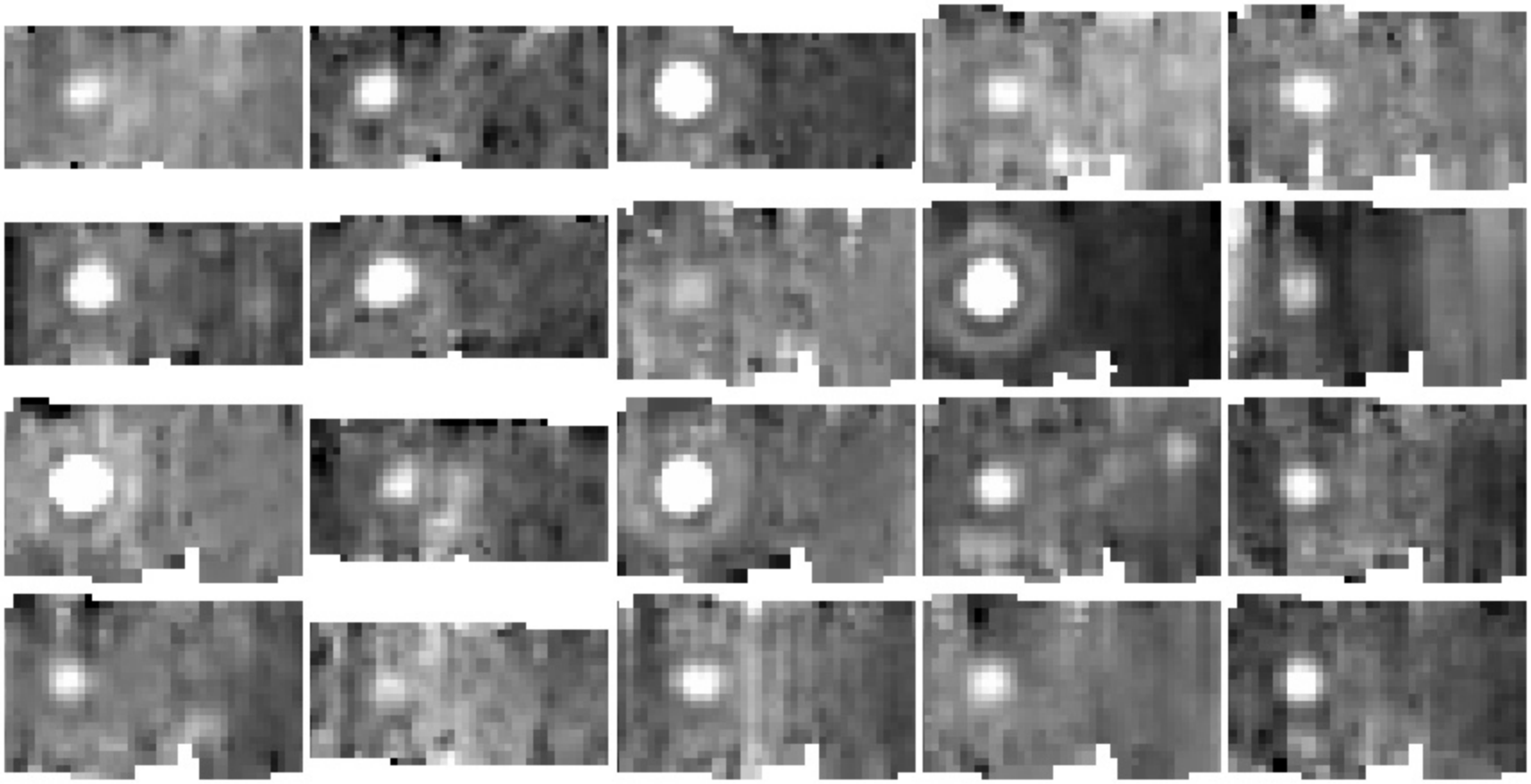
MIPS Observations of Asteroids for 160um Flux Calibration

- About 125 individual asteroid observations beginning ~ 3MC
- Saturation limit mismatch between bands
  - Dimmer asteroids (about 60) observed at 24, 70, 160
    - 24um < 3Jy
    - 160um < 0.5 Jy
  - Brighter at 70 and 160 only
- Use the dimmer asteroids to understand general SED properties
  - Fit 24 and 70um data
    - predict 160um to get cal factor at the dim end
    - Predict ‘canonical’ 70:160um color
- Use the brighter asteroids to extend to higher 160um fluxes
  - Use canonical 70:160um color to predict 160
- Statistical approach
  - Aren’t too concerned about details of each object
  - Simply reject outliers and move on
- Boot-strapping the 160um cal from 24 and 70 – not an independent calibration!

