Ia	05 58 24.96	27 12.1
2012fd	0.018898	15.2	Ia	05 58 51.93	-23 20 24.2

Plot 2 Data from The SAI Supernova Catalog

sn_name	redshift	sn_mag	sn_type	sn_ra	sn_dec
2002fc	0.879998	24.2	Ia	14 00 23.29	5 45 41.9
2007dv	0.1	19	Ia	14 00 51.02	57 28.4
2012T	0.026378	17.4	IaPec	14 01 41.69	49 33.9
2011is	0.020869	16.6	Ia	14 01 47.00	9 29 50.8
2001gm	0.478	23.4	Ia	14 01 51.18	5 05 38.5
2001gq	0.671	23.9	Ia	14 01 51.38	4 53 12.4
2002fl	0.259999	21.9	Ia	14 01 52.33	4 39 23.2
2000fr	0.542998	24.5	Ia	14 01 57.75	4 43 42.4
2001gn	1.1	25	Ia	14 01 59.90	5 04 59.6
2001go	0.551998	23.7	Ia	14 02 00.95	5 00 59.2
2002am	0.03002	19.1	Ia	14 02 03.14	-10 35 23.9

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1998D	0.012309	15.5	Ia	14 02 59.28	44 54.3
2011fe	0.000796	10.1	Ia	14 03 05.81	16 25.4
1991B	0.008713	16	Ia	14 03 24.29	- 6 04 22.9
2009mz	0.008713	14.7	Ia	14 03 24.64	- 6 03 31.3
2002ff	1.1	24	Ia:	14 03 39.82	5 46 50.6
2002fd	0.277998	23.4	Ia	14 03 54.08	4 59 49.0
1999ax	0.050001	18.5	Ia:	14 03 57.92	51 09.2
2002fe	1.086	24.7	Ia	14 04 18.16	5 19 25.6
2001U	0.028422	17.3	Ia	14 04 42.94	- 9 42 29.7
2011bz	0.028422	17.4	Ia	14 04 43.75	- 9 43 04.7
1999cp	0.009485	14.2	Ia	14 06 31.30	- 5 26 49.0
2002cr	0.009485	14.2	Ia	14 06 37.59	- 5 26 21.9
1995P	0.056006	18	Ia:	14 07 14.33	- 2 43 32.7
2010fd	0.53	22.4	Ia	14 07 14.93	59 51.5
1997ct	0.03	18.6	Ia	14 07 26.88	26 05.9
2008cf	0.046031	16.8	Ia	14 07 32.56	-26 33 06.6
2012di	0.07	18.1	Ia	14 08 06.69	03 07.7
2005S	0.019813	19.1	Ia	14 08 28.84	7 03 27.2
2007cc	0.029083	15.8	Ia	14 08 41.98	-21 35 48.4
1999ck	0.431998	21.9	Ia	14 08 56.59	- 0 05 50.7
2009ey	0.179	20.6	Ia	14 09 16.68	06 12.8
2010ff	0.27	22.9	Ia	14 09 19.94	15 45.2
1997cn	0.016766	16.2	IaPec	14 09 57.76	32 32.3
2007ei	0.1	20.1	Ia	14 10 11.29	8 18 39.8
2001ko	0.14057	20	Ia	14 10 58.32	50 50.9
2009nk	0.019639	17	Ia	14 10 58.74	6 21 47.9
2004dl	0.249999	21.2	Ia	14 11 11.50	-12 02 36.9
1990M	0.008652	12.4	Ia	14 11 29.30	- 5 02 36.0
2010fr	0.45	22.3	Ia	14 11 57.76	04 18.6
2010bp	0.009663	15.2	Ia	14 12 07.89	-49 23 43.3
2010fa	0.373	21.9	Ia	14 13 01.87	27 46.6
2012dm	0.077906	19.5	Ia	14 13 46.13	13 17.3
2010fs	0.441	22.3	Ia	14 14 03.34	21 43.8
2000bz	0.259999	21.2	Ia	14 15 02.66	- 6 17 16.0
2009cs	0.17	19.7	Ia	14 15 19.36	25 14.0
2009gf	0.018517	16.1	Ia	14 15 37.11	16 48.6
2003fg	0.239999	20.4	Ia	14 16 18.78	14 55.4
2007fd	0.07	19.5	Ia	14 16 19.03	13 01.3
2003fn	0.29	21.5	Ia	14 16 33.44	20 32.1
1997ca	0.519999	22.6	Ia	14 16 40.24	31 59.2
2007ao	0.023734	17.7	IaPec	14 16 49.74	48 24.1
2010fh	0.387	22.3	Ia	14 17 18.59	58 41.9
2003fo	0.369999	22.4	Ia	14 17 58.43	28 57.5
1996aa	0.010842	17	Ia	14 18 25.16	29 41.9
2013gn	0.010842	15.5	Ia	14 18 28.54	30 24.2
2003fi	0.440001	22.4	Ia	14 18 39.96	36 44.1
2003fj	0.469998	22.2	Ia	14 19 45.19	32 25.7
2003fk	0.349998	22.3	Ia	14 19 55.84	05 50.9
2003ey	0.065001	18.8	Ia	14 20 03.28	- 8 28 40.0
2004aj	0.247	22.3	Ia	14 20 37.58	-12 24 14.4

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1996ah	0.047386	18	Ia	14 20 38.90	07 21.0
2003fp	0.450001	22.6	Ia	14 20 53.61	36 20.7
1999bo	0.129999	19.7	Ia	14 21 07.48	- 5 57 25.8
2008cq	0.00421	14.4	Ia	14 21 09.61	-29 15 04.0
2003ff	0.499999	23.3	Ia	14 21 14.92	32 15.3
2013bt	0.036445	16.8	Ia	14 21 15.12	34 15.5
2003fh	0.249999	22.2	Ia	14 21 35.89	31 37.7
2006dy	0.007683	16.5	Ia	14 22 11.50	55 14.0
2007af	0.005471	15.3	Ia	14 22 21.03	- 0 23 37.6
2004K	0.03613	17.1	Ia	14 23 39.85	-19 26 50.0
2009av	0.0555	18.62	Ia	14 23 55.82	11 05.2
2012ei	0.006417	14.7	Ia	14 24 05.76	02 56.5
2009ft	0.056835	17.9	Ia	14 24 06.03	7 46 10.3
2005bv	0.035654	16.5	Ia	14 24 07.44	17 50.3
2002bz	0.036992	16.9	Ia	14 24 40.52	37 34.7
2001ay	0.030242	16.7	Ia	14 26 17.00	14 55.8
2014by	0.024794	16	Ia	14 27 48.59	33 42.5
1991ai	0.052803	18.5	Ia	14 27 55.19	12 20.5
2010V	0.01279	14.3	Ia	14 28 38.46	38 09.5
2011ai	0.035181	16.6	Ia	14 29 05.03	54 42.4
2009bi	0.126	20	Ia	14 29 39.61	09 32.8
2000fw	0.096249	19.1	Ia	14 30 14.07	0 30 35.4
2009ce	0.095	19.8	Ia	14 31 01.13	46 57.9
2009ei	0.23	20.9	Ia	14 32 17.26	36 15.8
2013aa	0.004007	11.9	Ia	14 32 33.88	-44 13 27.8
2011cv	0.111587	19.2	Ia	14 33 37.37	-12 02 20.9
2006bw	0.03	16.6	Ia	14 33 56.73	3 47 55.8
2003du	0.006396	13.5	Ia	14 34 35.80	20 03.8
2002db	0.036488	16	Ia	14 34 51.63	39 52.9
2006dt	0.026468	16.8	Ia	14 35 43.11	8 17 55.8
2012N	0.035209	16	Ia	14 35 44.65	43 41.6
2014bg	0.035209	16.3	Ia	14 35 45.97	43 18.2
2005bc	0.012266	16.4	Ia	14 37 15.05	27 23.1
2001ck	0.034697	16.4	Ia	14 37 50.08	29 02.2
2007cw	0.1	19.1	Ia	14 38 07.48	- 8 35 55.7
2002jo	0.009172	16.3	Ia	14 38 16.42	27 14.0
2012ci	0.030611	17.5	Ia	14 38 23.48	20 55.1
2010ax	0.050792	17	Ia	14 41 53.42	45 01.4
2009Y	0.009294	14.9	Ia	14 42 24.55	-17 14 46.3
2010cy	0.0389	17	Ia	14 43 42.85	3 58 16.2
2002lh	0.235999	21	Ia	14 44 20.38	15 44.4
2009en	0.046711	17.6	Ia	14 46 22.62	01 27.0
2009gb	0.022572	14.9	Ia	14 47 25.83	-30 39 02.5
2009as	0.022572	16.7	Ia	14 47 26.64	-30 39 34.5
2007gc	0.12	19.3	Ia	14 47 47.32	28 14.5
2007ee	0.045748	19.4	Ia	14 47 47.34	49 53.1
2010cs	0.041888	19.6	Ia	14 47 55.78	03 17.7
2006cz	0.042007	17.3	IaPec	14 48 36.66	- 4 44 30.7
2003jb	0.041075	16.5	Ia	14 49 22.28	16 06.2
2009fb	0.08	19.1	Ia	14 50 00.12	55 05.8

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2014cb	0.033183	16.4	Ia	14 50 49.90	-13 31 03.7
2007at	0.05412	17.7	Ia	14 51 12.28	-21 23 31.2
2014an	0.060608	18.6	Ia	14 51 42.93	8 34 12.5
2011jt	0.027777	16.5	Ia	14 53 23.01	2 57 43.1
2009eg	0.057	17.6	Ia	14 54 15.47	57 52.8
2009hv	0.054	18.6	Ia	14 54 32.90	39 39.5
2007O	0.036083	16.8	Ia	14 56 05.18	24 16.9
2008dk	0.07	18.8	Ia	14 56 13.33	51 14.1
2012M	0.033266	16.9	Ia	14 56 59.85	35 59.6
2011cy	0.16	20	Ia	14 58 37.10	2 20 59.1
2013hr	0.026191	16.2	Ia	14 59 00.81	48 47.5
2008af	0.033366	17.1	Ia	14 59 28.50	39 12.3
2005be	0.034997	16.1	Ia	14 59 32.72	40 11.6
2002bg	0.042452	16.9	Ia	14 59 39.23	12 44.5
2012af	0.053	16.7	IaPec	15 00 30.87	55 45.1
2009dy	0.089	18.4	Ia	15 01 04.03	13 13.9
2013bh	0.074458	18.5	IaPec	15 02 13.09	38 45.6
2007dm	0.08	19.6	Ia	15 02 55.12	7 12 05.6
2004bw	0.021198	17.6	Ia	15 03 46.75	- 3 18 16.4
2006bk	0.049519	16.9	Ia	15 04 33.65	57 51.1
2014ac	0.028935	16.6	Ia	15 04 40.09	37 54.2
2011ct	0.11	19.1	Ia	15 06 34.40	-10 19 36.5
2009ej	0.083	19	Ia	15 10 59.53	6 33 10.0
2013eb	0.018779	17.1	Ia	15 11 14.80	09 11.1
1999cm	0.045114	17.1	Ia	15 11 19.18	07 11.4
1999dg	0.021928	15.8	Ia	15 11 28.41	29 05.7
2009ai	0.040164	17.6	Ia	15 11 35.92	5 23 47.5
2007ey	0.11	19.7	Ia	15 12 21.36	30 03.7
2012bf	0.07	18.2	Ia	15 13 41.81	06 06.6
2014M	0.0222	16.3	Ia	15 15 17.18	29 09.7
2007ba	0.038539	18.2	Ia	15 16 42.63	7 23 47.8
2012ao	0.065	19.8	Ia	15 16 42.88	-14 38 38.1
2002ec	0.040394	17.5	Ia	15 19 24.89	53 14.0
2008dl	0.31	21.6	Ia	15 19 30.37	53 56.8
2009ek	0.21	20.7	Ia	15 19 46.76	31 50.6
2009eh	0.044	21.2	Ia	15 20 38.08	7 39 32.5
2005bm	0.102997	19.5	Ia	15 20 45.10	48 42.5
1996ab	0.13009	19.7	Ia	15 21 08.35	55 36.8
2005cf	0.006461	15.5	Ia	15 21 32.21	- 7 24 47.5
2009gw	0.11	20.7	Ia	15 22 13.62	58 01.3
2009hb	0.2	20.7	Ia	15 22 29.65	04 48.4
2010dw	0.03812	17.1	Ia	15 22 40.31	- 5 55 15.9
2008ck	0.065	19.3	Ia	15 22 42.30	22 08.0
2007dn	0.07	18.9	Ia	15 22 45.80	13 20.2
2012bs	0.066	18.1	Ia	15 23 01.70	7 11 41.2
2007ek	0.08	18.7	Ia	15 23 04.86	8 46 55.7
2001cw	0.930643	24.3	Ia	15 23 06.31	39 31.9
2007cf	0.032836	17.9	Ia	15 23 07.66	8 31 45.5
2014am	0.053	17.4	Ia	15 23 18.48	17 33.3
2003hj	0.075919	17.5	Ia	15 24 20.51	57 11.9

