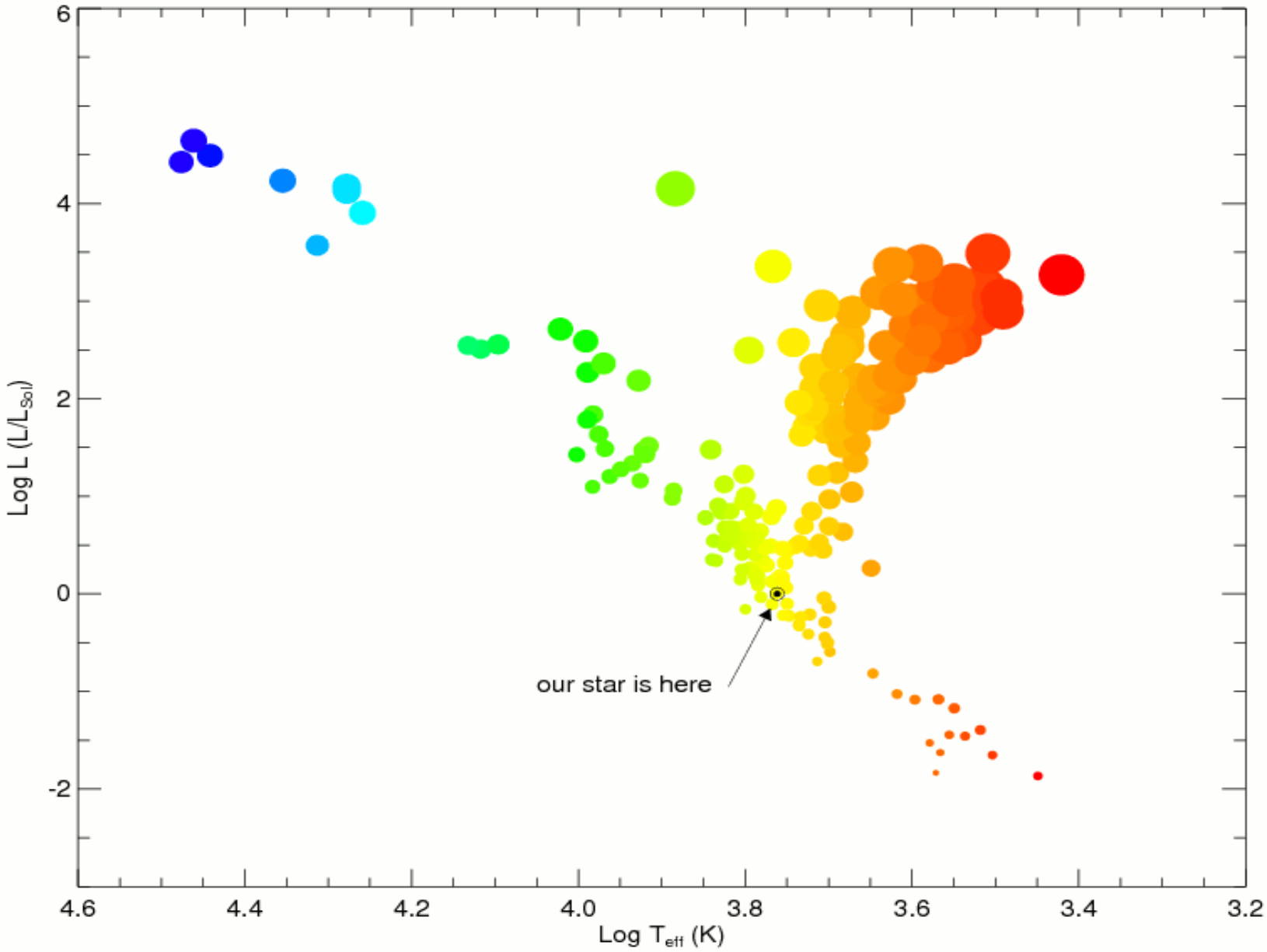
Calibration Tips

"the perfect calibrator is IMPOSSIBLE to find"
Tabetha Boyajian


6
4
2
0
-2
Log L (L/L$_{Sol}$)
4.6
4.4
4.2
4.0
3.8
3.6
3.4
3.2
Log T$_{eff}$ (K)
our star is here

Change Nothing - Check Everything

- Duh! All observing parameters must remain the same between the object and the calibrator.
- Sample Time
- Readout Mode
- Tiptilt
- Delay lines
- Position in sky
- Multiple calibrators
- Check Stars

Some (paraphrased) words of wisdom from Tabetha:

When acquiring data, CLOSE the bracket (finish the last calibrator observation) BEFORE you move the reference cart. Once the reference cart is moved, then start a NEW bracket. For some setups, this makes a BIG difference to the visibility calibration.