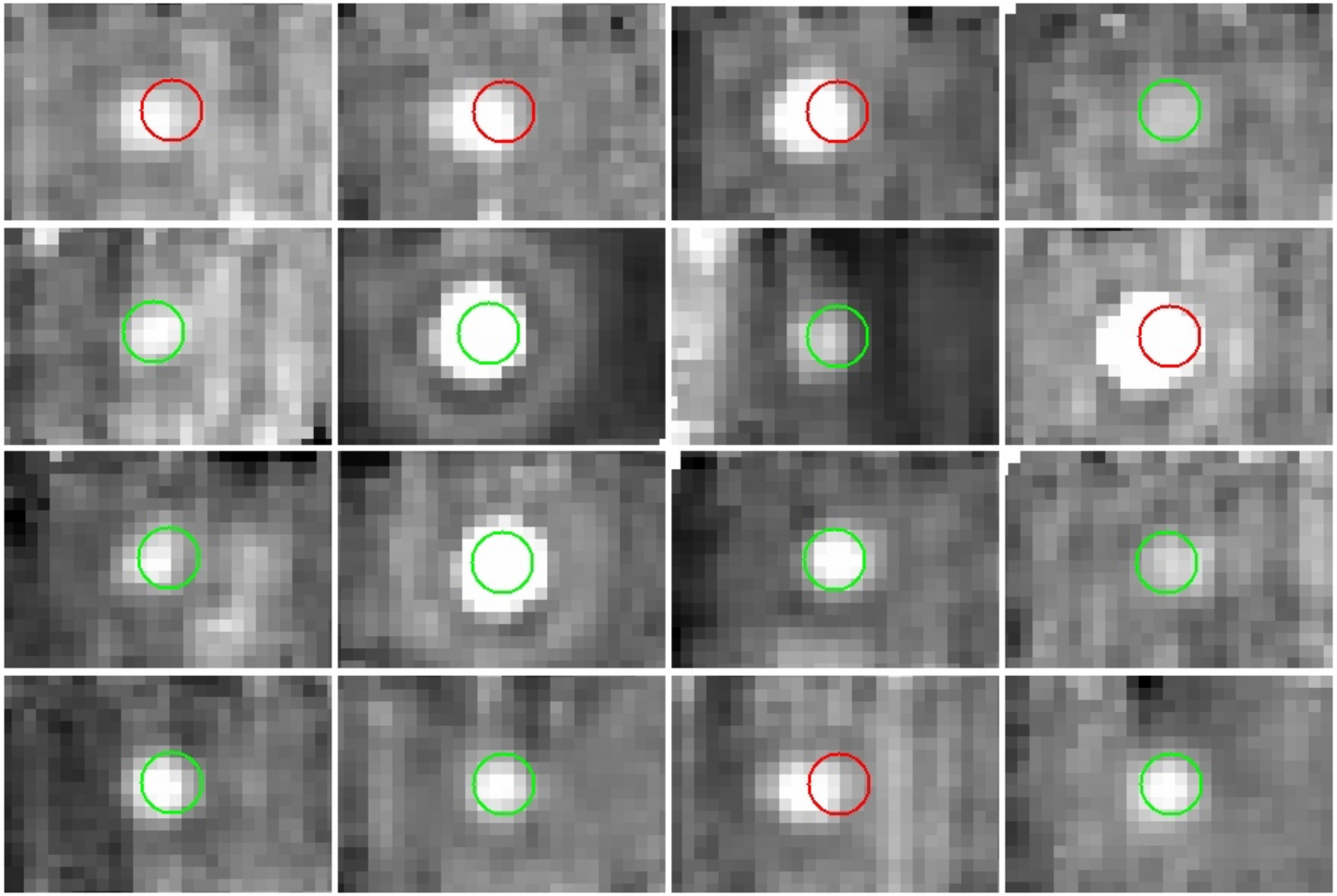
Status of reductions and modeling, insanity check