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2013ck	0.049	17.5	Ia	15 24 29.07	32 54.6
2009fc	0.081256	19.4	Ia	15 27 48.59	35 34.1
2007bk	0.032188	16.65	Ia	15 28 45.58	52 12.8
2009fd	0.139	20.4	Ia	15 29 10.96	47 38.8
2007gd	0.13	19.9	Ia	15 29 31.48	7 59 51.1
2013dh	0.013382	16.5	IaPec	15 30 01.09	59 12.9
2011et	0.09	18.8	Ia	15 30 01.40	52 29.1
1996cm	0.450001	22.7	Ia	15 30 11.25	5 55 27.0
2004cq	0.021998	17.5	Ia	15 31 19.76	16 52.1
2003K	0.021817	15.4	Ia	15 32 01.91	14 35.9
2011bw	0.089	19.2	Ia	15 35 58.75	18 42.8
2013dd	0.05205	17.5	Ia	15 36 05.15	57 06.9
1990L	0.014436	18	Ia	15 36 29.15	29 59.5
2014bp	0.068	17.9	Ia	15 36 31.24	54 14.2
2002gk	0.209998	21.3	Ia	15 37 07.50	9 36 19.0
2012dc	0.089902	18.6	Ia	15 38 17.95	44 17.3
2010gb	0.022595	15.8	Ia	15 38 39.79	00 19.9
2012el	0.018175	16.4	Ia	15 39 57.23	-30 33 18.8
2009Q	0.025604	16.1	Ia	15 40 12.88	44 18.1
2004cp	0.053997	19.6	Ia	15 40 24.76	51 57.2
2010bu	0.039	16.9	Ia	15 42 58.38	2 16 52.6
2002gl	0.510996	23.3	Ia	15 43 24.40	7 53 58.0
2001bs	0.029186	18.2	Ia	15 43 39.38	45 31.3
2004ct	0.033373	17.5	Ia	15 43 45.75	24 59.5
2001gw	0.363001	22	Ia	15 43 45.86	7 57 50.3
2011de	0.029186	16.1	Ia	15 43 53.25	45 42.5
2007fi	0.12	19.7	Ia	15 44 16.87	43 13.7
2009fh	0.123	20.4	Ia	15 44 38.77	47 51.2
2001al	0.069998	21.1	Ia	15 44 51.74	07 29.0
2001hd	0.511	22.8	Ia	15 45 35.92	8 16 50.6
2001he	0.581999	23	Ia:	15 46 35.69	8 11 26.4
2002gm	0.489998	22.3	Ia	15 46 57.00	8 12 37.0
2002ck	0.029882	15.9	Ia	15 47 00.75	- 0 59 25.5
2011ex	0.04	17.6	Ia	15 48 51.75	57 48.9
2011er	0.12	18.9	Ia	15 49 50.65	49 30.1
2009dc	0.021391	15.6	IaPec	15 51 12.11	42 28.2
2000cf	0.036001	17	Ia	15 52 56.19	56 12.7
2005dh	0.038359	16.9	Ia	15 54 03.32	08 09.9
2008cg	0.036168	16.6	IIn	15 54 15.15	58 25.0
2009ji	0.048	17.9	Ia	15 54 52.48	05 05.6
2009ih	0.032882	17.3	IaPec	15 55 31.05	56 54.0
2004di	0.019767	16.8	Ia	15 55 41.00	51 49.0
2007ap	0.015444	15.5	Ia	15 56 23.06	30 57.9
2006bt	0.032155	17.4	Ia	15 56 30.53	02 45.6
2014ch	0.044	16.5	Ia	15 58 31.07	51 58.7
1991M	0.007236	14.4	Ia	15 58 34.82	27 28.7
2002li	0.326999	20.5	Ia	15 59 03.08	18 16.0
2006ay	0.09	19	Ia	15 59 12.76	44 27.9
2010ft	0.42	21.8	Ia	16 01 15.41	17 53.5
2003ar	0.025214	16.8	Ia	16 02 08.11	24 55.5

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2001bp	0.094999	17.5	Ia	16 02 09.25	43 08.0
1999cc	0.031328	16.1	Ia	16 02 42.03	21 34.4
2000Q	0.02	16	Ia	16 05 11.85	39 51.5
2001cq	0.199998	22.8	Ia:	16 05 18.70	11 42.1
2000cp	0.034223	18	Ia	16 05 27.62	49 48.8
2008ek	0.034537	18.9	Ia	16 05 33.17	35 33.2
2010fi	0.331	22.1	Ia	16 05 44.83	04 27.9
2008ba	0.03	18.6	Ia	16 05 49.17	27 17.2
2009df	0.12	18.6	Ia	16 05 52.67	24 45.5
1996O	0.037245	18	Ia	16 06 00.00	11 48.0
2004cv	0.037125	16.6	Ia	16 06 14.45	24 54.0
2010fj	0.55	23.1	Ia	16 06 48.80	58 51.4
2002lk	0.119999	18.1	Ia	16 06 55.92	28 18.2
1999ac	0.009497	14.2	IaPec	16 07 15.01	7 58 20.4
2014bq	0.08	17.8	Ia	16 07 25.38	47 35.7
2010fb	0.336	22.2	Ia	16 08 18.40	54 29.2
2010fe	0.43	22.4	Ia	16 08 52.65	00 17.4
2014be	0.071	18.6	Ia	16 09 35.20	26 31.1
2006cc	0.032612	18.1	Ia	16 09 56.47	07 35.9
2010dy	0.042619	17.6	Ia	16 10 11.03	0 45 07.5
1992bi	0.458	22	Ia	16 10 12.81	47 12.7
2008cl	0.063434	17.7	Ia	16 11 04.35	27 08.0
2003au	0.030791	19.2	Ia	16 11 11.56	15 58.2
2011dv	0.031103	16	Ia	16 12 04.62	12 33.2
2011dz	0.024598	16.4	Ia	16 12 44.82	17 03.2
2007ai	0.031661	17.3	Ia	16 12 53.74	-21 37 48.7
2010fl	0.36	21.5	Ia	16 13 48.22	36 30.7
2007ds	0.14	19.7	Ia	16 14 04.60	8 55 20.0
2000df	0.039435	17.2	Ia	16 14 12.22	6 09 00.6
2007di	0.13	19.7	Ia	16 14 25.92	5 09 21.1
2010fc	0.233	22.5	Ia	16 14 28.71	43 33.0
2002ci	0.022228	17.1	Ia	16 15 37.95	19 17.4
2013eh	0.034997	16.6	Ia	16 16 09.19	32 53.0
2013ed	0.033158	15.8	Ia	16 16 24.25	53 05.7
2002de	0.027965	16	Ia	16 16 30.38	42 30.2
2001kt	0.103791	19.9	Ia	16 17 13.40	28 27.7
2013dp	0.022324	15.5	Ia	16 17 32.30	34 56.7
2010an	0.02952	17	Ia	16 17 40.46	00 10.1
2003ia	0.02952	17.2	Ia	16 17 41.17	00 07.2
2006dw	0.027042	15.8	Ia	16 17 43.29	57 55.1
2010fm	0.36	21.6	Ia	16 17 47.71	18 08.3
2011dl	0.0341	16.9	Ia	16 18 04.97	33 04.0
2012bp	0.028291	15.5	Ia	16 18 12.44	28 52.8
2010fn	0.323	21.9	Ia	16 18 15.87	23 04.9
2007en	0.12	19.6	Ia	16 18 43.84	3 02 50.1
2010fo	0.347	22	Ia	16 18 53.81	46 58.5
2002lj	0.14	19.7	Ia	16 19 19.65	09 54.2
2003lx	0.037862	18.5	Ia	16 19 21.66	05 23.6
1991ad	0.069998	18.5	Ia	16 19 24.20	38 46.0
2013cl	0.06345	17.9	Ia	16 19 31.59	47 11.3

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2013cp	0.074921	18.1	Ia	16 19 52.11	56 08.1
2003ge	0.033453	17.8	Ia	16 20 08.75	47 53.7
2012ar	0.028259	16.6	Ia	16 20 36.02	-10 27 38.2
2007bj	0.016656	15.1	IaPec	16 22 10.59	- 1 30 51.4
2009he	0.030647	17.5	IaPec	16 22 12.33	16 22.5
2013cv	0.035	16.5	IaPec	16 22 43.18	57 35.4
2006R	0.034074	17.5	Ia	16 23 20.82	15 49.8
2012ds	0.03403	16.4	Ia	16 23 45.90	9 47 12.9
2009fl	0.029146	17.6	IaPec	16 25 10.10	53 20.8
1999cb	0.028899	15.7	Ia	16 25 48.41	20 32.4
2014al	0.04	16.8	Ia	16 26 55.28	38 24.4
2012aj	0.031	16.1	Ia	16 27 03.96	36 49.8
2014bo	0.133525	19.3	Ia	16 27 46.15	44 23.7
2013ec	0.081	18.5	Ia	16 27 50.24	28 20.9
2010ef	0.11	18.5	Ia	16 28 52.10	22 29.0
2009fv	0.029359	16.3	Ia	16 29 44.22	48 41.8
1991aj	0.031418	18	Ia	16 29 44.90	46 43.0
2014dl	0.032966	16.5	IaPec	16 29 46.09	8 38 30.6
1992ap	0.029876	18	Ia	16 30 27.46	29 18.3
2014ag	0.031658	15.5	Ia	16 30 40.68	30 34.7
2010gl	0.0188	15.8	Ia	16 31 38.62	37 26.2
2009ff	0.17	20.5	Ia	16 33 10.92	05 30.8
2003hq	0.040001	17.1	Ia	16 33 40.90	22 37.7
2001az	0.040694	16.1	Ia	16 34 27.71	01 46.8
2003il	0.174997	23	Ia:	16 35 47.50	13 26.9
1995O	0.175121	22	Ia:	16 35 56.12	11 43.9
2002ll	0.050001	20.5	Ia:	16 37 08.30	24 37.7
1992R	0.052326	18	Ia	16 37 10.48	10 00.4
1992ac	0.052326	18	Ia	16 37 10.48	10 04.4
2002aw	0.026428	16.6	Ia	16 37 29.06	52 49.7
2009ew	0.09	18.7	Ia	16 38 59.85	58 58.1
2009ae	0.031147	16.5	Ia	16 39 28.87	18 55.6
2002lo	0.14	21.8	Ia	16 39 56.42	19 20.5
2002lp	0.113998	20.4	Ia	16 40 11.45	28 30.2
2002lq	0.069998	21.9	Ia	16 40 28.83	14 09.1
2013cw	0.017505	16.9	Ia	16 41 27.18	47 05.0
1991am	0.061025	18	Ia:	16 41 50.73	44 11.1
2007dr	0.14	19.9	Ia	16 41 56.00	22 59.1
2010dt	0.052889	17.9	Ia	16 43 14.68	40 30.4
2007gk	0.026981	18.8	Ia	16 45 18.22	55 50.0
2003dw	0.02992	16.7	Ia	16 45 51.10	37 38.0
2013dj	0.025304	16.6	IaPec	16 46 01.94	6 27 59.3
2009fa	0.042	17.7	Ia	16 46 42.82	15 28.6
2007hh	0.11	19.9	Ia	16 46 59.10	56 02.5
2007is	0.029653	16.3	Ia	16 47 14.59	14 36.9
2009dx	0.042	18.8	Ia	16 49 25.67	5 52 48.1
1994Q	0.029477	17	Ia	16 49 51.15	25 55.9
2009kp	0.017758	15.1	Ia	16 49 51.49	32 35.8
2011aj	0.017556	16.6	Ia	16 50 13.98	22 28.0
2002di	0.036411	17.6	IaPec	16 52 23.30	42 40.0

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2010dd	0.02957	17.2	Ia	16 52 47.60	03 45.7
2010gp	0.024262	17.5	Ia	16 52 57.39	2 23 16.4
2009fx	0.047659	18	IaPec	16 53 11.28	57 54.9
2007ep	0.12	19.4	Ia	16 54 38.51	02 59.7
1999ch	0.15		Ia	16 54 45.69	59 13.9
1998cx	0.019562	17.8	Ia	16 54 55.31	-72 35 24.0
2007hu	0.034257	17.3	Ia	16 56 29.96	58 40.4
2008dt	0.034257	17.2	Ia	16 56 30.56	58 33.2
2008eq	0.056835	18.4	Ia	17 00 07.20	07 56.6
2007ae	0.064387	17.4	Ia	17 01 51.95	01 54.6
2013dv	0.057	17.1	Ia	17 03 10.73	26 53.9
2010ag	0.033803	18.6	IaPec	17 03 53.63	30 06.2
2013cx	0.034	17.5	Ia	17 04 16.05	30 37.6
2013ci	0.036	16.1	Ia	17 04 53.60	9 07 59.4
1997cd	0.509999	22.9	Ia	17 06 17.07	04 34.0
1997ce	0.440001	23.3	Ia	17 07 48.26	01 26.2
2010ed	0.048974	18.7	Ia	17 09 24.13	12 48.1
2011T	0.029193	16.3	Ia	17 10 03.62	30 01.2
2012cx	0.027672	17.3	Ia	17 10 05.86	22 23.5
2001cp	0.022416	15.9	Ia	17 11 02.58	5 50 26.8
2002er	0.008577	14.6	Ia	17 11 29.88	7 59 44.8
1999bt	0.049901	17	Ia	17 11 37.77	25 15.5
2006mp	0.023	16.7	IaPec	17 12 00.20	33 20.8
2008fj	0.027015	18.6	Ia	17 12 49.86	48 51.8
2011cm	0.03	18.1	Ia	17 14 19.18	59 55.2
1990O	0.030664	16.6	Ia	17 15 35.92	19 25.8
2002bw	0.017333	17.4	Ia	17 16 35.60	-10 20 31.8
2013bs	0.027612	16	Ia	17 17 22.03	04 00.2
2010gn	0.0365	16.4	Ia	17 17 49.90	52 52.0
2003ek	0.036038	18.2	Ia	17 18 32.50	40 00.8
2013dr	0.016834	15.2	Ia	17 19 30.22	42 04.3
2013cm	0.04	18.3	IaPec	17 20 01.94	44 51.3
2003U	0.02834	18	Ia	17 22 45.66	09 50.4
2009ia	0.027413	17.5	Ia	17 26 11.25	18 31.3
1991af	0.022388	18.5	Ia	17 27 07.67	28 23.3
2007eo	0.1	19	Ia	17 28 46.33	10 40.3
2006ap	0.022248	17.2	Ia	17 30 41.19	6 16 33.1
2009hl	0.049447	18		17 31 10.14	25 40.1
2007kf	0.046698	17	Ia	17 31 31.23	18 39.8
2012er	0.039694	16	Ia	17 31 52.62	50 10.1
2000gb	0.122504	20.4	Ia	17 32 28.54	04 25.5
1999da	0.012275	16.1	Ia	17 35 22.96	48 49.3
2009ex	0.08	20.2	Ia	17 38 26.07	23 00.7
2014bm	0.041265	17.4	Ia	17 42 32.11	35 41.2
2012fe	0.05	17.5	IaPec	17 43 12.18	46 02.5
2005ao	0.038406	16.6	Ia	17 44 49.64	54 28.1
2012ea	0.010209	16.4	IaPec	17 45 10.40	08 26.8
2013gz	0.016401	16.3	Ia	17 46 27.70	42 13.2
2011bd	0.028246	16	Ia	17 47 06.32	18 04.7
2012df	0.07	18.2	Ia	17 48 18.72	18 02.1

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2012db	0.019313	14.6	Ia	17 48 48.70	-60 42 19.3
2002by	0.012451	14.5	IaPec	17 50 18.58	-59 33 51.6
2013hm	0.031988	17	Ia	17 50 48.49	11 50.9
1998bp	0.01046	14.6	Ia	17 54 50.72	19 49.9
2009hs	0.027495	18.1	Ia	17 55 50.93	35 59.1
2000cn	0.023449	16.6	Ia	17 57 40.42	49 58.1
2010hh	0.019114	17.6	IaPec	17 59 18.38	52 32.2