Try to not only get a calibrator that is close in sky to your object, but also one that is close in delay space (<10 meters is a good distance). This of course depends on Ra/Dec and baseline, so is often something that typically likes to manifest itself at the last minute when you are on sky and slew to the next new object. Another good reason to have more than one calibrator picked out to observe

CLOSE the bracket before you do a NIRO alignment. Once NIRO alignment is complete, then start new bracket. This is imperative.

NIRO should always be aligned when you move the reference cart position to a new position.

When is a good time to align NIRO?

- Align when on new object and/or a long period of time has elapsed while observing a single object in brackets. I have found that after ~1.5 hours it is a good time to do this.

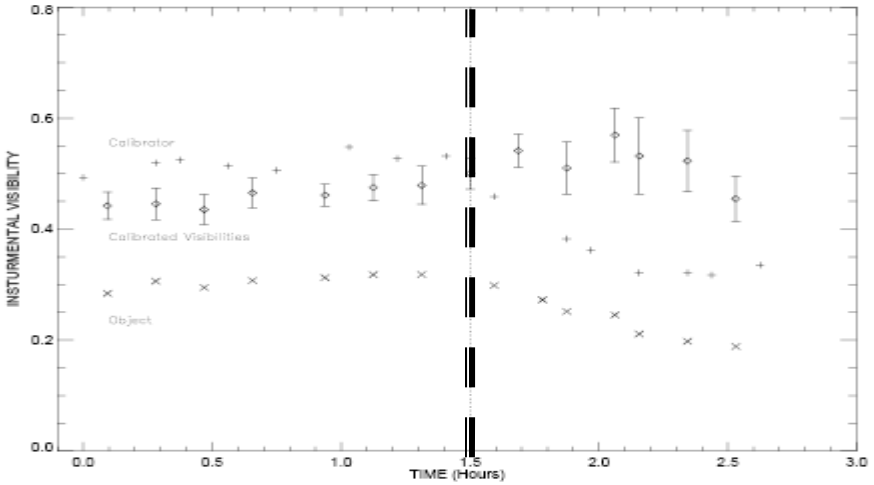


Figure. 8.1: Data for HD 215648 and its calibrator taken on 2007-07-21. Insturmental visibilities for the calibrator (*plusses*), object (*crosses*), and the objects calibrated visibilities (*diamonds*) are shown with respect to Time. The *dotted* line marks a time where NIRO should have been realigned.

When is a good time to align NIRO?

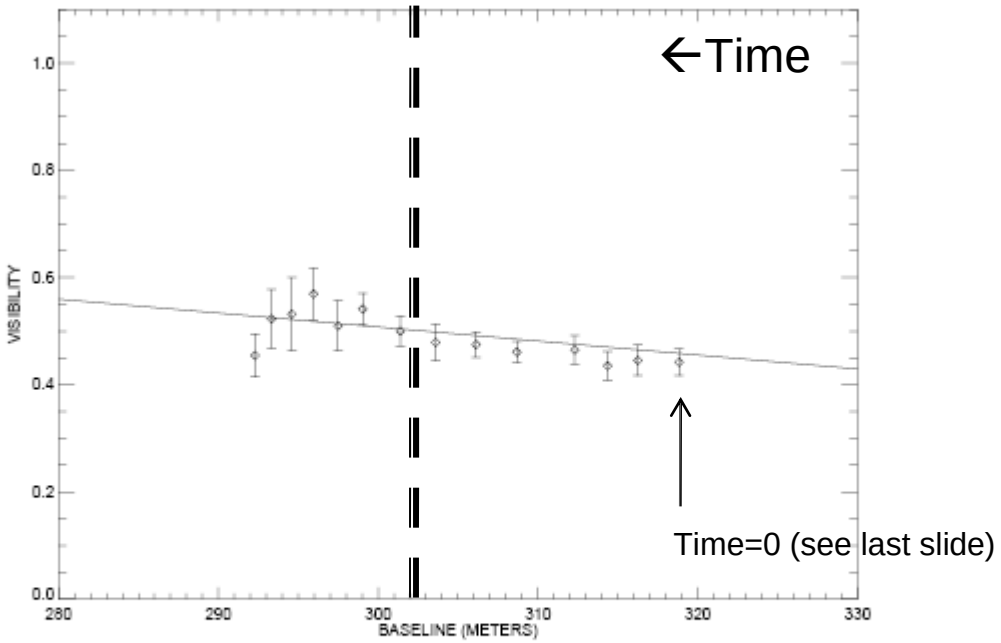


Figure. 8.2: Limb darkened diameter fit to the calibrated visibilities of HD 215648 taken on 2007-07-21. In this case, Time=0 represents the points at the longest projected baseline.

