

Re: SNe1a data

Source: <http://sci.tech-archive.net/Archive/sci.astro/2005-05/msg00037.html>

- *From:* "sean" <jaymoseley@xxxxxxxxxxxx>
 - *Date:* 6 May 2005 09:07:46 -0700
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Steve W wrote..

>Yes, that's R mag at maximum minus the R-I color _at B maximum_, so
>it's only approximate. It also ignores the K correction. You got
>the normalization by a different method, and we agree within 2%, so
>this should be good enough.

I wonder if that's the reason why your calculated value of 1.06 is slightly different from the graphs 1.04. Maybe in the graph the data is shown with k correction whereas in the tables it's without k correction? Although it's a big difference between the R max and the k corrected R max so maybe not. (Also I would have thought that when Knop writes ... "Magnitude in the observed filter at the peak of the rest-frame B-band lightcurve." ...that this would insinuate a K correction has been already applied if R max is already in "rest frame B band")

>If I'm right about what zero point means, 0.91 in the table is
> $22.388 + 0.102 = 22.49$ mag at I measured on day 50819.87. The
>estimated I_{max} from above is 22.428. Thus on that date, the
>SN was $22.49 - 22.428 = 0.062$ fainter than maximum. Thus the maximum
>corresponds to $1.06 * 0.91 = 0.96$.

>A simpler way of getting the same result is to note the zero point is
> $22.428 - 22.388 = 0.04$ mag brighter than I_{max} . This is equivalent to
>saying $I_{\text{max}} = 0.96$ in the table units.

Yes thanks.

I tried the same method for another SN,... 1998as and it works but once again the calculated normalization value is slightly different from the value taken off the graph.

The calculated normalization value is 1.44 whereas it's 1.38 if I work it out from the graph artwork. Once again the graph normalization datapoint is lower than the calculated one from the tables.

I wonder why that is.

But judging from 1997eq it seems that the 1.06 which you worked out gave a better χ^2 result for the dilated template so I'll

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assume the graph artwork either isnt as accurate or has been k corrected or something like that.

>You just average it in the same as positive readings. If the error >bars were equal, the average would be $(0.59+0.13-0.11)/3=0.20$. A >quick weighted average is 0.31 ± 0.18 , if I have punched the right >buttons on my calculator. This is in "Table 13 units," so multiply >by 1.04 or 1.06. The error bar is large enough that this value won't >much matter.

Thanks again

I can now work out how 0.31 as a weighted average is calculated using the formula $((M1 \times W1) + (M2 \times W2) + \text{etc....})$ but I was wondering if you could describe the calculation of how you got ± 0.18 as the weighted error margin?

>I don't know what you mean by "afterglow." Basically you have to >argue that the light curve is not the same as the template, for which >there is no evidence.

By afterglow I mean the decay curve of the observed SN datapoints becoming fainter over time

Yes Im stuck with the readings of course.

But just as a hypothetical argument...

(Assuming you mean above that `lightcurve` means the HST and ground based datapoints and `template` is the composite V band lightcurve)

Then I would argue that the last HST datapoint does not decay in line with the V band template from Knop and is therefore incorrect or a unaccounted for rebrightening in the observed SN decay.

Look at the last 3 readings of the observed (*1.06) HST readings compared to the expected dilated template (t-day) values..

JD observed(*1.06) t-day t-flux

50846.82 .402 22.96 .41

50855.83 .286 29.0 .294

50863.83 .233 34.46 .215

Notice how the 2nd and third last observed HST are decaying at the same rate but slightly fainter than the expected values(t-flux)

predicted by the Knops dilated template but the last HST reading is brighter than expected from the template.

In other words if one were to extrapolate the last HST reading from the 2nd and third last and followed the same decay rate as the template, the last HST reading (.233)should be *below* the expected t-day value (.215)for that day, not above.

My rough estimate is that if the first 2 are below the template by about 0.01 then the last reading if it were to follow the extrapolated decay rate should be about .205 not .233

And redoing all the calculations on this assumption one finds that in fact, with this in mind, the undilated template now becomes as good a chi fit if not better than the dilated template to the data if one "corrects" the last HST reading so

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its in line with the expected decay rate of a SN1a V band template.
So as you ask above I need to supply the hypothetical
argument, which I've done, and also the evidence. And my evidence
is, quite literally, the V band template supplied by Knop.
Sean

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- *Follow-Ups:*
 - ◆ *Re: SNe1a data*
 - ◇ *From: Steve Willner*

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