Plot 3 Data from The SAI Supernova Catalog with calculated Trend

sn_name	redshift	sn_mag	sn_type	sn_ra	sn_dec	Trend Line	sn_mag-Trend
2005ew	0.002998	15.1	Ia	03 39 23.74	02 49.0	14.112	0.988
1993af	0.003345	17	Ia:	05 08 00.71	-37 29 18.0	14.2589	2.7411
2008ge	0.003502	12.4	IaPec	04 08 24.68	-47 53 47.4	14.3205	-1.9205
2001el	0.003902	12.7	Ia	03 44 30.59	-44 38 23.6	14.4656	-1.7656
2014dg	0.004005	14.9	Ia	03 48 19.88	07 54.2	14.5005	0.3995
2005df	0.004319	12.5	Ia	04 17 37.85	-62 46 09.5	14.6018	-2.1018
2003gs	0.004478	13.4	IaPec	02 27 38.36	- 1 09 35.4	14.6503	-1.2503
2005ke	0.004879	16.3	Ia	03 35 04.35	-24 56 38.8	14.7654	1.5346
2010ey	0.004906	16.8	Ia	03 41 31.50	-19 54 00.4	14.7728	2.0272
2010el	0.005004	16.5	IaPec	04 19 58.83	-54 56 38.5	14.7993	1.7007
2006ce	0.005026	12.4	Ia	02 22 54.63	-21 14 29.4	14.8052	-2.4052
2011ek	0.005031	16.1	Ia	02 25 48.89	31 59.8	14.8065	1.2935
2012fr	0.005462	13.78	Ia	03 33 36.23	-36 07 35.4	14.9168	-1.1368
2003hv	0.005619	12.5	Ia	03 04 09.32	-26 05 07.5	14.9548	-2.4548
2003if	0.00566	17.6	Ia	03 19 52.61	-26 03 50.5	14.9646	2.6354
2006dd	0.005922	14	Ia	03 22 41.62	-37 12 13.0	15.0253	-1.0253
2006mr	0.005922	15.14	Ia	03 22 42.84	-37 12 28.5	15.0253	0.1147
1992A	0.006152	12.6	Ia	03 36 27.43	-34 57 31.5	15.0764	-2.4764
2007on	0.006338	14.9	Ia	03 38 50.90	-35 34 30.0	15.1164	-0.2164
2011iv	0.006338	12.4	Ia	03 38 51.34	-35 35 31.8	15.1164	-2.7164
2004ea	0.006517	18.2	Ia	04 16 13.20	-16 45 20.5	15.1538	3.0462
2003hx	0.007098	14.3	Ia	05 46 46.97	-16 47 00.6	15.2683	-0.9683
2012Z	0.007127	15.6	IaPec	03 22 05.35	-15 23 15.6	15.2738	0.3262
2002fk	0.007127	13.1	Ia	03 22 05.71	-15 24 03.2	15.2738	-2.1738
2008hy	0.008538	14.3	Ia	03 45 08.45	39 55.5	15.5162	-1.2162
2009ig	0.008773	14	Ia	02 38 11.61	- 1 18 45.1	15.5526	-1.5526
1994aa	0.009059	17	Ia	03 24 49.40	- 3 02 33.6	15.5956	1.4044
2010lp	0.01014	16.7	IaPec	02 54 03.50	2 57 43.4	15.7469	0.9531
2013ex	0.01043	15.6	Ia	05 32 46.62	-14 02 45.4	15.7847	-0.1847
2010ko	0.01043	16.8	Ia	05 32 49.44	-14 05 45.9	15.7847	1.0153
2008fg	0.010884	17	Ia	03 18 44.10	28 57.2	15.8419	1.1581
2009ab	0.011171	16.5	Ia	04 16 36.39	2 45 51.0	15.8768	0.6232
2001eb	0.012652	16.3	Ia	04 30 45.10	0 52 17.9	16.0439	0.2561
1991bd	0.012731	17	Ia	04 02 49.66	1 58 26.3	16.0522	0.9478
2001ep	0.013012	15	Ia	04 57 00.26	- 4 45 40.2	16.0815	-1.0815
1998eb	0.013119	17.8	Ia	05 42 12.02	22 26.3	16.0925	1.7075
2009im	0.013164	15.1	Ia	03 33 22.08	- 4 59 56.8	16.0971	-0.9971

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2006lf	0.013208	17.6	Ia	04 38 29.49	02 01.5	16.1016	1.4984
2009F	0.013337	15.5	Ia	04 59 23.56	-11 07 50.1	16.1146	-0.6146
2011U	0.01335	16.6	Ia	04 13 33.94	32 36.7	16.1159	0.4841
2008R	0.013512	14.6	Ia	03 03 53.72	-11 59 39.3	16.1321	-1.5321
1998dj	0.013602	16	Ia	02 01 06.92	- 6 49 04.8	16.141	-0.141
1996by	0.013722	16.1	Ia	05 58 24.96	27 12.1	16.1528	-0.0528
2010it	0.013754	15.9	Ia	03 41 57.50	- 4 42 21.1	16.1559	-0.2559
2011dx	0.013854	16.5	IaPec	03 37 05.61	- 5 01 56.3	16.1656	0.3344
2003hm	0.013915	17.7	Ia	02 48 58.39	3 10 07.6	16.1715	1.5285
1993ab	0.013931	18	Ia:	03 02 01.45	34 53.5	16.1731	1.8269
2013gy	0.014069	17.9	Ia	03 42 16.88	- 4 43 18.5	16.1863	1.7137
2009bt	0.014263	16.9	Ia	03 08 56.99	33 35.1	16.2047	0.6953
1999dq	0.014329	14.7	IaPec	02 33 59.68	58 30.4	16.2109	-1.5109
2005el	0.01493	16	Ia	05 11 48.72	5 11 39.4	16.266	-0.266
1997dp	0.01496	17.8	Ia	02 34 06.48	56 13.4	16.2687	1.5313
2011iq	0.015	18.3	Ia	02 48 49.60	- 8 04 30.0	16.2723	2.0277
2011hh	0.015	16.9	Ia	02 57 04.61	47 43.3	16.2723	0.6277
2014H	0.015	16.3	Ia	03 37 01.41	05 01.0	16.2723	0.0277
2006dr	0.015124	16.1	Ia	03 17 14.19	-32 34 31.8	16.2833	-0.1833
2010ju	0.015244	16.7	Ia	05 41 55.99	29 51.0	16.2939	0.4061
2006hb	0.01527	15.7	IaPec	05 02 01.28	-21 07 55.1	16.2962	-0.5962
2009ic	0.015347	14.8	Ia	04 53 18.03	- 3 00 59.6	16.3029	-1.5029
2006P	0.015364	17.4	Ia:	03 19 17.90	-12 06 18.3	16.3044	1.0956
1995bd	0.015393	17.3	IaPec	04 45 21.24	04 02.5	16.307	0.993
2005ev	0.0154	16	Ia	02 31 04.93	42 06.5	16.3076	-0.3076
2004B	0.01565	17.8	Ia	04 42 04.72	- 7 12 07.8	16.3292	1.4708
2012id	0.015748	16.3	Ia	04 42 41.13	34 59.8	16.3375	-0.0375
2009J	0.015783	17.4	IaPec	05 55 21.13	-76 55 20.8	16.3405	1.0595
2009iw	0.015783	14.6	Ia	05 55 25.63	-76 55 15.9	16.3405	-1.7405
2008J	0.015941	15.4	IInPec	02 34 24.20	-10 50 38.5	16.3539	-0.9539
2006aw	0.01617	14.9	Ia	05 04 18.18	-63 34 57.3	16.373	-1.473
2011ka	0.016408	14.5	Ia	05 14 28.23	-62 10 19.3	16.3926	-1.8926
2010kg	0.016646	17.7	Ia	04 40 08.40	7 21 00.0	16.412	1.288
2008er	0.016648	18.5	Ia	02 04 36.27	56 10.4	16.4121	2.0879
2007J	0.016788	17.3	IbPec:	02 18 51.70	43 43.3	16.4234	0.8766
2005dm	0.016838	17.5	IaPec	02 18 39.25	- 6 54 10.8	16.4273	1.0727
2011gy	0.016881	15.4	Ia	03 29 35.30	52 03.3	16.4308	-1.0308
2011fw	0.016896	17.2	Ia	03 20 54.21	52 05.0	16.432	0.768
2013fb	0.016939	15.9	Ia	02 22 42.07	16 01.0	16.4354	-0.5354
2004gw	0.01701	17.9	Ia	05 08 48.41	26 20.7	16.441	1.459
2009fu	0.017066	15.7	Ia	02 12 09.10	33 55.1	16.4454	-0.7454
2013hk	0.017135	15.9	Ia	03 02 10.85	55 38.8	16.4508	-0.5508
2006ke	0.017181	18.3	Ia	05 52 37.38	49 00.5	16.4544	1.8456
2003F	0.017271	15.9	Ia	05 11 33.01	03 28.4	16.4614	-0.5614
2012en	0.017295	17.8	Ia	04 07 25.20	1 45 32.9	16.4633	1.3367
2004fz	0.017308	15.9	Ia	02 01 06.41	52 44.2	16.4643	-0.5643
2004fd	0.017323	15.7	Ia	02 43 15.25	25 25.6	16.4654	-0.7654
2012B	0.017341	16.4	Ia	03 51 34.52	04 42.9	16.4668	-0.0668
2008hs	0.017413	17.3	Ia	02 25 29.62	50 35.1	16.4724	0.8276
2011M	0.017425	17.1	Ia	05 00 41.55	14 38.6	16.4733	0.6267

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2006le	0.017425	17.6	Ia	05 00 41.99	15 19.0	16.4733	1.1267
1999ek	0.017522	17.9	Ia	05 36 31.60	38 17.8	16.4808	1.4192
2011hk	0.017554	15.6	IaPec	02 18 45.79	- 6 38 30.6	16.4832	-0.8832
2012fx	0.017652	16.7	IaPec	02 55 41.24	-27 25 26.7	16.4907	0.2093
2005mz	0.017678	18	IaPec	03 19 49.88	30 18.6	16.4927	1.5073
2009le	0.017791	16.1	Ia	02 09 17.14	-23 24 44.8	16.5012	-0.4012
2003em	0.017791	17.2	Ia	02 09 20.23	-23 24 53.0	16.5012	0.6988
2006ef	0.017894	15.3	Ia	02 04 19.51	- 8 43 42.2	16.509	-1.209
2010ia	0.017909	17.3	Ia	03 56 56.20	8 30 45.1	16.5101	0.7899
2002eh	0.017974	16.4	Ia	02 26 08.45	54 45.2	16.5149	-0.1149
2002es	0.017992	16	IaPec	03 23 47.23	33 53.5	16.5163	-0.5163
2008ey	0.018084	18.1	Ia	02 51 42.39	49 51.5	16.5231	1.5769
2003lb	0.018105	15.8	Ia	03 45 05.67	45 39.3	16.5247	-0.7247
1991bj	0.018132	18.8	Ia	03 41 30.48	- 4 39 49.6	16.5267	2.2733
2009km	0.018346	15.6	Ia	03 02 59.01	-14 49 01.9	16.5424	-0.9424
2003ij	0.018382	17.8	Ia	05 55 41.18	54 21.7	16.5451	1.2549
2006nr	0.018382	15.8	Ia	05 56 23.51	54 38.8	16.5451	-0.7451
2011do	0.018392	14.8	Ia	04 25 47.56	-67 48 40.7	16.5458	-1.7458
2013S	0.018576	15.9	Ia	03 35 30.29	16 59.3	16.5591	-0.6591
2006em	0.018866	17.4	IaPec	02 25 44.30	56 31.8	16.5799	0.8201
2012fd	0.018898	15.2	Ia	05 58 51.93	-23 20 24.2	16.5822	-1.3822
2005A	0.019138	17.1	Ia	02 30 43.25	- 2 56 19.8	16.5991	0.5009
2001gc	0.01929	15.5	Ia	05 55 26.14	54 34.2	16.6097	-1.1097
2012hp	0.019456	16	Ia	03 54 17.37	30 38.7	16.6212	-0.6212
2008L	0.019483	17.8	Ia	03 17 16.65	22 57.6	16.6231	1.1769
2008hm	0.019664	17.2	Ia	03 27 10.90	56 39.6	16.6355	0.5645
2004dt	0.019707	15.9	Ia	02 02 12.77	- 0 05 51.5	16.6384	-0.7384
2012U	0.019772	14.9	Ia	02 06 04.33	-55 11 37.5	16.6429	-1.7429
1993Y	0.020009	17.1	Ia	03 31 24.41	45 02.6	16.6588	0.4412
1992bc	0.020163	15.2	Ia	03 05 17.28	-39 33 39.7	16.6691	-1.4691
2003hz	0.020173	16.7	Ia	05 48 07.86	15 22.8	16.6698	0.0302
2013fe	0.02032	14.4	Ia	03 03 53.27	-39 24 20.3	16.6795	-2.2795
2010A	0.020334	15.8	Ia	02 32 39.46	0 37 10.2	16.6805	-0.8805
2012E	0.020384	15.5	Ia	02 33 22.81	9 35 05.9	16.6838	-1.1838
2009la	0.020385	15.8	Ia	04 22 45.81	-40 36 49.3	16.6838	-0.8838
2014aj	0.020395	17.6	Ia	05 11 43.91	29 29.1	16.6845	0.9155
2004ee	0.020509	17.2	Ia	02 06 14.62	-37 20 05.4	16.692	0.508
2013fz	0.020607	15.1	Ia	04 23 46.44	-51 35 46.3	16.6984	-1.5984
2014cd	0.020607	15.9	Ia	04 23 47.24	-51 36 02.9	16.6984	-0.7984
2009hp	0.021016	16.7	Ia	02 58 23.96	6 35 35.1	16.7247	-0.0247
2005ls	0.021136	15.8	Ia	02 54 15.97	43 29.8	16.7324	-0.9324
2006kf	0.021251	17.4	Ia	03 41 50.48	8 09 25.0	16.7396	0.6604
2011H	0.021331	15.6	Ia	02 23 06.02	02 32.4	16.7447	-1.1447
2003in	0.021331	17.7	Ia	03 35 33.31	5 03 52.7	16.7447	0.9553
1991bc	0.021351	16	Ia	03 20 45.66	- 1 02 47.2	16.7459	-0.7459
1994ah	0.021664	18	Ia	02 56 37.75	-33 54 43.6	16.7655	1.2345
2009hn	0.021855	17.5	Ia	02 32 00.31	1 14 53.5	16.7772	0.7228
1997ej	0.022302	16.5	Ia	04 17 53.49	-56 36 58.2	16.8044	-0.3044
2014dn	0.022302	17.1	IaPec	04 17 54.28	-56 36 45.2	16.8044	0.2956
2010jm	0.022362	17.4	Ia	03 46 03.55	42 15.5	16.808	0.592

