Another Status report on L 1527 analysis

May 25, 2008

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This is a continuation of the status report that I wrote five days ago.

I tried a few more things today and have reached a good stopping point on the analysis. Below is a summary of what I have done. I highlight the main conclusions in red.

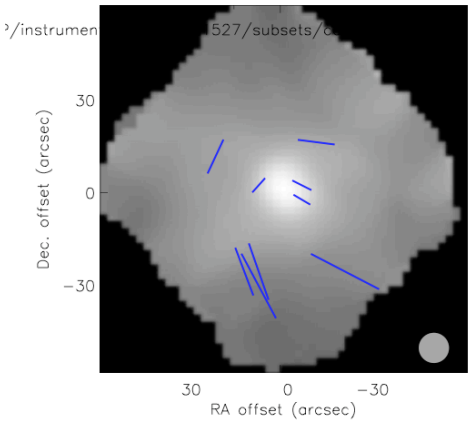
(1) Recall that once you add i.p. and pointing corrections to method 2, and add smoothing to method 1, then the two methods give results that are quite similar (both maps looks like the right hand side of Figure 2 of my May 20th memo). The remaining minor differences could be due to differing background subtraction parameters (see May 20th memo) and/or differing sharpinteg flags (see May 20th memo). I played around with this a bit and found that both of these effects seem to be factors. I also tried upping the background correction iterations to 20 (for method 1) and the resulting map is identical to that made with 10 iterations. Apparently, 10 iterations is plenty. So, again, the final result seems robust in the sense that it does not depend on analysis parameters.

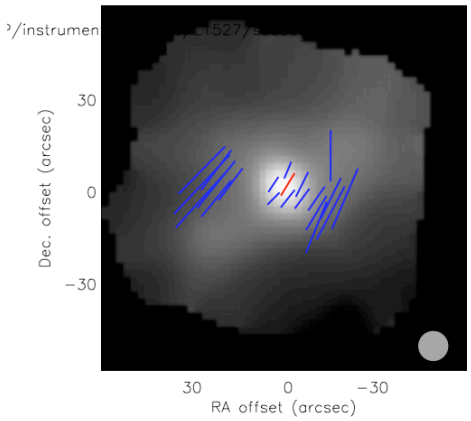
(2) Using method 1 (but with smoothing as in method 2) I tried breaking the data into three "bins" (with 12 files, 11 files, 12 files, respectively). The maps are shown below. The vectors don't agree as well as they should given the errors. I tried to estimate the factor by which our errors are underestimated and came up with a factor of ~1.5.

(3) I repeated the above experiment using method 2 modified by adding i.p. and pointing corrections. The results are the same – the data in the three bins just don't seem to agree within the errors. (For the third bin, I had to use bg 5 0 instead of bg 5 5 as the background algorithm crashed. I guess there was not enough data to fit both amplitude and DC offset.)

(4) I used a less aggressive rgm that Darren sent recently (threshhold 4.0) and re-analyzed all the data using sharpinteg flags -c -em and sharpcombine flag -bg 10 0. The errors are lower at the peak, but otherwise the result is similar in all senses, including the relatively poor agreement between the three "bins". Because the formal errors are lower, I adopt this map, but I inflate the errors by a factor of 1.5, using polsharp3. The result is shown in Figure 2.

Figure 1 (below): Three "bins". Vectors are plotted every ~8 arcseconds so they are more or less independent. Otherwise plots are same as for May 20th memo:





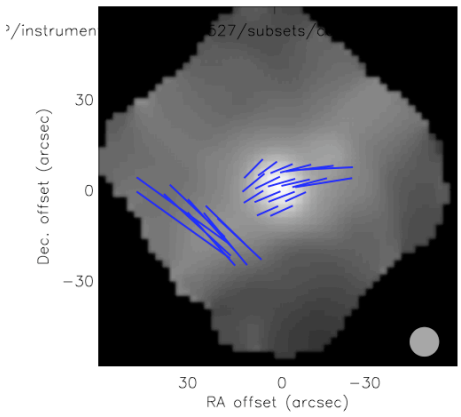
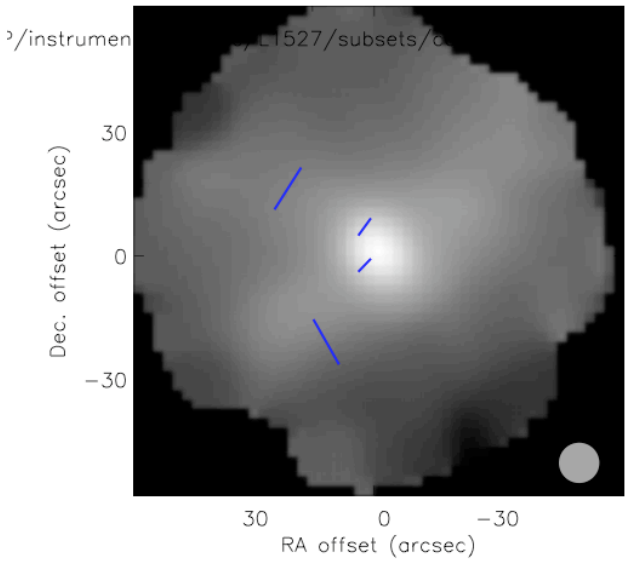


Figure 2 (below): The final result of my initial analysis. I have (crudely) inflated the error-bars by a factor of 1.5 to reflect the additional errors beyond the frame rate errors reported by the pipeline. We have four 2-sigma vectors and no 3 sigma vectors.



Conclusion: To complete the analysis, a proper reduced-chi-squared test using Mike's new code is needed. Also, it would be nice to know what is causing the extra errors. One fairly easy thing to try would be to use Mike's code in outlier rejection mode.