- Focus just on the objects with data at all 3 bands
  - Photometry at 160um complete
  - 24 and 70 done for ~45 observations (not done >19MC)
- Red_Phot package used for some, but not all data (?)
  - Need to reprocess everything, all 3 bands
- Spot-checked 160um red_phot photometry vs. me_phot
  - Used red_phot mosaics for both, same apertures, ap_corrs
    - 32”, 64” – 128”; 1.79
  - Reasonably good agreement
  - Pointing an issue for red_phot results
  - Need to re-do photometry for everything

Typical 160um images

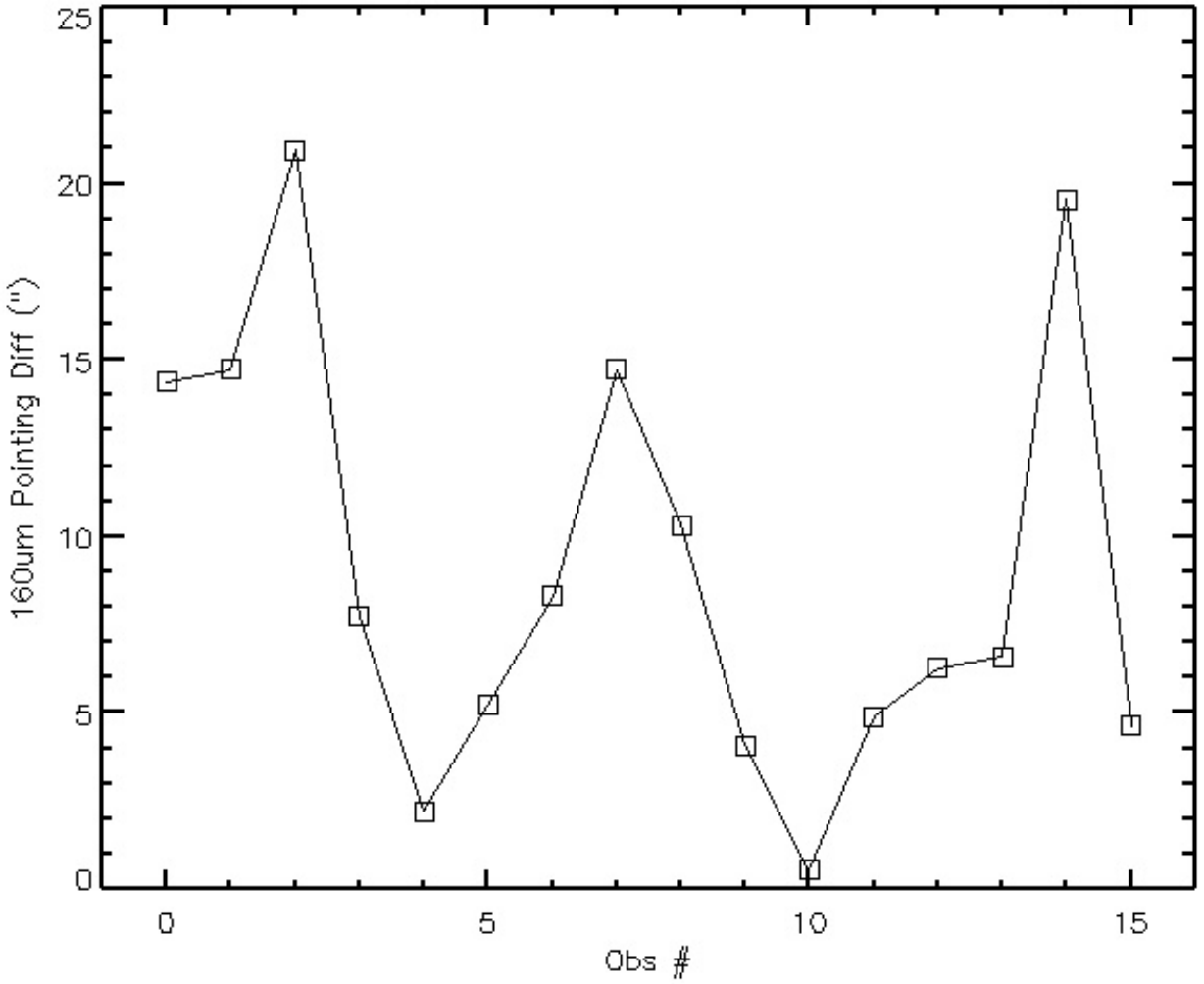


Pointing Issues



- Red_Phot does photometry at REF_POS for 160um
  - Non-circular aperture

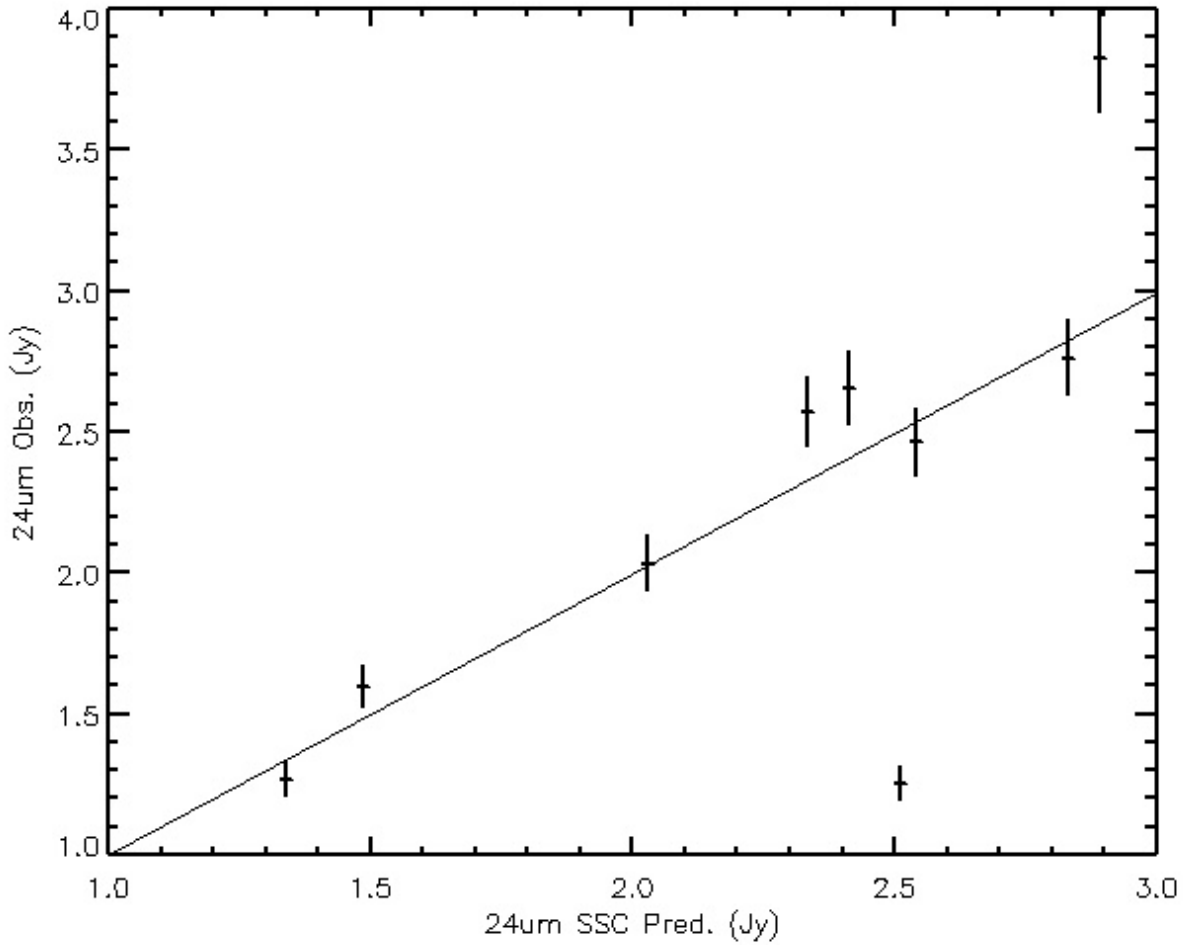
Pointing Issues



SEDs: SSC Predictions & UofA Fits

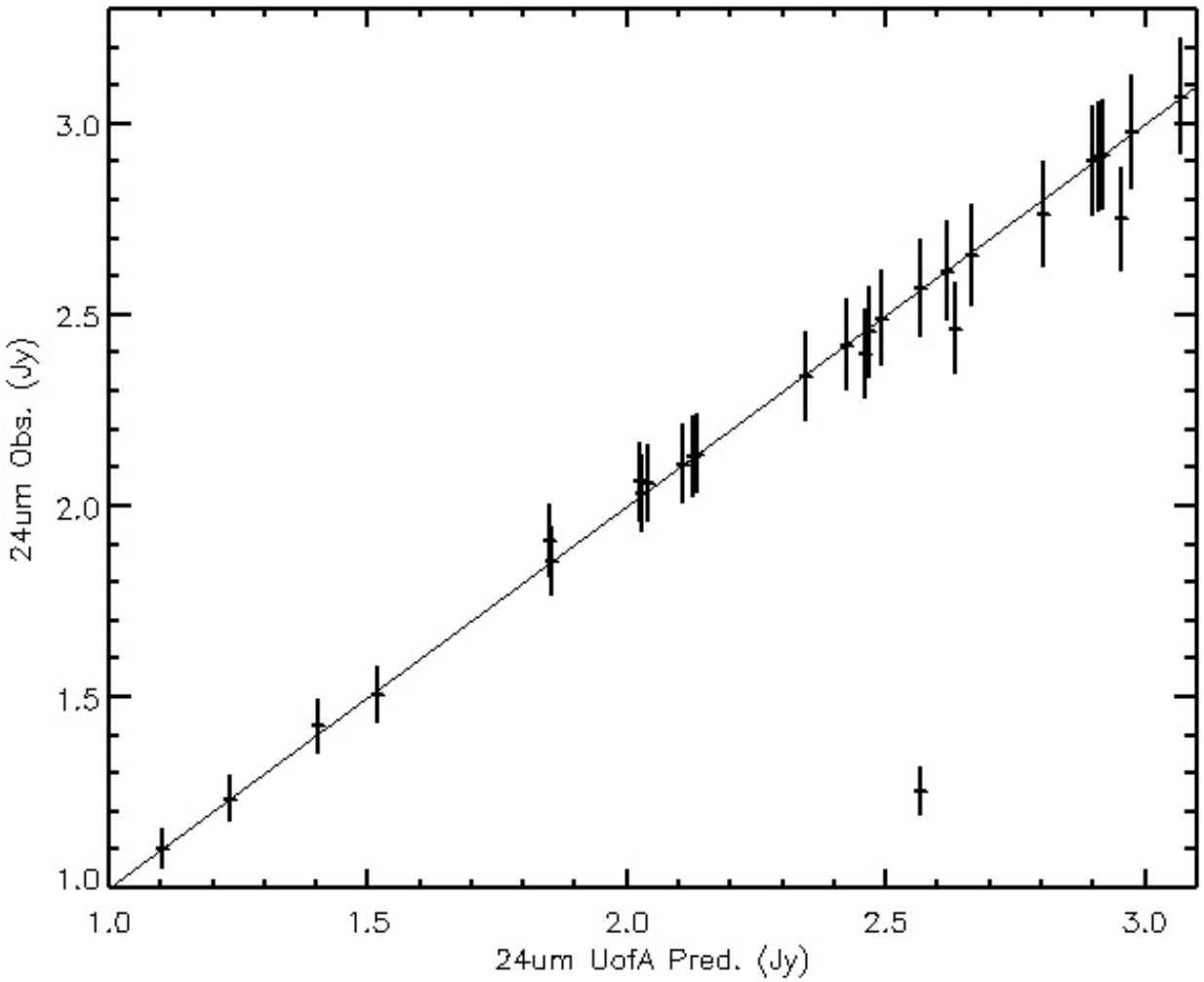
- SSC: Bidushi
  - Standard Thermal Model (STM)
    - Equiv. to non-rotating sphere
  - Use IRAS albedo + size
  - Get helio- and Spitzer- distances from JPL Horizons service
  - ➔ SED prediction
    - Used for observation planning
- UofA: Myra
  - STM
    - Includes viewing geometry
  - Get helio- and Spitzer- distances, H_V, phase angle from JPL Horizons service
  - Run a grid of models, minimize residuals from 24 and 70um photometry
  - Used for:
    - Predicting 160um flux
    - Looking at variations in predicted 70:160um color