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2009iv	0.0226	17.6	Ia	02 58 14.19	5 58 19.3	16.8222	0.7778
1995ak	0.02272	16.2	Ia	02 45 48.83	3 13 50.1	16.8293	-0.6293
2007E	0.022962	15.9	Ia	02 26 34.41	-15 50 36.5	16.8435	-0.9435
2014dd	0.023244	17.5	Ia	03 03 36.18	56 52.0	16.8599	0.6401
2010jf	0.023949	17.7	IaPec	03 40 43.47	1 03 34.0	16.9	0.8
2009jz	0.023959	17	IaPec	05 40 05.29	-55 32 04.0	16.9006	0.0994
2004J	0.025	17.5	Ia	05 46 32.18	-17 46 53.0	16.9576	0.5424
2009D	0.025053	16.5	Ia	03 54 22.83	-19 10 54.2	16.9605	-0.4605
2013hi	0.025367	16.2	Ia	03 14 24.72	10 49.1	16.9772	-0.7772
2001dw	0.02544	16.6	Ia	03 00 47.88	46 27.5	16.981	-0.381
2011hq	0.025721	18.3	Ia	05 00 56.13	-13 24 57.9	16.9958	1.3042
2009I	0.026177	16.4	Ia	02 45 10.40	- 4 42 49.4	17.0194	-0.6194
1991bb	0.026563	17.7	Ia	03 53 37.51	06 19.3	17.039	0.661
2010kq	0.026596	16.4	Ia	02 18 10.92	05 42.4	17.0407	-0.6407
1999gp	0.026744	16.1	Ia	02 31 39.15	22 52.3	17.0481	-0.9481
2011gs	0.027	17.4	Ia	04 21 09.99	28 04.4	17.0609	0.3391
2013D	0.027119	17.5	IaPec	03 41 15.13	23 03.9	17.0668	0.4332
2011ah	0.027198	16	Ia	05 53 50.77	-32 44 44.2	17.0707	-1.0707
2013ae	0.028	16.2	Ia	02 41 53.16	23 58.8	17.1097	-0.9097
2012hx	0.028	16.3	Ia	05 01 29.88	-13 43 46.4	17.1097	-0.8097
2009ad	0.028387	16.6	Ia	05 03 33.38	6 39 35.7	17.1281	-0.5281
2010he	0.028412	16.8	Ia	02 49 10.80	-14 26 59.8	17.1293	-0.3293
2000fs	0.02884	18.7	Ia	03 08 26.24	4 06 39.9	17.1493	1.5507
2012I	0.029	16.2	Ia	02 58 27.83	6 11 25.3	17.1568	-0.9568
2008gy	0.029	16.8	Ia	03 10 00.95	13 23.1	17.1568	-0.3568
2005eq	0.029026	17.2	IaPec	03 08 49.31	- 7 01 59.7	17.158	0.042
2004go	0.02903	16.5	Ia	02 55 41.76	-14 14 14.5	17.1582	-0.6582
2005ec	0.029263	16.6	Ia	04 54 19.17	1 38 27.6	17.1689	-0.5689
2013fh	0.029803	17.8	Ia	04 21 38.29	-17 55 41.4	17.1934	0.6066
2007so	0.02983	17	Ia	02 47 43.13	15 14.8	17.1946	-0.1946
2012eu	0.029937	17.3	Ia	03 13 04.16	- 8 23 31.7	17.1994	0.1006
2002hu	0.03	16.3	Ia	02 18 20.06	27 58.8	17.2023	-0.9023
2012gz	0.03	17.2	Ia	02 50 17.61	24 39.9	17.2023	-0.0023
2006qw	0.03	17.9	Ia	03 08 46.88	56 26.0	17.2023	0.6977
2007gn	0.03	18.3	Ia	03 16 31.37	27 40.7	17.2023	1.0977
2007hg	0.03	18	Ia	04 08 32.65	2 22 43.7	17.2023	0.7977
2003ah	0.03	17	Ia	04 43 08.54	0 46 00.4	17.2023	-0.2023
2014I	0.03012	17	Ia	05 42 19.80	-25 32 39.9	17.2076	-0.2076
2003kd	0.030187	16.7	Ia	03 00 45.80	27 13.0	17.2106	-0.5106
2000dx	0.030345	16.3	Ia	02 18 26.88	5 39 02.0	17.2176	-0.9176
2005do	0.030471	17.4	Ia	03 02 00.42	34 34.2	17.2232	0.1768
2006rz	0.03092	20	Ia	03 46 06.78	0 23 23.1	17.2428	2.7572
2009aq	0.031	16.8	Ia	03 09 19.79	05 05.3	17.2462	-0.4462
2012hh	0.031185	16.7	Ia	02 42 39.56	31 54.6	17.2542	-0.5542
2012H	0.031852	16.5	Ia	05 20 14.94	-25 18 56.4	17.2826	-0.7826
2004gc	0.032088	17.4	Ia	05 21 49.95	6 40 33.7	17.2925	0.1075
2010hk	0.032102	17.6	Ia	03 37 52.61	4 56 52.2	17.2931	0.3069
2011ag	0.032343	17.3	Ia	03 12 26.55	15 06.4	17.3031	-0.0031
2011jq	0.032604	18.4	IaPec	05 16 41.55	6 29 30.2	17.3139	1.0861
2006os	0.03281	17.2	Ia	02 55 01.01	00 34.8	17.3224	-0.1224

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2014dm	0.033116	16.55	Ia	04 08 07.13	- 8 49 37.0	17.3348	-0.7848
1999J	0.033299	17	IaPec	05 35 32.27	-69 29 52.1	17.3422	-0.3422
2008gp	0.033523	18.1	Ia	03 23 00.73	1 21 42.8	17.3512	0.7488
2011ik	0.033758	17.2	Ia	02 25 04.09	12 51.9	17.3606	-0.1606
2013A	0.033805	16.5	Ia	02 22 04.27	13 57.7	17.3625	-0.8625
2013gv	0.03412	17.76	Ia	03 09 57.30	12 48.3	17.3749	0.3851
2003iv	0.034372	17.1	Ia	02 50 07.25	50 46.5	17.3848	-0.2848
2005et	0.034377	17.9	Ia	02 56 30.53	56 12.8	17.385	0.515
2000dp	0.034523	16.8	Ia	02 52 44.41	-14 31 54.7	17.3907	-0.5907
2005eu	0.034897	17.6	Ia	02 27 43.26	10 36.6	17.4051	0.1949
2012fk	0.035	16.7	Ia	02 30 52.04	28 45.9	17.4091	-0.7091

Plot 4 Data from The SAI Supernova Catalog with calculated Trend

sn_name	redshift	sn_mag	sn_type	sn_ra	sn_dec	Trend Line	sn_mag - Trend
2013aa	0.004007	11.9	Ia	14 32 33.88	-44 13 27.8	13.7898	-1.8898
2008cq	0.00421	14.4	Ia	14 21 09.61	-29 15 04.0	13.8698	0.5302
2007af	0.005471	15.3	Ia	14 22 21.03	- 0 23 37.6	14.2944	1.0056
2003du	0.006396	13.5	Ia	14 34 35.80	20 03.8	14.5476	-1.0476
2012ei	0.006417	14.7	Ia	14 24 05.76	02 56.5	14.5529	0.1471
2005cf	0.006461	15.5	Ia	15 21 32.21	- 7 24 47.5	14.564	0.936
1991M	0.007236	14.4	Ia	15 58 34.82	27 28.7	14.7476	-0.3476
2006dy	0.007683	16.5	Ia	14 22 11.50	55 14.0	14.8447	1.6553
2002er	0.008577	14.6	Ia	17 11 29.88	7 59 44.8	15.0231	-0.4231
1990M	0.008652	12.4	Ia	14 11 29.30	- 5 02 36.0	15.0372	-2.6372
1991B	0.008713	16	Ia	14 03 24.29	- 6 04 22.9	15.0486	0.9514
2009mz	0.008713	14.7	Ia	14 03 24.64	- 6 03 31.3	15.0486	-0.3486
2002jo	0.009172	16.3	Ia	14 38 16.42	27 14.0	15.1318	1.1682
2009Y	0.009294	14.9	Ia	14 42 24.55	-17 14 46.3	15.1532	-0.2532
1999cp	0.009485	14.2	Ia	14 06 31.30	- 5 26 49.0	15.1862	-0.9862
2002cr	0.009485	14.2	Ia	14 06 37.59	- 5 26 21.9	15.1862	-0.9862
1999ac	0.009497	14.2	IaPec	16 07 15.01	7 58 20.4	15.1882	-0.9882
2010bp	0.009663	15.2	Ia	14 12 07.89	-49 23 43.3	15.2163	-0.0163
2012ea	0.010209	16.4	IaPec	17 45 10.40	08 26.8	15.3054	1.0946
1998bp	0.01046	14.6	Ia	17 54 50.72	19 49.9	15.3447	-0.7447
1996aa	0.010842	17	Ia	14 18 25.16	29 41.9	15.4029	1.5971
2013gn	0.010842	15.5	Ia	14 18 28.54	30 24.2	15.4029	0.0971
2005bc	0.012266	16.4	Ia	14 37 15.05	27 23.1	15.6029	0.7971
1999da	0.012275	16.1	Ia	17 35 22.96	48 49.3	15.6041	0.4959
1998D	0.012309	15.5	Ia	14 02 59.28	44 54.3	15.6085	-0.1085
2002by	0.012451	14.5	IaPec	17 50 18.58	-59 33 51.6	15.6271	-1.1271
2010V	0.01279	14.3	Ia	14 28 38.46	38 09.5	15.6707	-1.3707
2013dh	0.013382	16.5	IaPec	15 30 01.09	59 12.9	15.744	0.756
1990L	0.014436	18	Ia	15 36 29.15	29 59.5	15.8668	2.1332
2007ap	0.015444	15.5	Ia	15 56 23.06	30 57.9	15.9762	-0.4762
2013gz	0.016401	16.3	Ia	17 46 27.70	42 13.2	16.0737	0.2263
2007bj	0.016656	15.1	IaPec	16 22 10.59	- 1 30 51.4	16.0987	-0.9987
1997cn	0.016766	16.2	IaPec	14 09 57.76	32 32.3	16.1093	0.0907
2013dr	0.016834	15.2	Ia	17 19 30.22	42 04.3	16.1159	-0.9159

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2002bw	0.017333	17.4	Ia	17 16 35.60	-10 20 31.8	16.1632	1.2368
2013cw	0.017505	16.9	Ia	16 41 27.18	47 05.0	16.1792	0.7208
2011aj	0.017556	16.6	Ia	16 50 13.98	22 28.0	16.184	0.416
2009kp	0.017758	15.1	Ia	16 49 51.49	32 35.8	16.2025	-1.1025
2012el	0.018175	16.4	Ia	15 39 57.23	-30 33 18.8	16.2401	0.1599
2009gf	0.018517	16.1	Ia	14 15 37.11	16 48.6	16.2703	-0.1703
2013eb	0.018779	17.1	Ia	15 11 14.80	09 11.1	16.2931	0.8069
2010gl	0.0188	15.8	Ia	16 31 38.62	37 26.2	16.2949	-0.4949
2010hh	0.019114	17.6	IaPec	17 59 18.38	52 32.2	16.3217	1.2783
2012db	0.019313	14.6	Ia	17 48 48.70	-60 42 19.3	16.3385	-1.7385
1998cx	0.019562	17.8	Ia	16 54 55.31	-72 35 24.0	16.3593	1.4407
2009nk	0.019639	17	Ia	14 10 58.74	6 21 47.9	16.3657	0.6343
2004di	0.019767	16.8	Ia	15 55 41.00	51 49.0	16.3762	0.4238
2005S	0.019813	19.1	Ia	14 08 28.84	7 03 27.2	16.38	2.72
2000Q	0.02	16	Ia	16 05 11.85	39 51.5	16.3952	-0.3952
2011is	0.020869	16.6	Ia	14 01 47.00	9 29 50.8	16.4641	0.1359
2004bw	0.021198	17.6	Ia	15 03 46.75	- 3 18 16.4	16.4895	1.1105
2009dc	0.021391	15.6	IaPec	15 51 12.11	42 28.2	16.5041	-0.9041
2003K	0.021817	15.4	Ia	15 32 01.91	14 35.9	16.5361	-1.1361
1999dg	0.021928	15.8	Ia	15 11 28.41	29 05.7	16.5443	-0.7443
2004cq	0.021998	17.5	Ia	15 31 19.76	16 52.1	16.5495	0.9505
2014M	0.0222	16.3	Ia	15 15 17.18	29 09.7	16.5643	-0.2643
2002ci	0.022228	17.1	Ia	16 15 37.95	19 17.4	16.5663	0.5337
2006ap	0.022248	17.2	Ia	17 30 41.19	6 16 33.1	16.5678	0.6322
2013dp	0.022324	15.5	Ia	16 17 32.30	34 56.7	16.5733	-1.0733
1991af	0.022388	18.5	Ia	17 27 07.67	28 23.3	16.578	1.922
2001cp	0.022416	15.9	Ia	17 11 02.58	5 50 26.8	16.58	-0.68
2009gb	0.022572	14.9	Ia	14 47 25.83	-30 39 02.5	16.5912	-1.6912
2009as	0.022572	16.7	Ia	14 47 26.64	-30 39 34.5	16.5912	0.1088
2010gb	0.022595	15.8	Ia	15 38 39.79	00 19.9	16.5929	-0.7929
2006mp	0.023	16.7	IaPec	17 12 00.20	33 20.8	16.6217	0.0783
2000cn	0.023449	16.6	Ia	17 57 40.42	49 58.1	16.653	-0.053
2007ao	0.023734	17.7	IaPec	14 16 49.74	48 24.1	16.6726	1.0274
2010gp	0.024262	17.5	Ia	16 52 57.39	2 23 16.4	16.7082	0.7918
2011dz	0.024598	16.4	Ia	16 12 44.82	17 03.2	16.7305	-0.3305
2014by	0.024794	16	Ia	14 27 48.59	33 42.5	16.7434	-0.7434
2003ar	0.025214	16.8	Ia	16 02 08.11	24 55.5	16.7706	0.0294
2013dj	0.025304	16.6	IaPec	16 46 01.94	6 27 59.3	16.7764	-0.1764
2009Q	0.025604	16.1	Ia	15 40 12.88	44 18.1	16.7955	-0.6955
2013hr	0.026191	16.2	Ia	14 59 00.81	48 47.5	16.8322	-0.6322
2012T	0.026378	17.4	IaPec	14 01 41.69	49 33.9	16.8438	0.5562
2002aw	0.026428	16.6	Ia	16 37 29.06	52 49.7	16.8468	-0.2468
2006dt	0.026468	16.8	Ia	14 35 43.11	8 17 55.8	16.8493	-0.0493
2007gk	0.026981	18.8	Ia	16 45 18.22	55 50.0	16.8804	1.9196
2008fj	0.027015	18.6	Ia	17 12 49.86	48 51.8	16.8824	1.7176
2006dw	0.027042	15.8	Ia	16 17 43.29	57 55.1	16.884	-1.084
2009ia	0.027413	17.5	Ia	17 26 11.25	18 31.3	16.9061	0.5939
2009hs	0.027495	18.1	Ia	17 55 50.93	35 59.1	16.911	1.189
2013bs	0.027612	16	Ia	17 17 22.03	04 00.2	16.9178	-0.9178
2012cx	0.027672	17.3	Ia	17 10 05.86	22 23.5	16.9214	0.3786