More controversial and perhaps obsolete:

we all should be using 1x1 pixels, *especially* in poor seeing. If the seeing really sucks, try longer scan lengths like FB MED or FB LONG if you are having trouble holding on to the fringes. You may also try slower scan speeds to improve the data quality.

I (Tabetha) can not think of a situation that you would benefit from using 2x2 over 1x1 pixels.

Observing with 1x1 and 2x2 pixel arrays

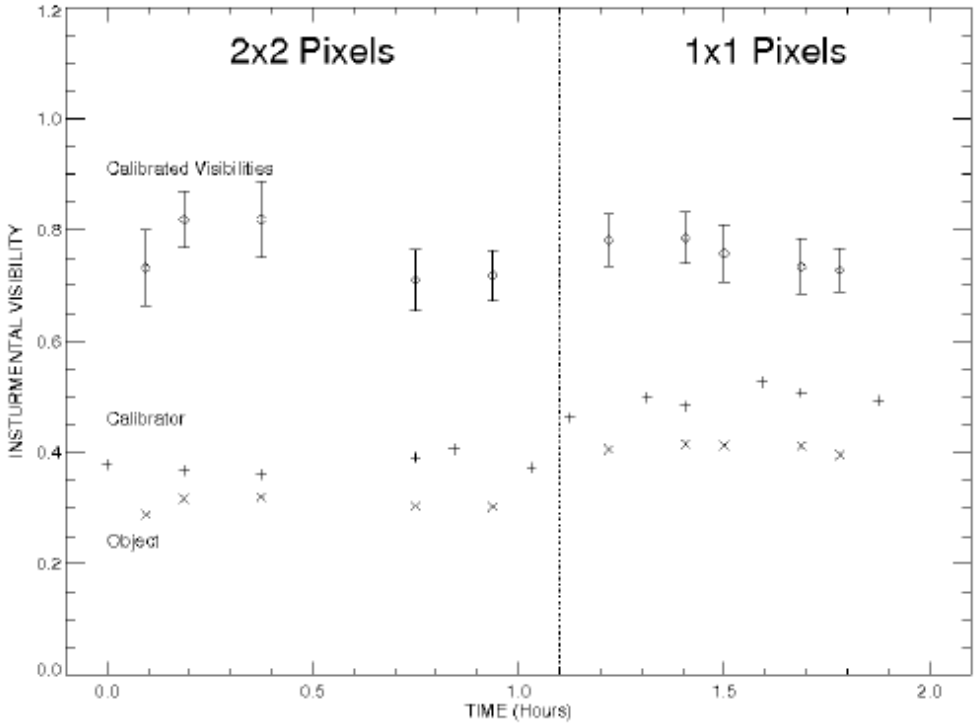


Figure. 8.3: Data for HD 90839 and its calibrator taken on 2007-11-16. Insturmental visibilities for the calibrator (*plusses*), object (*crosses*), and the objects calibrated visibilities (*diamonds*) are shown with respect to Time. The *dotted* line marks a time where NIRO was changed to collect data in 1×1 mode.