24um Photometry vs. SSC Predictions

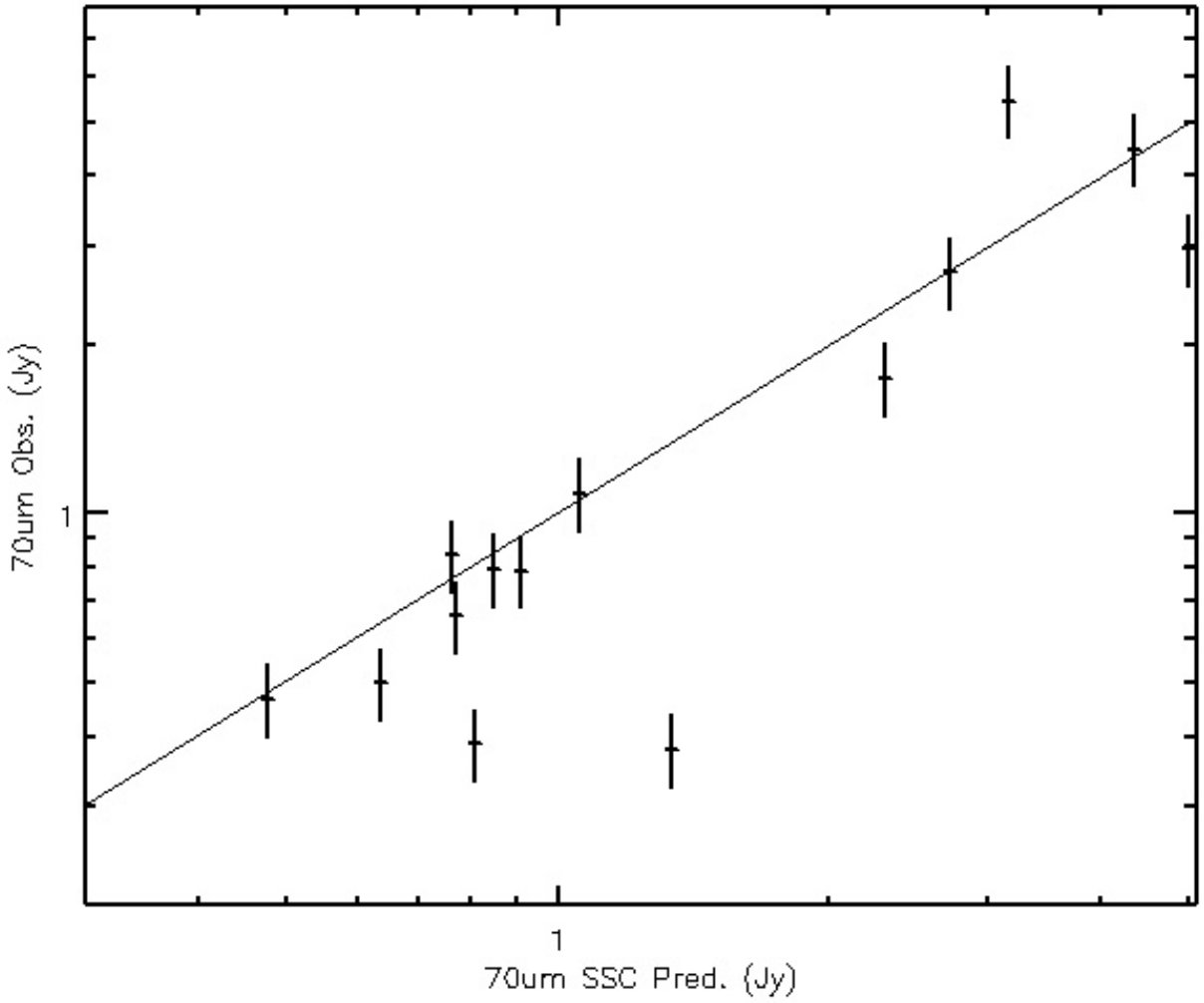


- Many more data points possible – these are where I checked the 160um phot.