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2011jt	0.027777	16.5	Ia	14 53 23.01	2 57 43.1	16.9275	-0.4275
2002de	0.027965	16	Ia	16 16 30.38	42 30.2	16.9384	-0.9384
2011bd	0.028246	16	Ia	17 47 06.32	18 04.7	16.9546	-0.9546
2012ar	0.028259	16.6	Ia	16 20 36.02	-10 27 38.2	16.9554	-0.3554
2012bp	0.028291	15.5	Ia	16 18 12.44	28 52.8	16.9572	-1.4572
2003U	0.02834	18	Ia	17 22 45.66	09 50.4	16.96	1.04
2001U	0.028422	17.3	Ia	14 04 42.94	- 9 42 29.7	16.9647	0.3353
2011bz	0.028422	17.4	Ia	14 04 43.75	- 9 43 04.7	16.9647	0.4353
1999cb	0.028899	15.7	Ia	16 25 48.41	20 32.4	16.9917	-1.2917
2014ac	0.028935	16.6	Ia	15 04 40.09	37 54.2	16.9937	-0.3937
2007cc	0.029083	15.8	Ia	14 08 41.98	-21 35 48.4	17.002	-1.202
2009fl	0.029146	17.6	IaPec	16 25 10.10	53 20.8	17.0055	0.5945
2001bs	0.029186	18.2	Ia	15 43 39.38	45 31.3	17.0077	1.1923
2011de	0.029186	16.1	Ia	15 43 53.25	45 42.5	17.0077	-0.9077
2011T	0.029193	16.3	Ia	17 10 03.62	30 01.2	17.0081	-0.7081
2009fv	0.029359	16.3	Ia	16 29 44.22	48 41.8	17.0173	-0.7173
1994Q	0.029477	17	Ia	16 49 51.15	25 55.9	17.0238	-0.0238
2010an	0.02952	17	Ia	16 17 40.46	00 10.1	17.0261	-0.0261
2003ia	0.02952	17.2	Ia	16 17 41.17	00 07.2	17.0261	0.1739
2010dd	0.02957	17.2	Ia	16 52 47.60	03 45.7	17.0289	0.1711
2007is	0.029653	16.3	Ia	16 47 14.59	14 36.9	17.0334	-0.7334
2008fn	0.029843	16.8	Ib/c	16 21 48.53	03 41.0	17.0438	-0.2438
1992ap	0.029876	18	Ia	16 30 27.46	29 18.3	17.0456	0.9544
2002ck	0.029882	15.9	Ia	15 47 00.75	- 0 59 25.5	17.0459	-1.1459
2003dw	0.02992	16.7	Ia	16 45 51.10	37 38.0	17.0479	-0.3479
1997ct	0.03	18.6	Ia	14 07 26.88	26 05.9	17.0523	1.5477
2006bw	0.03	16.6	Ia	14 33 56.73	3 47 55.8	17.0523	-0.4523
2008ba	0.03	18.6	Ia	16 05 49.17	27 17.2	17.0523	1.5477
2011cm	0.03	18.1	Ia	17 14 19.18	59 55.2	17.0523	1.0477
2002am	0.03002	19.1	Ia	14 02 03.14	-10 35 23.9	17.0534	2.0466
2001ay	0.030242	16.7	Ia	14 26 17.00	14 55.8	17.0653	-0.3653
2012ci	0.030611	17.5	Ia	14 38 23.48	20 55.1	17.0849	0.4151
2009he	0.030647	17.5	IaPec	16 22 12.33	16 22.5	17.0869	0.4131
1990O	0.030664	16.6	Ia	17 15 35.92	19 25.8	17.0878	-0.4878
2003au	0.030791	19.2	Ia	16 11 11.56	15 58.2	17.0944	2.1056
2012aj	0.031	16.1	Ia	16 27 03.96	36 49.8	17.1054	-1.0054
2011dv	0.031103	16	Ia	16 12 04.62	12 33.2	17.1108	-1.1108
2009ae	0.031147	16.5	Ia	16 39 28.87	18 55.6	17.1131	-0.6131
1999cc	0.031328	16.1	Ia	16 02 42.03	21 34.4	17.1225	-1.0225
1991aj	0.031418	18	Ia	16 29 44.90	46 43.0	17.1271	0.8729
2014ag	0.031658	15.5	Ia	16 30 40.68	30 34.7	17.1395	-1.6395
2007ai	0.031661	17.3	Ia	16 12 53.74	-21 37 48.7	17.1396	0.1604
2013hm	0.031988	17	Ia	17 50 48.49	11 50.9	17.1563	-0.1563
2006bt	0.032155	17.4	Ia	15 56 30.53	02 45.6	17.1647	0.2353
2007bk	0.032188	16.65	Ia	15 28 45.58	52 12.8	17.1664	-0.5164
2006cc	0.032612	18.1	Ia	16 09 56.47	07 35.9	17.1876	0.9124
2007cf	0.032836	17.9	Ia	15 23 07.66	8 31 45.5	17.1987	0.7013
2009ih	0.032882	17.3	IaPec	15 55 31.05	56 54.0	17.2009	0.0991
2014dl	0.032966	16.5	IaPec	16 29 46.09	8 38 30.6	17.2051	-0.7051
2013ed	0.033158	15.8	Ia	16 16 24.25	53 05.7	17.2145	-1.4145

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2014cb	0.033183	16.4	Ia	14 50 49.90	-13 31 03.7	17.2157	-0.8157
2012M	0.033266	16.9	Ia	14 56 59.85	35 59.6	17.2197	-0.3197
2008af	0.033366	17.1	Ia	14 59 28.50	39 12.3	17.2246	-0.1246
2004ct	0.033373	17.5	Ia	15 43 45.75	24 59.5	17.2249	0.2751
2003ge	0.033453	17.8	Ia	16 20 08.75	47 53.7	17.2288	0.5712
2010ag	0.033803	18.6	IaPec	17 03 53.63	30 06.2	17.2457	1.3543
2013cx	0.034	17.5	Ia	17 04 16.05	30 37.6	17.2551	0.2449
2012ds	0.03403	16.4	Ia	16 23 45.90	9 47 12.9	17.2565	-0.8565
2006R	0.034074	17.5	Ia	16 23 20.82	15 49.8	17.2586	0.2414
2011dl	0.0341	16.9	Ia	16 18 04.97	33 04.0	17.2599	-0.3599
2000cp	0.034223	18	Ia	16 05 27.62	49 48.8	17.2657	0.7343
2007hu	0.034257	17.3	Ia	16 56 29.96	58 40.4	17.2673	0.0327
2008dt	0.034257	17.2	Ia	16 56 30.56	58 33.2	17.2673	-0.0673
2008ek	0.034537	18.9	Ia	16 05 33.17	35 33.2	17.2805	1.6195
2001ck	0.034697	16.4	Ia	14 37 50.08	29 02.2	17.288	-0.888
2005be	0.034997	16.1	Ia	14 59 32.72	40 11.6	17.3019	-1.2019
2013eh	0.034997	16.6	Ia	16 16 09.19	32 53.0	17.3019	-0.7019
2013cv	0.035	16.5	IaPec	16 22 43.18	57 35.4	17.3021	-0.8021

Plot 5 Data from The SAI Supernova Catalog with calculated sn_mag -Trend

sn_name	redshift	sn_mag	sn_type	sn_ra	sn_dec	Trend Line	sn_mag-Trend
2014dg	0.004005	14.9	Ia	03 48 19.88	07 54.2	14.5005	0.3995
2006mr	0.005922	15.14	Ia	03 22 42.84	-37 12 28.5	15.0253	0.1147
2007on	0.006338	14.9	Ia	03 38 50.90	-35 34 30.0	15.1164	-0.2164
2012Z	0.007127	15.6	IaPec	03 22 05.35	-15 23 15.6	15.2738	0.3262
2013ex	0.01043	15.6	Ia	05 32 46.62	-14 02 45.4	15.7847	-0.1847
2001eb	0.012652	16.3	Ia	04 30 45.10	0 52 17.9	16.0439	0.2561
2011U	0.01335	16.6	Ia	04 13 33.94	32 36.7	16.1159	0.4841
1998dj	0.013602	16	Ia	02 01 06.92	- 6 49 04.8	16.141	-0.141
1996by	0.013722	16.1	Ia	05 58 24.96	27 12.1	16.1528	-0.0528
2010it	0.013754	15.9	Ia	03 41 57.50	- 4 42 21.1	16.1559	-0.2559
2011dx	0.013854	16.5	IaPec	03 37 05.61	- 5 01 56.3	16.1656	0.3344
2005el	0.01493	16	Ia	05 11 48.72	5 11 39.4	16.266	-0.266
2014H	0.015	16.3	Ia	03 37 01.41	05 01.0	16.2723	0.0277
2006dr	0.015124	16.1	Ia	03 17 14.19	-32 34 31.8	16.2833	-0.1833
2010ju	0.015244	16.7	Ia	05 41 55.99	29 51.0	16.2939	0.4061
2005ev	0.0154	16	Ia	02 31 04.93	42 06.5	16.3076	-0.3076
2012id	0.015748	16.3	Ia	04 42 41.13	34 59.8	16.3375	-0.0375
2012B	0.017341	16.4	Ia	03 51 34.52	04 42.9	16.4668	-0.0668
2012fx	0.017652	16.7	IaPec	02 55 41.24	-27 25 26.7	16.4907	0.2093
2009le	0.017791	16.1	Ia	02 09 17.14	-23 24 44.8	16.5012	-0.4012
2002eh	0.017974	16.4	Ia	02 26 08.45	54 45.2	16.5149	-0.1149
1993Y	0.020009	17.1	Ia	03 31 24.41	45 02.6	16.6588	0.4412
2003hz	0.020173	16.7	Ia	05 48 07.86	15 22.8	16.6698	0.0302
2009hp	0.021016	16.7	Ia	02 58 23.96	6 35 35.1	16.7247	-0.0247
1997ej	0.022302	16.5	Ia	04 17 53.49	-56 36 58.2	16.8044	-0.3044
2014dn	0.022302	17.1	IaPec	04 17 54.28	-56 36 45.2	16.8044	0.2956

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2009jz	0.023959	17	IaPec	05 40 05.29	-55 32 04.0	16.9006	0.0994
2009D	0.025053	16.5	Ia	03 54 22.83	-19 10 54.2	16.9605	-0.4605
2001dw	0.02544	16.6	Ia	03 00 47.88	46 27.5	16.981	-0.381
2011gs	0.027	17.4	Ia	04 21 09.99	28 04.4	17.0609	0.3391
2013D	0.027119	17.5	IaPec	03 41 15.13	23 03.9	17.0668	0.4332
2010he	0.028412	16.8	Ia	02 49 10.80	-14 26 59.8	17.1293	-0.3293
2008gy	0.029	16.8	Ia	03 10 00.95	13 23.1	17.1568	-0.3568
2005eq	0.029026	17.2	IaPec	03 08 49.31	- 7 01 59.7	17.158	0.042
2007so	0.02983	17	Ia	02 47 43.13	15 14.8	17.1946	-0.1946
2012eu	0.029937	17.3	Ia	03 13 04.16	- 8 23 31.7	17.1994	0.1006
2012gz	0.03	17.2	Ia	02 50 17.61	24 39.9	17.2023	-0.0023
2003ah	0.03	17	Ia	04 43 08.54	0 46 00.4	17.2023	-0.2023
2014I	0.03012	17	Ia	05 42 19.80	-25 32 39.9	17.2076	-0.2076
2005do	0.030471	17.4	Ia	03 02 00.42	34 34.2	17.2232	0.1768
2009aq	0.031	16.8	Ia	03 09 19.79	05 05.3	17.2462	-0.4462
2004gc	0.032088	17.4	Ia	05 21 49.95	6 40 33.7	17.2925	0.1075
2010hk	0.032102	17.6	Ia	03 37 52.61	4 56 52.2	17.2931	0.3069
2011ag	0.032343	17.3	Ia	03 12 26.55	15 06.4	17.3031	-0.0031
2006os	0.03281	17.2	Ia	02 55 01.01	00 34.8	17.3224	-0.1224
1999J	0.033299	17	IaPec	05 35 32.27	-69 29 52.1	17.3422	-0.3422
2011ik	0.033758	17.2	Ia	02 25 04.09	12 51.9	17.3606	-0.1606
2013gv	0.03412	17.76	Ia	03 09 57.30	12 48.3	17.3749	0.3851
2003iv	0.034372	17.1	Ia	02 50 07.25	50 46.5	17.3848	-0.2848
2005eu	0.034897	17.6	Ia	02 27 43.26	10 36.6	17.4051	0.1949

Plot6 Data from The SAI Supernova Catalog with calculated sn_mag -Trend

sn_name	redshift	sn_mag	sn_type	sn_ra	sn_dec	Trend Line	sn_mag - Trend
2012ei	0.006417	14.7	Ia	14 24 05.76	02 56.5	14.5529	0.1471
1991M	0.007236	14.4	Ia	15 58 34.82	27 28.7	14.7476	-0.3476
2002er	0.008577	14.6	Ia	17 11 29.88	7 59 44.8	15.0231	-0.4231
2009mz	0.008713	14.7	Ia	14 03 24.64	- 6 03 31.3	15.0486	-0.3486
2009Y	0.009294	14.9	Ia	14 42 24.55	-17 14 46.3	15.1532	-0.2532
2010bp	0.009663	15.2	Ia	14 12 07.89	-49 23 43.3	15.2163	-0.0163
2013gn	0.010842	15.5	Ia	14 18 28.54	30 24.2	15.4029	0.0971
1999da	0.012275	16.1	Ia	17 35 22.96	48 49.3	15.6041	0.4959
1998D	0.012309	15.5	Ia	14 02 59.28	44 54.3	15.6085	-0.1085
2007ap	0.015444	15.5	Ia	15 56 23.06	30 57.9	15.9762	-0.4762
2013gz	0.016401	16.3	Ia	17 46 27.70	42 13.2	16.0737	0.2263
1997cn	0.016766	16.2	IaPec	14 09 57.76	32 32.3	16.1093	0.0907
2011aj	0.017556	16.6	Ia	16 50 13.98	22 28.0	16.184	0.416
2012el	0.018175	16.4	Ia	15 39 57.23	-30 33 18.8	16.2401	0.1599
2009gf	0.018517	16.1	Ia	14 15 37.11	16 48.6	16.2703	-0.1703
2010gl	0.0188	15.8	Ia	16 31 38.62	37 26.2	16.2949	-0.4949
2004di	0.019767	16.8	Ia	15 55 41.00	51 49.0	16.3762	0.4238
2000Q	0.02	16	Ia	16 05 11.85	39 51.5	16.3952	-0.3952
2011is	0.020869	16.6	Ia	14 01 47.00	9 29 50.8	16.4641	0.1359
2014M	0.0222	16.3	Ia	15 15 17.18	29 09.7	16.5643	-0.2643
2009as	0.022572	16.7	Ia	14 47 26.64	-30 39 34.5	16.5912	0.1088