Observing with 1x1 and 2x2 pixel arrays

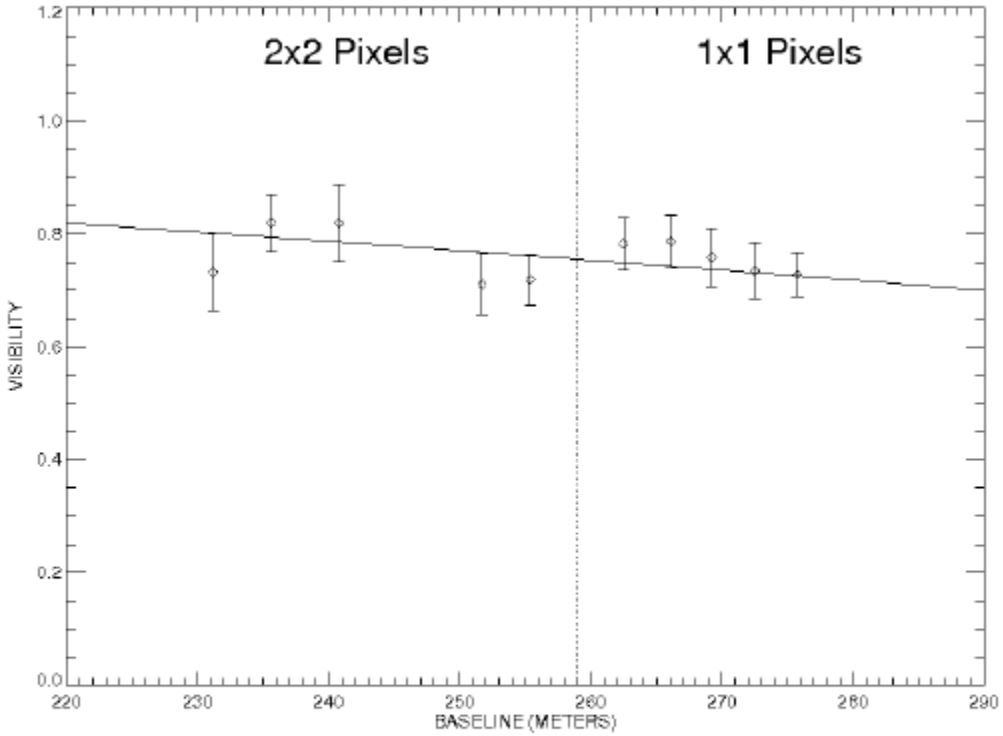
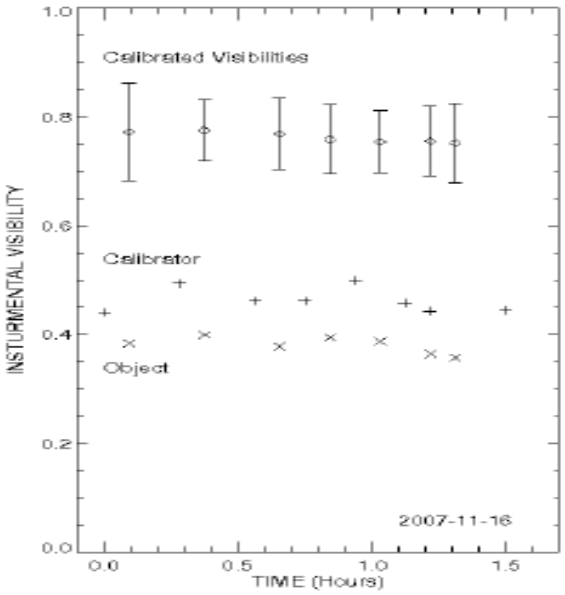
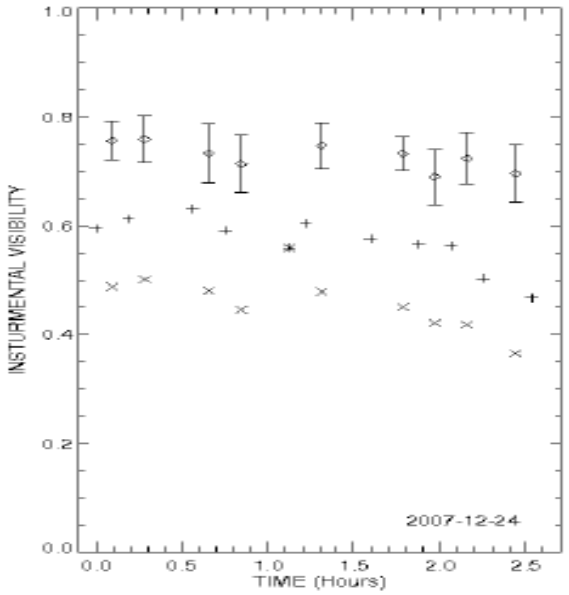


Figure. 8.4: Limb darkened diameter fit to the calibrated visibilities of HD 90839 taken on 2007-11-16. The scatter in the calibrated visibilities when observing with 2×2 pixels is apparent here.