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2006mp	0.023	16.7	IaPec	17 12 00.20	33 20.8	16.6217	0.0783
2000cn	0.023449	16.6	Ia	17 57 40.42	49 58.1	16.653	-0.053
2011dz	0.024598	16.4	Ia	16 12 44.82	17 03.2	16.7305	-0.3305
2003ar	0.025214	16.8	Ia	16 02 08.11	24 55.5	16.7706	0.0294
2013dj	0.025304	16.6	IaPec	16 46 01.94	6 27 59.3	16.7764	-0.1764
2002aw	0.026428	16.6	Ia	16 37 29.06	52 49.7	16.8468	-0.2468
2006dt	0.026468	16.8	Ia	14 35 43.11	8 17 55.8	16.8493	-0.0493
2012cx	0.027672	17.3	Ia	17 10 05.86	22 23.5	16.9214	0.3786
2011jt	0.027777	16.5	Ia	14 53 23.01	2 57 43.1	16.9275	-0.4275
2012ar	0.028259	16.6	Ia	16 20 36.02	-10 27 38.2	16.9554	-0.3554
2001U	0.028422	17.3	Ia	14 04 42.94	- 9 42 29.7	16.9647	0.3353
2011bz	0.028422	17.4	Ia	14 04 43.75	- 9 43 04.7	16.9647	0.4353
2014ac	0.028935	16.6	Ia	15 04 40.09	37 54.2	16.9937	-0.3937
1994Q	0.029477	17	Ia	16 49 51.15	25 55.9	17.0238	-0.0238
2010an	0.02952	17	Ia	16 17 40.46	00 10.1	17.0261	-0.0261
2003ia	0.02952	17.2	Ia	16 17 41.17	00 07.2	17.0261	0.1739
2010dd	0.02957	17.2	Ia	16 52 47.60	03 45.7	17.0289	0.1711
2008fn	0.029843	16.8	Ib/c	16 21 48.53	03 41.0	17.0438	-0.2438
2003dw	0.02992	16.7	Ia	16 45 51.10	37 38.0	17.0479	-0.3479
2006bw	0.03	16.6	Ia	14 33 56.73	3 47 55.8	17.0523	-0.4523
2001ay	0.030242	16.7	Ia	14 26 17.00	14 55.8	17.0653	-0.3653
2012ci	0.030611	17.5	Ia	14 38 23.48	20 55.1	17.0849	0.4151
2009he	0.030647	17.5	IaPec	16 22 12.33	16 22.5	17.0869	0.4131
1990O	0.030664	16.6	Ia	17 15 35.92	19 25.8	17.0878	-0.4878
2007ai	0.031661	17.3	Ia	16 12 53.74	-21 37 48.7	17.1396	0.1604
2013hm	0.031988	17	Ia	17 50 48.49	11 50.9	17.1563	-0.1563
2006bt	0.032155	17.4	Ia	15 56 30.53	02 45.6	17.1647	0.2353
2009ih	0.032882	17.3	IaPec	15 55 31.05	56 54.0	17.2009	0.0991
2012M	0.033266	16.9	Ia	14 56 59.85	35 59.6	17.2197	-0.3197
2008af	0.033366	17.1	Ia	14 59 28.50	39 12.3	17.2246	-0.1246
2004ct	0.033373	17.5	Ia	15 43 45.75	24 59.5	17.2249	0.2751
2013cx	0.034	17.5	Ia	17 04 16.05	30 37.6	17.2551	0.2449
2006R	0.034074	17.5	Ia	16 23 20.82	15 49.8	17.2586	0.2414
2011dl	0.0341	16.9	Ia	16 18 04.97	33 04.0	17.2599	-0.3599
2007hu	0.034257	17.3	Ia	16 56 29.96	58 40.4	17.2673	0.0327
2008dt	0.034257	17.2	Ia	16 56 30.56	58 33.2	17.2673	-0.0673

Plot 7 and 8 Data Adapted from The SAI Supernova Catalog

Sequence	Redshift	2<=RA<=5 sn_mag	14<=RA<=17 sn_mag	Dist. Modulus	exponent	parsecs/2	dist (LY)	km/year	km/s/MPC
1	0.001	12.94754068	11.30808329	1.639457385	1.327891477	10.63803663	34.67999941	23826467.33	2.461349516
2	0.002	13.80371608	12.4741648	1.329551281	1.265910256	9.223170997	30.06753745	20657532.03	2.133988466
3	0.003	14.30454658	13.15627875	1.148267831	1.229653566	8.484447575	27.65929909	19002981.47	1.963068154
4	0.004	14.65989147	13.6402463	1.019645176	1.203929035	7.996483392	26.06853586	17910067.14	1.850166644

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5	0.005	14.93551839	14.01564069	0.919877695	1.183975539	7.637400112	24.89792437	17105812.9	1.767084635
6	0.006	15.16072198	14.32236025	0.838361727	1.167672345	7.356010655	23.98059474	16475572.86	1.701978842
7	0.007	15.3511289	14.58168794	0.769440958	1.153888192	7.126203101	23.23142211	15960863.01	1.648807686
8	0.008	15.51606687	14.8063278	0.709739072	1.141947814	6.932946019	22.60140402	15528016.83	1.604093304
9	0.009	15.66155248	15.0044742	0.657078277	1.131415655	6.766836133	22.05988579	15155973.39	1.565660039
10	0.01	15.79169379	15.1817222	0.60997159	1.121994318	6.621621043	21.5864846	14830728.92	1.532061255
11	0.011	15.90942092	15.34206251	0.567358409	1.113471682	6.492944432	21.16699885	14542526.38	1.502289021
12	0.012	16.01689737	15.48844175	0.528455622	1.105691124	6.377656563	20.7911604	14284311.2	1.475614575
13	0.013	16.11576613	15.6230976	0.492668528	1.098533706	6.273410548	20.45131839	14050826.92	1.45149491
14	0.014	16.20730429	15.74776944	0.459534853	1.091906971	6.17841356	20.1416282	13838058.09	1.429515216
15	0.015	16.29252429	15.86383615	0.42868814	1.085737628	6.091266943	19.85753023	13642872.07	1.409351882
16	0.016	16.37224227	15.9724093	0.399832968	1.079966594	6.010859792	19.59540292	13462780.72	1.390747875
17	0.017	16.4471258	16.0743981	0.372727699	1.07454554	5.936295948	19.35232479	13295776.88	1.37349585
18	0.018	16.51772787	16.1705557	0.347172172	1.069434434	5.866842627	19.12590696	13140219.29	1.357426259
19	0.019	16.58451171	16.26151299	0.322998718	1.064599744	5.801893437	18.9141726	12994749.8	1.3423988
20	0.02	16.64786918	16.3478037	0.300065486	1.060013097	5.740941236	18.71546843	12858232.54	1.328296134
21	0.021	16.70813479	16.42988339	0.278251403	1.055650281	5.683557852	18.5283986	12729708.52	1.315019195
22	0.022	16.76559632	16.50814401	0.257452304	1.051490461	5.629378696	18.35177455	12608361.13	1.302483627
23	0.023	16.82050313	16.58292521	0.237577921	1.047515584	5.578090918	18.18457639	12493489.7	1.290617043
24	0.024	16.87307277	16.65452325	0.218549518	1.043709904	5.529424187	18.02592285	12384488.73	1.279356898
25	0.025	16.9234961	16.72319809	0.200298004	1.040059601	5.483143413	17.87504753	12280831.69	1.268648798
26	0.026	16.97194152	16.7891791	0.182762423	1.036552485	5.439042958	17.73128004	12182058.01	1.258445164
27	0.027	17.01855838	16.85266965	0.165888722	1.033177744	5.396941975	17.59403084	12087762.63	1.248704153
28	0.028	17.06347969	16.91385094	0.149628749	1.02992575	5.356680629	17.46277885	11997587.57	1.239388783
29	0.029	17.10682449	16.97288507	0.13393942	1.026787884	5.318117007	17.33706144	11911214.97	1.23046622
30	0.03	17.14869969	17.02991765	0.118782036	1.023756407	5.281124568	17.21646609	11828361.41	1.221907186
31	0.031	17.18920167	17.08507997	0.104121706	1.020824341	5.245590034	17.10062351	11748773.19	1.213685471

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32	0.032	17.22841767	17.1384908	0.089926863	1.017985373	5.21141162	16.98920188	11672222.33	1.205777524
33	0.033	17.26642682	17.19025796	0.076168855	1.015233771	5.178497551	16.88190202	11598503.28	1.198162113
34	0.034	17.3033012	17.2404796	0.062821595	1.012564319	5.146764814	16.7784533	11527430.1	1.190820029
35	0.035	17.3391066	17.28924534	0.049861267	1.009972253	5.116138086	16.67861016	11458834.11	1.183733845

Plot 9 Data from The SAI Supernova Catalog

sn_name	redshift	sn_mag	sn_type	sn_ra	sn_dec
2014J*	0.00075	11.4	Ia	09 55 42.15	40 25.9
1999by*	0.00212	13.1	IaPec	09 21 52.07	00 06.5
2011by*	0.002836	14.2	Ia	11 55 45.56	19 33.8
1998bu*	0.002974	11.9	Ia	10 46 46.03	50 07.1
2006mq	0.003228	12.7	Ia:	08 06 12.39	-27 33 45.4
2001dp	0.003508	14.4	Ia	11 53 45.22	20 56.8
2012ht	0.003572	15.9	Ia	10 53 22.71	46 34.8
1998aq	0.003701	12.4	Ia	11 56 25.81	07 41.6
2003cg	0.004133	14.1		10 14 15.99	3 28 02.1
1994ae	0.004274	13.2	Ia	10 47 01.95	16 31.1
2002cv	0.004377	16.6	Ia	10 18 03.68	50 06.0
2002bo	0.004377	13.8	Ia	10 18 06.51	49 41.4
1993Z	0.004523	13.9	Ia	09 10 19.60	7 01 40.3
2011B	0.004613	15.4	Ia	08 55 48.10	13 01.5
1995al	0.005134	13.4	Ia	09 50 55.97	33 09.4
2007sa	0.0052	14.2	Ia	11 03 10.78	13 26.3
1992G	0.005295	13.6	Ia	10 36 18.52	19 14.0
2014ad	0.0053	14.56	IcPec:	11 57 44.44	-10 10 15.7
2001fu	0.005653	15.1	Ia	08 52 16.58	-17 44 29.8
2011ae	0.006047	15.3	Ia	11 54 49.25	-16 51 43.6
2007bm	0.006222	16	Ia	11 25 02.30	- 9 47 53.8
2010fz	0.00631	15.8	Ia	09 42 04.77	0 19 51.0
1995D	0.006572	13.4	Ia	09 40 54.79	5 08 26.6
2011eh	0.006741	14.6	IaPec	11 18 31.57	58 36.9
2011at	0.006755	14.5	Ia	09 28 57.56	-14 48 20.6
2002hl	0.006898	16.3	Ia	11 24 40.12	46 03.0
2007ax	0.007058	16.4	Ia	08 22 43.26	33 16.9
2001bg	0.007184	13.7	Ia	08 35 18.86	28 05.8
1996Z	0.007595	14.6	Ia	09 36 44.82	-21 08 51.7
1999gh	0.007778	14.7	Ia	09 44 19.75	-21 16 25.0
2005am	0.007906	14	Ia	09 16 12.77	-16 18 16.2
2013cg	0.007912	13.98	Ia	09 26 56.77	-24 46 59.6
2010hg	0.008241	13.9	Ia	09 46 13.70	-30 27 13.3
2007cj	0.008264	15.7	Ia	09 59 55.76	-29 37 03.3
2008fw	0.008484	14	Ia	10 28 55.97	-44 39 55.6
1998cn	0.008992	15.8	Ia	11 35 54.40	32 10.2
2004bd	0.009024	14.3	Ia	11 39 42.18	54 31.8

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2010ev	0.009182	14.3	Ia	10 25 29.01	-39 49 51.0
2013eu	0.009253	15.4	Ia	10 24 22.31	36 23.5
2010hx	0.009259	15.2	Ia	10 28 51.06	-35 36 22.3
2012gl	0.009361	16.1	Ia	10 12 50.32	40 56.7
2008fv	0.009395	16.1	Ia	10 16 57.28	24 36.4
1997bq	0.009395	14.5	Ia	10 17 05.33	23 02.1
2013E	0.00942	14	Ia	10 00 05.54	-34 14 01.1
2003aa	0.010133	15.9	IaPec	10 46 36.82	45 32.2
1997ei	0.010599	16.3	Ic	11 54 59.98	29 26.4
2011ao	0.010693	15.6	Ia	11 53 51.03	21 46.3
2004gi	0.010811	14.9	Ia	10 39 23.34	-27 54 40.0
2010Y	0.010865	15.9	Ia	10 51 03.95	46 47.0
2012ij	0.010997	16.6	Ia	11 40 15.84	27 22.2
2014K	0.011625	16.4	Ia	08 51 08.19	50 33.4
2009kq	0.011693	16.7	Ia	08 36 15.09	04 01.7
2007al	0.012078	16.6	IaPec	09 59 18.48	-19 28 25.8
2011ic	0.012122	16	Ia	10 15 33.21	-20 34 06.0
2008hv	0.012622	16.8	Ia	09 07 34.06	3 23 32.1
1993C	0.012785	18	Ia	09 40 23.82	56 11.6
2013hh	0.012981	15.9	IaPec	11 29 04.39	14 09.2
2011hr	0.01332	16	IaPec	08 54 46.03	32 16.1
2005as	0.013425	15.9	Ia	10 48 03.52	-20 50 56.5
2008bi	0.013445	15.9	Ia	08 35 53.39	0 42 23.1
2006ou	0.013483	16	Ia	11 37 13.10	26 07.3
2001fe	0.013545	14.9	Ia	09 37 57.06	29 41.5
2013gq	0.013772	15.2	Ia	08 17 53.46	28 10.5
2007S	0.013883	16.7	IaPec	10 00 31.26	4 24 26.2
2014ao	0.014077	15.3	Ia	08 34 33.32	- 2 32 36.3
1999aa	0.014383	14.8	IaPec	08 27 42.12	29 15.5
2009lp	0.015	16.5	Ia	10 37 28.45	-27 39 18.9
2001V	0.015018	14.5	Ia	11 57 24.93	12 09.0
2008bc	0.015087	15.2	Ia	09 38 31.23	-63 58 25.6
2013eg	0.01521	17.2	Ia	10 43 28.19	-25 51 52.6
2010H	0.015283	15.2	Ia	08 06 24.36	1 02 09.1
2013fg	0.015341	15.4	Ia	08 21 22.44	-13 18 37.0
2008bt	0.01536	16.5	IbPec	10 50 16.93	-12 06 31.8
2001L	0.015452	15.4	Ia	11 36 48.83	- 8 35 07.0
2013H	0.015547	16.5	Ia	09 06 30.70	-75 49 01.5
2010ja	0.015555	17.9	Ia	08 02 28.39	9 23 40.9
2010jq	0.015951	17.1	Ia	10 36 36.40	-27 28 44.5
2001er	0.01615	17.2	Ia	09 53 20.66	50 44.8
2000ce	0.016304	16.6	Ia	08 05 09.45	47 15.2
2009U	0.016505	15.8	IaPec	11 43 18.72	-12 52 46.1
2003jz	0.016513	16	Ia	09 46 28.67	45 04.7
2012gw	0.016574	14.8	Ia	10 10 09.14	-38 08 05.1
2001G	0.016694	14.2	Ia	09 09 33.18	16 51.3
2006ax	0.016811	16.5	Ia	11 24 03.46	-12 17 29.2
2013gs	0.016888	16.2	Ia	09 31 08.83	23 05.3
2003Y	0.016932	16.7	Ia	08 54 34.60	10 19.8
2014aa	0.01695	15.2	Ia	11 45 03.56	58 25.3