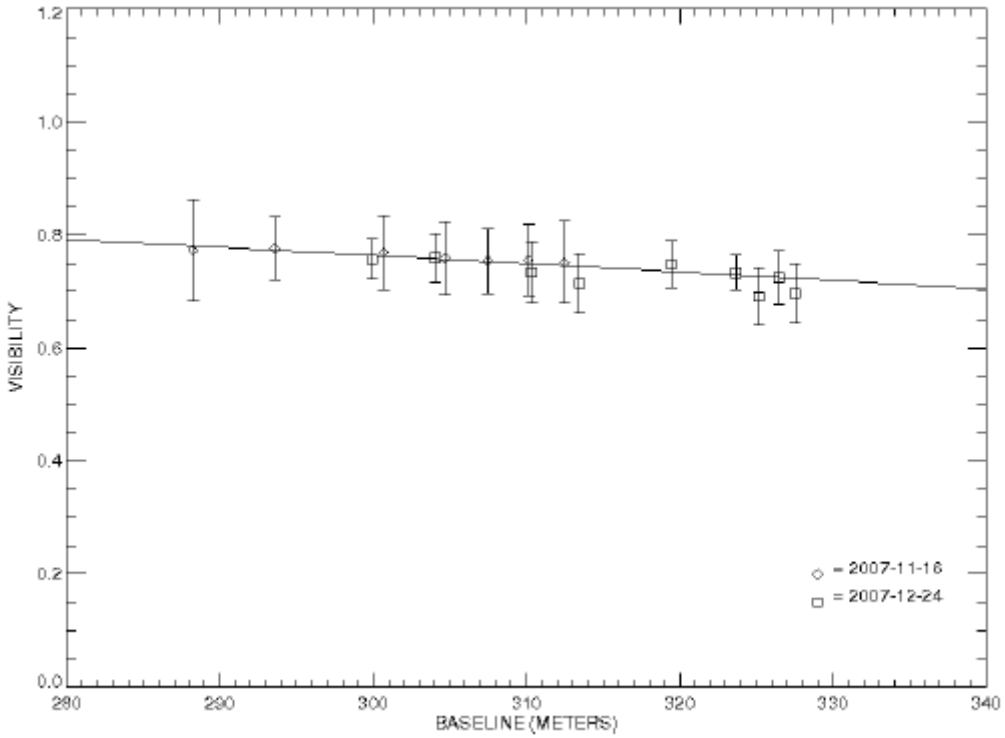
Night-to-night repeatability

- Although the raw visibilities change from night-to-night, after data calibration, there should be no difference in the results on a night-to-night basis.
- This is also a good way to ensure that the calibrator (or the object) is not a binary.





Night-to-night repeatability

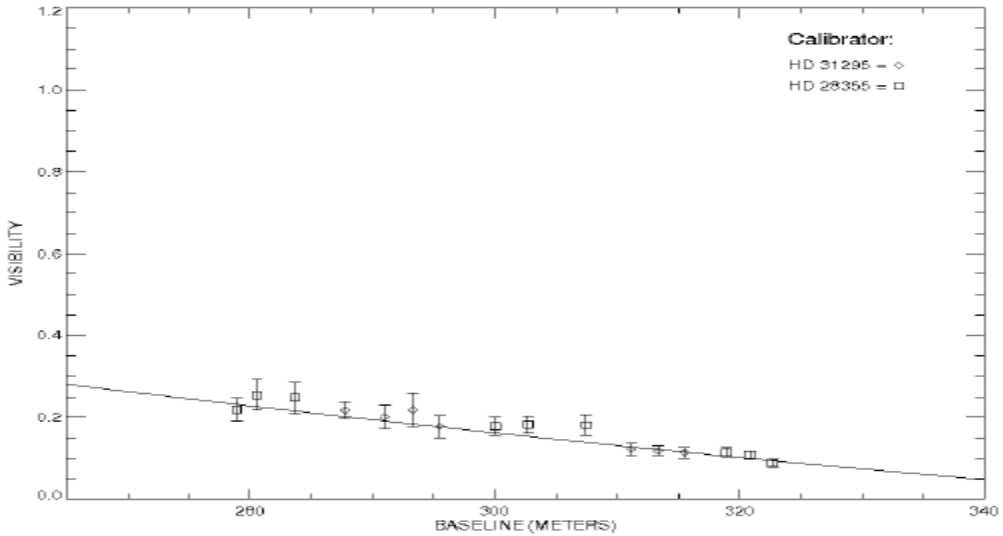


Observing with more than one calibrator

- Will eliminate questionable calibrator "goodness", if any
- This star was observed in this fashion (but there are several good ways to do this):

C1-O-C1-O-C1-O-C1 – C2-O-C2-O-C2-O-C2 – C1-O-...

where I aligned NIRO or moved delay carts when switching to a new calibrator. And *never* align NIRO in the middle of a bracket!



Chris has developed a good rule of thumb to go by to ensure that you get good S/N data:

Kmag = 3.5-4.5: 750Hz

Kmag = 4.5-5.5: 500Hz

Kmag = >5.5: 250Hz

Remember that you should go with the scan speed of the dimmest star, whether its your calibrator, object or check star, and stay at that speed for all bracketed observations.

Additional notes

- Brightness of target versus calibrator
  - So far, simple tests were preformed (varying the recording mode and noting the SUM numbers on NIRO) and no difference in the calibrated visibilities are seen
- The true effective wavelength of filter (Emily).