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1999gj	0.016968	17.3	Ia	10 29 19.20	06 20.2
1991K	0.016998	18	Ia:	09 20 30.47	-16 30 01.7
2007as	0.017095	15.8	Ia	09 27 36.01	-80 10 39.2
2011hd	0.017139	16	Ia	09 58 48.30	47 03.3
1999bh	0.017198	16.8	Ia	10 54 46.97	17 20.0
2006hn	0.017198	15.5	Ia	11 07 18.67	41 49.8
2002jm	0.018012	17.5	IaPec	10 19 25.20	- 5 39 14.5
2007ci	0.018132	17.5	Ia	11 45 45.85	46 13.9
2002au	0.018392	17.3	Ia:	09 34 37.57	5 50 15.7
1999gd	0.018491	16.6	Ia	08 38 24.61	45 33.1
2011ia	0.019	15.3	Ia	09 45 03.45	15 35.5
2009ds	0.019204	15.9	Ia	11 49 04.12	- 9 43 44.9
2001E	0.019204	15.5	Ia	11 49 05.00	- 9 44 10.9
2004fw	0.019269	18.3	Ia	08 52 14.55	53 30.4
2005ki	0.01954	17.7	Ia	10 40 28.22	9 12 08.4
2009mh	0.019739	16.6	Ia	11 43 55.93	46 55.2
2003cp	0.01977	16.2	Ia	08 09 11.13	41 14.0
2008as	0.019787	16.2	Ia	10 21 47.89	-19 29 42.0
2005lt	0.019931	15.7	Ia	11 42 26.21	07 05.0
2012cv	0.02	16.3	Ia	09 58 28.91	-10 53 12.5
2003af	0.02	15.6	Ia	11 10 21.69	24 50.9
2003W	0.02007	16.9	Ia	09 46 49.48	02 37.6
2013G	0.02068	15.6	Ia	11 53 21.40	45 07.9
2001P	0.02068	17.5	Ia	11 53 21.56	44 53.3
2006oq	0.020734	15.8	Ia	11 44 00.07	58 38.3
2007bc	0.020818	16	Ia	11 19 14.57	48 32.5
2009na	0.020916	15.3	Ia	10 47 01.42	32 38.1
2006or	0.020963	16.3	Ia	11 48 03.47	21 24.0
2001N	0.020974	16.3	Ia	10 39 58.08	05 26.0
2008Z	0.020991	17.2	Ia	09 43 15.25	17 03.9
2014ah	0.021026	15.4	Ia	11 55 30.86	55 26.3
2004bg	0.021028	15.5	Ia	11 21 01.53	20 23.4
2009cz	0.021167	16	Ia	09 15 00.02	44 07.1
2010iw	0.021487	16.3	IaPec	08 45 15.01	49 21.8
2012cy	0.021735	16.8	Ia	10 55 21.80	7 41 50.4
2009lu	0.021763	18	Ia	10 54 20.96	- 4 20 39.1
2003D	0.021938	17.5	IaPec	09 38 53.52	- 4 51 05.1
2008ia	0.022	15.1	Ia	08 50 35.15	-61 16 40.6
2009al	0.022086	15.8	Ia	10 51 22.08	8 34 42.4
2014ae	0.022225	15.2	Ia	11 19 20.95	48 57.3
2004at	0.022335	17.2	Ia	10 58 45.18	29 12.0
2006ar	0.022478	18.2	Ia	10 37 30.75	00 58.1
2003ag	0.022851	16.1	Ia	11 26 01.82	1 59 02.8
2014ai	0.022902	17.23	Ia	09 19 44.19	45 49.5
2002hv	0.023367	18.6	Ia	09 22 10.91	50 10.8
2014ap	0.023516	15.7	Ia	11 30 13.28	10 06.2
2004av	0.023641	15.8	Ia	11 40 57.84	-22 28 53.6
2003ik	0.023733	16.6	Ia	08 04 06.52	59 19.8
1996V	0.023789	16.5	Ia	11 21 31.23	2 48 40.4
1994K	0.023833	17.5	Ia	10 00 24.61	52 31.7

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2004bc	0.023916	16.5	Ia	10 59 31.41	11 28.9
2004ap	0.023939	16.5	Ia	10 05 43.81	16 17.1
2013C	0.023956	16.7	Ia	11 05 55.24	31 20.3
2007kd	0.024183	16.3	Ia	09 25 58.01	37 59.3
2002bf	0.024396	16.6	Ia	10 15 42.31	40 06.7
2013P	0.02454	16.7	Ia	09 13 37.17	59 58.6
2005M	0.024552	18.2	Ia	09 37 32.36	12 02.7
2002he	0.024563	16.1	IaPec:	08 19 58.83	49 13.2
2012hj	0.024597	17.7	Ia	11 07 19.23	22 46.1
2011C	0.024757	15.4	Ia	11 17 54.88	- 2 05 45.2
2006bb	0.024983	17.3	Ia	08 33 31.09	31 04.1
2010jn	0.025052	16.9	Ia	09 37 30.26	09 33.4
1999X	0.025084	16.3	Ia	08 54 32.23	30 41.1
2009P	0.02513	16.1	IaPec	11 20 38.78	- 3 32 46.3
2014R	0.025148	17.7	Ia	09 30 12.30	51 13.4
2005ms	0.025204	17.1	Ia	08 49 14.34	07 47.9
2005mc	0.025236	16.5	Ia	08 27 06.36	38 45.6
2008gf	0.025441	16.7	II	09 44 31.40	45 31.1
2013ah	0.025441	18.6	Ia	09 44 33.89	45 44.1
2003eh	0.025514	17.6	Ia	11 08 24.34	3 29 47.0
2013N	0.025558	15.9	Ia	11 50 04.13	16 46.0
2001gb	0.025731	16.8	Ia	09 59 00.96	49 12.4
2013hl	0.026128	16.9	Ia	11 50 00.17	20 17.2
2010lq	0.026366	15.2	Ia	08 32 41.03	-24 02 46.2
2004gs	0.026645	17.1	Ia	08 38 23.18	37 39.8
2013V	0.026762	17.5	Ia	09 08 41.54	48 49.2
2008hp	0.027	16.4	Ia	09 43 26.22	10 21.9
2002bn	0.027241	16.3	Ia	11 32 39.04	56 54.2
2009mx	0.027245	18.1	IaPec	09 20 37.72	38 52.9
1999at	0.027298	18.8	Ia	10 23 11.30	59 06.0
1993D	0.027318	18	Ia	11 28 58.81	-22 29 06.2
2003bt	0.027515	16.7	Ia	10 55 22.48	- 7 39 12.3
2009aa	0.027732	17.4	Ia	11 23 42.28	-22 16 14.5
2005km	0.027789	17.3	Ia	11 20 48.72	17 25.2
2012cm	0.028202	16.5	Ia	09 10 05.45	12 45.1
2013gb	0.028289	16.1	Ia	08 58 52.50	34 59.9
2005F	0.028573	17.7	Ia	09 04 53.68	33 56.3
2004az	0.028824	17.8	Ia	11 52 48.22	20 51.7
2004ck	0.029266	19.8	Ia	10 14 35.20	52 05.7
2001ba	0.02956	15.9	Ia	11 38 01.76	-32 19 51.0
2006qo	0.029703	18.5	Ia:	08 00 08.37	22 07.7
2007uz	0.029743	18	Ia	11 20 51.63	-29 24 16.5
1997bz	0.029847	17.5	Ia	11 22 25.46	1 11 21.5
2004bp	0.029962	18	Ia	11 09 53.25	00 06.4
2003ap	0.03	16.7	Ia	09 50 52.83	-21 51 10.1
2011J	0.03	18.8	Ia	10 50 44.20	00 49.0
2013ao	0.03	17	Ia	11 44 44.74	-20 31 41.1
2008ae	0.030083	17.8	IaPec	09 56 03.20	29 58.8
2002ar	0.030094	16.5	Ia	11 37 43.92	00 34.4
2008bd	0.030104	16.7	Ia	10 18 23.32	-13 06 11.2

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2007V	0.030327	16.7	Ia	10 27 05.58	- 3 18 05.1
2001ie	0.030787	16.1	Ia	10 16 50.70	16 44.5
2007ux	0.030915	15.7	Ia	10 09 19.98	59 32.8
2007bd	0.031018	17.6	Ia	08 31 33.28	- 1 11 58.0
2004as	0.031021	17.2	Ia	11 25 39.18	49 49.4
2006te	0.031545	15.8	Ia	08 11 42.99	33 16.8
2011ho	0.031832	18.3	Ia	11 44 12.95	30 58.1
2003ae	0.031998	17.1	Ia	09 28 22.58	26 40.7
1999am	0.032062	17.8	Ia	08 24 10.88	06 58.6
2004H	0.032065	17.6	Ia	11 33 59.77	03 46.5
2004L	0.032253	16.8	Ia	10 27 04.11	01 07.3
2011bg	0.03226	16.3	IaPec	11 56 14.31	21 11.9
2012ce	0.032939	16.6	Ia	11 13 49.46	-29 55 32.0
2003kc	0.033166	18.1	Ia	09 46 34.32	39 19.0
2003cq	0.033209	17	Ia	11 56 14.16	31 19.3
2012if	0.033357	18.2	Ia	11 17 30.29	24 07.4
2003bf	0.033583	17.2	Ia	08 08 26.35	19 56.2
2011be	0.033957	17.1	Ia	09 22 52.62	59 15.7
2008E	0.034	18	Ia	11 25 36.95	08 25.9
2002br	0.034183	17	Ia	10 34 08.92	42 20.9
2008cz	0.034233	18.1	Ia	11 23 10.90	12 51.0
2013U	0.034527	16.6	IaPec	10 01 12.00	0 19 42.3
2009ee	0.034895	17.3	Ia	11 21 25.30	20 23.3
2002hd	0.035	18	Ia	08 54 03.39	- 7 11 21.5
2008at	0.035	16.5	Ia	10 27 12.35	24 56.4
2007qc	0.035	16.8	Ia	11 57 04.75	29 55.3

* Removed to create roughly equivalent ranges for comparison.

Plot 10 Data from The SAI Supernova Catalog

sn_name	redshift	sn_mag	sn_type	sn_ra	sn_dec
2013dy	0.003874	16.3	Ia	22 18 17.60	34 09.5
2008ha	0.004658	18.2	IaPec	23 34 52.69	13 35.4
2000E	0.00475	13.8	Ia	20 37 13.77	05 50.2
2011dm	0.004917	16.5	Ia	21 56 41.59	17 48.9
2014ck	0.005116	16.1	IaPec	22 45 38.77	09 43.1
2014ba	0.00584	14.7	IaPec	22 55 01.97	-39 39 34.5
1993L	0.006417	14	Ia	22 57 52.87	-35 51 27.0
2007kg	0.006671	17.17	Ia	23 58 37.43	59 06.7
2007le	0.006724	14.9	Ia	23 38 48.41	- 6 31 21.3
1997dt	0.007312	15.3	Ia	23 00 02.93	58 50.9
2005dc	0.007391	15.7	Ia	21 42 22.66	-44 47 21.2
2010bv	0.008652	15.4	Ia	22 14 01.90	-26 55 44.5
2013gh	0.008789	15.9	Ia	22 02 21.85	-18 55 00.4
2004eq	0.008832	13.4	Ia	21 57 09.46	-34 34 51.3
1998dh	0.008936	13.9	Ia	23 14 40.31	4 32 14.1
2004fu	0.009215	16.5	Ia	20 35 11.58	48 26.1
2002ge	0.010013	14.1	Ia	22 54 21.49	-45 20 26.9

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2012dn	0.01018	16.3	Ia	20 23 36.26	-28 16 43.4
2002cd	0.01034	16.4	Ia	20 23 34.42	20 47.4
2008cc	0.010453	16	Ia	21 03 29.62	-67 11 01.1
2004bv	0.010515	15.3	Ia	20 25 06.34	-24 48 53.7
2006bh	0.010834	14.6	Ia	22 40 16.10	-66 29 06.3
2004db	0.011177	17.7	Ia	22 47 55.88	-22 19 40.6
1999ee	0.011406	14.6	Ia	22 16 10.00	-36 50 39.7
2002dp	0.011634	15.1	Ia	23 28 30.12	25 38.8
2012ah	0.012271	14.8	Ia	23 25 59.63	-81 54 33.3
2003dt	0.014088	17.5	Ia	20 47 17.56	0 18 42.8
2002ha	0.014088	14.5	Ia	20 47 18.58	0 18 45.6
1991ag	0.014223	14.7	Ia	20 00 08.63	-55 22 03.3
2007hj	0.014252	15.7	Ia	23 01 47.89	35 11.4
2008ea	0.014511	17.5	II	23 20 22.60	19 10.6
2014ci	0.014526	16.3	Ia	22 34 04.53	26 25.4
2012fz	0.014596	14.5	Ia	20 03 24.84	-55 57 19.2
1992al	0.0146	14.6	Ia	20 45 56.45	-51 23 40.0
2012gm	0.014786	15.9	Ia	23 17 37.05	00 08.8
2014cg	0.014913	17.8	Ia	20 04 34.84	44 16.8
2002jg	0.014987	15.8	Ia	22 19 28.80	23 04.5
2005kc	0.015138	18	Ia	22 34 07.34	5 34 06.3
2013fa	0.015513	15.6	Ia	20 43 53.56	30 52.0
2009nq	0.015626	15.2	Ia	23 15 16.97	01 22.5
2003gt	0.015657	16.4	Ia	20 32 59.12	9 52 19.3
2013ga	0.015684	15.7	Ia	22 04 21.56	44 33.6
2004eo	0.015701	16.2	Ia	20 32 54.19	9 55 42.7
2003ep	0.015705	15.7	Ia	21 21 07.34	05 05.8
2012ig	0.015737	16.2	Ia	21 14 22.85	14 40.4
2004ey	0.015844	16	Ia	21 49 07.81	0 26 39.2
2004da	0.016031	15.2	IaPec	20 22 21.24	6 25 50.3
1990R	0.016051	17.5	Ia	21 12 20.90	36 37.0
2009fk	0.016181	18.5	Ia	22 44 23.90	- 0 09 42.0
2011im	0.016181	16.9	Ia	22 44 25.21	- 0 10 02.0
2002dl	0.016261	17.7	IaPec	22 20 53.96	17 33.7
2006cm	0.016335	16.6	IaPec	21 20 17.46	- 1 41 02.7
2006B	0.016357	16.5	Ia	23 21 09.78	24 01.2
1996ca	0.016365	16.5	Ia	22 30 59.26	-13 59 50.9
2008ec	0.016382	17.3	Ia	23 03 16.56	8 52 19.8
2009jr	0.016548	16	Ia	20 26 26.03	2 54 32.1
2013fw	0.016957	16.2	Ia	21 13 44.78	34 33.3
2001da	0.017195	16.3	Ia	23 53 32.78	8 07 02.6
2006ch	0.017244	16.6	Ia	23 47 06.12	28 50.6
2013Q	0.017244	15.6	Ia	23 47 07.84	29 11.5
2007fs	0.017306	15.3	Ia	22 01 40.44	-21 30 29.6
2013ei	0.017407	16	Ia	21 26 31.93	10 49.4
2007cs	0.017558	15.9	Ia	23 49 39.00	55 52.1
2004ca	0.017805	18	Ia	21 43 32.84	41 33.0
2003gl	0.017936	18.2	Ia	23 53 53.99	7 57 23.7
2010im	0.018	16.3	Ia	20 11 31.59	-45 41 57.8
2007fb	0.018012	15.6	Ia	23 56 52.37	5 30 31.8

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2012co	0.018199	17.2	Ia	21 44 08.52	14 50.9
1998co	0.018205	16	Ia	21 47 36.24	-13 10 52.3
2009hk	0.018346	16.9	Ia	20 38 37.42	-25 06 56.0
2006bn	0.018516	18.4	Ia	20 00 15.75	-38 34 18.3
2012fw	0.018586	15.3	Ia	21 01 58.98	-48 16 26.4
2001iq	0.018599	16.6	Ia	22 25 10.42	43 04.2
2012gb	0.018633	16.4	IaPec	22 15 42.78	14 37.7
2012bl	0.018702	15.4	Ia	20 23 55.28	-48 21 17.3
2011gu	0.019033	16.9	IaPec	23 06 02.81	06 36.3
2008ff	0.019193	15.5	Ia	20 13 59.96	-44 21 07.8
2004fa	0.019363	16.8	Ia	20 22 35.00	-29 49 20.7
2001ib	0.019616	15.3	Ia	22 15 38.58	17 56.0
2001dd	0.019686	16.4	Ia	20 30 54.08	- 0 39 26.9
2013hq	0.019933	16.3	Ia	22 24 13.19	05 00.7
2000ey	0.020407	15.4	Ia	23 19 25.20	5 54 21.1
2011fs	0.021026	15.8	Ia	22 17 19.52	34 49.9
2007B	0.021097	16.7	Ia	22 35 31.10	48 06.6
2001dl	0.021167	16.1	Ia	21 21 01.73	9 10 50.4
2003gq	0.021439	17.5	IaPec	22 53 20.71	07 57.6
2002dr	0.021931	17	Ia	22 51 01.00	22 23.0
1999do	0.021932	14.9	Ia	22 53 29.87	38 42.9
2013em	0.022005	15.7	Ia	23 02 26.64	31 31.3
2009gg	0.022015	15.8	Ia	21 01 29.91	-52 01 00.2
2006dm	0.02214	16.9	Ia	23 41 47.84	- 3 40 08.4
2010ex	0.022809	15.8	Ia	23 00 10.90	05 57.2
2011ff	0.023272	16.8	Ia	22 45 02.88	00 15.7
2002el	0.023299	17	Ia	20 56 30.09	-18 33 34.3
2006eu	0.023586	17.2	Ia	20 02 51.15	19 02.3
2002ef	0.023624	16.2	Ia	23 51 29.54	-13 22 46.4
2009in	0.023673	16.3	IaPec	23 22 35.32	-13 05 43.6
2002dx	0.023677	18.8	Ia	23 57 06.73	50 15.5
2013di	0.023813	16.6	Ia	22 36 27.53	36 54.6
2000fo	0.023849	16.5	Ia	22 58 25.34	38 26.6
2007qe	0.024	17	Ia	23 54 12.98	24 33.4
2013dt	0.024132	16.7	Ia	22 44 35.45	3 38 37.2
1998eg	0.024757	15.5	Ia	22 39 30.32	8 36 20.8
2012et	0.024965	16.6	Ia	23 42 38.88	05 31.1
2002dm	0.025174	19.6	Ia	20 32 07.30	-57 35 03.4
2008ct	0.025316	19	Ia:	22 02 24.48	19 21.4
2005di	0.025318	18.3	Ia	22 25 32.84	-24 14 20.1
2003he	0.025514	18.1	Ia	23 58 57.05	- 2 14 53.1
2003gr	0.025654	16.3	Ia	23 38 12.67	-20 46 56.0
2005er	0.02591	18.4	IaPec	22 50 00.84	37 05.7
2007cq	0.025917	15.8	Ia	22 14 40.43	5 04 48.9
2003kg	0.025979	16.6	Ia	22 03 34.64	06 10.6
2010ii	0.026928	18	Ia	22 38 13.18	29 30.0
2012ee	0.027125	15.4	Ia	20 45 15.28	- 5 37 22.1
2013fn	0.027132	17.3	Ia	21 00 23.74	-14 29 52.0
2002et	0.027432	16.5	Ia	20 08 31.02	-25 27 37.5
2010cq	0.027472	16.4	Ia	21 01 44.10	-14 38 30.5

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2002eb	0.027539	17.6	Ia	22 19 05.24	35 39.8
2011gf	0.027655	16.1	Ia	21 12 24.27	- 7 48 52.1
2007su	0.027862	16.9	Ia	22 19 08.88	10 40.3
2013hp	0.027935	17.4	Ia	23 13 59.72	53 38.6
2013ey	0.027942	15.9	Ia	20 58 03.73	03 10.6
2009fw	0.028272	16.1	Ia	20 32 18.50	-19 43 59.6
2006do	0.028426	16.7	Ia	23 32 03.08	-27 43 31.8
2012eo	0.028546	17.2	Ia	22 14 37.82	57 18.4
2002df	0.028679	17.1	Ia	20 45 39.33	- 4 57 04.7
2006ev	0.028728	16.6	Ia	21 30 59.26	59 21.2
2008cv	0.02876	17	Ia	21 04 55.31	-21 43 49.5
2000A	0.028899	15.5	Ia	23 27 58.90	8 47 02.1
1992bb	0.028913	17.5	Ia	21 18 14.86	- 7 35 03.5
1993ah	0.029285	16.3	Ia:	23 51 50.27	-27 57 47.0
2011hb	0.029522	17.3	Ia	23 27 55.51	8 46 45.7
2001dt	0.029757	18.2	Ia	23 22 19.17	09 25.3
2007oo	0.029757	18.8	Ia	23 22 19.50	09 20.0
2011hv	0.029813	17.4	Ia	23 18 16.55	0 15 43.1
2007dz	0.03	17.9	Ia	21 45 16.26	02 48.6
2010hj	0.03	17.1	Ia	21 49 09.84	-59 02 23.2
2012go	0.03	16.5	Ia	22 41 51.81	58 07.0
2006rb	0.03	17.7	Ia	23 35 25.09	7 06 46.4
2007rx	0.03	17.2	Ia	23 40 11.74	25 16.5
1991bf	0.030091	17.5	Ia	23 52 15.36	-29 26 29.2
2004fg	0.030132	18.2	Ia	23 47 24.45	23 22.4
2000cw	0.030132	17.2	Ia	23 47 25.10	23 15.8
2010dl	0.0302	16.4	Ia	21 35 00.97	- 0 30 47.8
2000ej	0.030361	18	Ia	21 20 15.66	- 4 52 40.5
2005mu	0.030401	17.4	Ia	21 35 52.50	-26 27 03.5
2006ha	0.03047	18.4	Ia	22 58 34.30	10 25.8
2013fy	0.030958	15.5	Ia	21 37 27.13	-47 01 55.6
2004ef	0.030974	17.5	Ia	22 42 10.00	59 40.3
2005cg	0.030988	17.7	Ia	21 10 50.42	0 12 07.4
2011ie	0.031	16.7	Ia	23 00 54.71	50 32.3
2011L	0.031	17	Ia	23 40 11.52	25 42.2
2001de	0.031064	17.2	Ia	22 34 18.06	24 54.7
2001fg	0.031101	17.9	Ia	21 12 45.23	- 0 52 36.2
2013cy	0.031465	16.8	Ia	22 10 34.23	-22 39 47.8
2006en	0.031938	15.2	Ia	23 10 05.06	13 24.0
2014at	0.031982	16.4	Ia	21 46 14.82	-46 31 21.1
2000dn	0.032065	17.3	Ia	23 05 05.86	- 3 12 01.0
1990ab	0.032829	18	Ia	21 54 04.01	-40 04 16.1
2006dv	0.032999	17.5	Ia	23 15 53.06	5 07 50.2
2013fj	0.033453	16.7	Ia	22 15 28.48	34 03.6
2007ob	0.033926	17	Ia	23 12 25.99	54 49.3
2011hc	0.034	16.4	Ia	20 12 10.07	-11 21 57.7
1997dg	0.034	16.4	Ia	23 40 14.21	12 11.8
2005iq	0.034043	17	Ia	23 58 32.50	-18 42 33.0
2006op	0.03409	21.6	Ia:	21 21 31.86	0 59 35.9
2004bz	0.034168	18.3	Ia	22 15 01.05	24 16.6

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2003gj	0.034335	17.6	Ia	21 07 19.18	-25 29 23.6
2010ij	0.03441	15.9	Ia	22 20 20.19	03 22.2
2003gn	0.034451	18.1	Ia	22 33 51.68	48 08.5
2006gr	0.034597	18.3	Ia	22 32 22.67	49 43.3

Plot 11 Mean Trend Data Derived from the SAI Supernova Catalog

Redshift	RA 2-5 sn_mag	RA 8-11 sn_mag	RA14-17 sn_mag	RA20-23 sn_mag	RA 2-5 Δdistmod	RA 8-11 Δdistmod	RA 14-17 Δdistmod	RA 20-23 Δdistmod
0.001	12.947540681	1.91130634	11.30808329	13.10505106	0	0	0	0
0.002	13.803716081	2.92353328	12.4741648	13.91471628	0.856175397	1.012226938	1.166081502	0.809665222
0.003	14.304546581	3.55545065	13.15627875	14.38834007	0.500830502	0.631917371	0.682113951	0.473623793
0.004	14.659891471	4.00380316	13.6402463	14.7243815	0.355344896	0.44835251	0.48396755	0.336041429
0.005	14.935518391	4.35157238	14.01564069	14.98503548	0.275626915	0.347769225	0.375394396	0.260653982
0.006	15.160721981	4.63572053	14.32236025	15.19800529	0.225203587	0.284148146	0.306719555	0.21296981
0.007	15.3511289	14.87596437	14.58168794	15.3780687	0.19040692	0.240243835	0.259327689	0.180063409
0.008	15.516066871	5.08407304	14.8063278	15.53404672	0.164937976	0.208108675	0.224639862	0.15597802
0.009	15.661552481	5.2676379	15.0044742	15.67162909	0.145485606	0.183564861	0.198146401	0.137582364
0.01	15.791693791	5.43184227	15.1817222	15.79470071	0.130141309	0.164204364	0.177247995	0.123071618
0.011	15.909420921	5.58038318	15.34206251	15.90603253	0.117727134	0.148540915	0.160340315	0.111331821
0.012	16.016897371	5.71599041	15.48844175	16.00767052	0.107476453	0.135607231	0.14637924	0.101637989
0.013	16.115766131	5.84073697	15.6230976	16.1011684	0.098868753	0.12474656	0.134655847	0.093497887
0.014	16.207304291	5.95623425	15.74776944	16.18773393	0.091538167	0.115497275	0.124671842	0.086565522
0.015	16.292524291	6.06375964	15.86383615	16.2683245	0.085219995	0.10752539	0.116066708	0.080590573
0.016	16.372242271	6.16434292	15.9724093	16.34371195	0.079717981	0.100583285	0.108573154	0.075387447
0.017	16.4471258	16.25882639	16.0743981	16.41452757	0.074883533	0.094483473	0.101988801	0.070815621
0.018	16.517727871	6.34790778	16.1705557	16.48129431	0.070602073	0.089081388	0.0961576	0.066766743
0.019	16.584511711	6.43217155	16.26151299	16.54445023	0.066783832	0.084263764	0.090957286	0.063155921
0.02	16.647869181	6.51211215	16.3478037	16.60436593	0.063357477	0.079940599	0.086290709	0.059915697
0.021	16.708134791	6.58815162	16.42988339	16.66135772	0.060265611	0.076039471	0.082079693	0.056991791
0.022	16.765596321	6.66065306	16.50814401	16.71569775	0.057461523	0.072501444	0.078260622	0.05434003
0.023	16.820503131	6.72993113	16.58292521	16.76762185	0.054906817	0.069278072	0.0747812	0.051924104
0.024	16.873072771	6.79626029	16.65452325	16.81733574	0.052569636	0.066329159	0.071598039	0.049713886
0.025	16.9234961	16.85988137	16.72319809	16.86501991	0.050423328	0.063621078	0.068674841	0.047684172
0.026	16.971941521	6.92100685	16.7891791	16.91083362	0.048445425	0.061125481	0.065981006	0.045813715
0.027	17.018558381	6.97982515	16.85266965	16.9549181	0.046616853	0.058818301	0.063490554	0.044084477
0.028	17.063479691	7.03650413	16.91385094	16.99739915	0.044921314	0.056678973	0.061181288	0.042481045
0.029	17.106824491	7.09119395	16.97288507	17.03838932	0.043344798	0.054689822	0.059034127	0.040990171
0.03	17.148699691	7.14402952	17.02991765	17.07798972	0.041875197	0.052835568	0.05703258	0.039600403
0.031	17.189201671	7.19513246	17.08507997	17.11629151	0.040501989	0.051102939	0.055162319	0.038301792
0.032	17.228417671	7.2446128	17.1384908	17.15337717	0.039215992	0.049480346	0.053410835	0.037085655
0.033	17.266426821	7.29257043	17.19025796	17.18932154	0.038009153	0.04795763	0.051767161	0.035944374
0.034	17.3033012	17.33909628	17.2404796	17.22419279	0.03687438	0.046525843	0.05022164	0.034871246
0.035	17.3391066	17.38427335	17.28924534	17.25805313	0.035805406	0.045177076	0.048765733	0.033860342

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