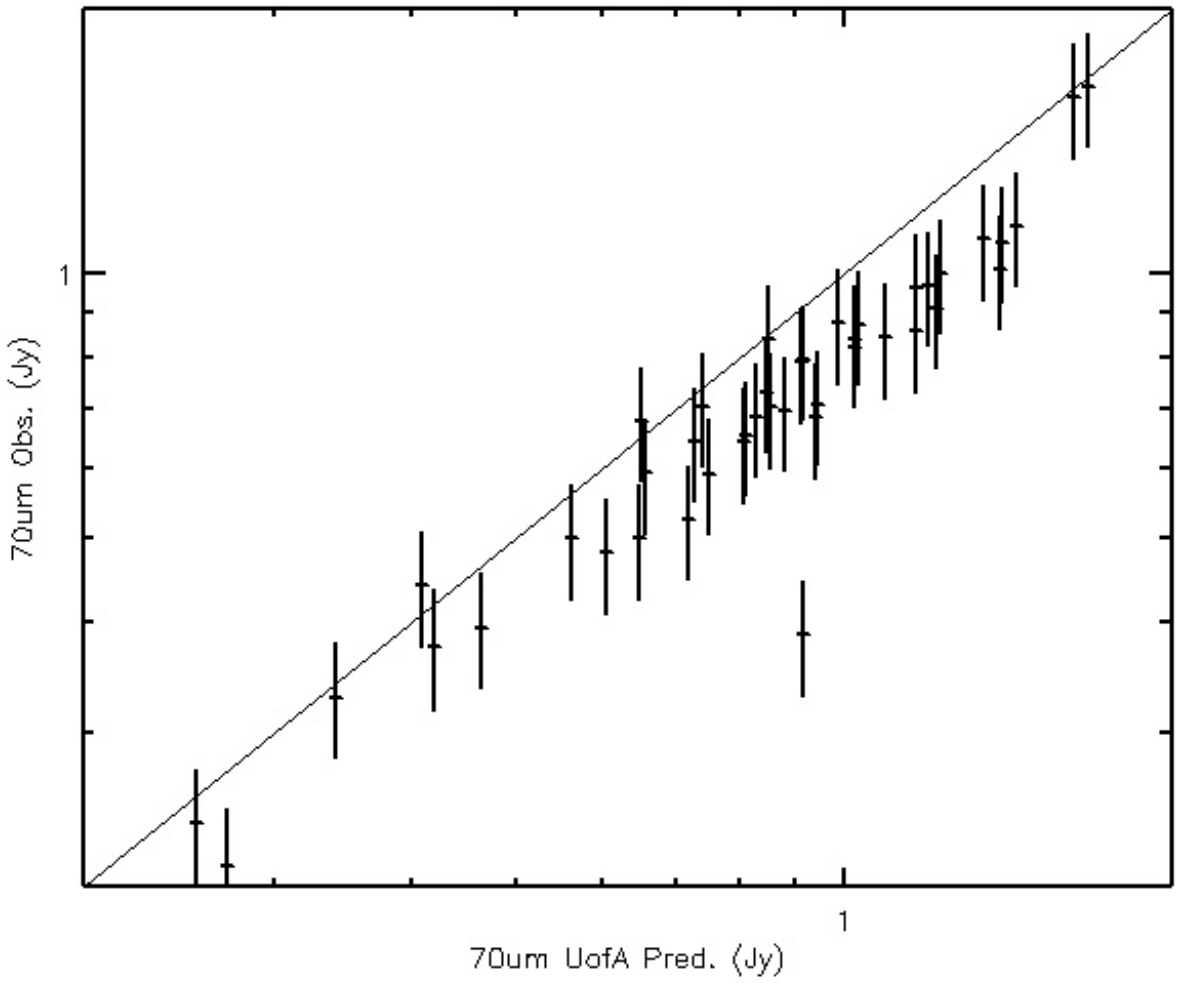
24um Photometry vs. UofA Fits



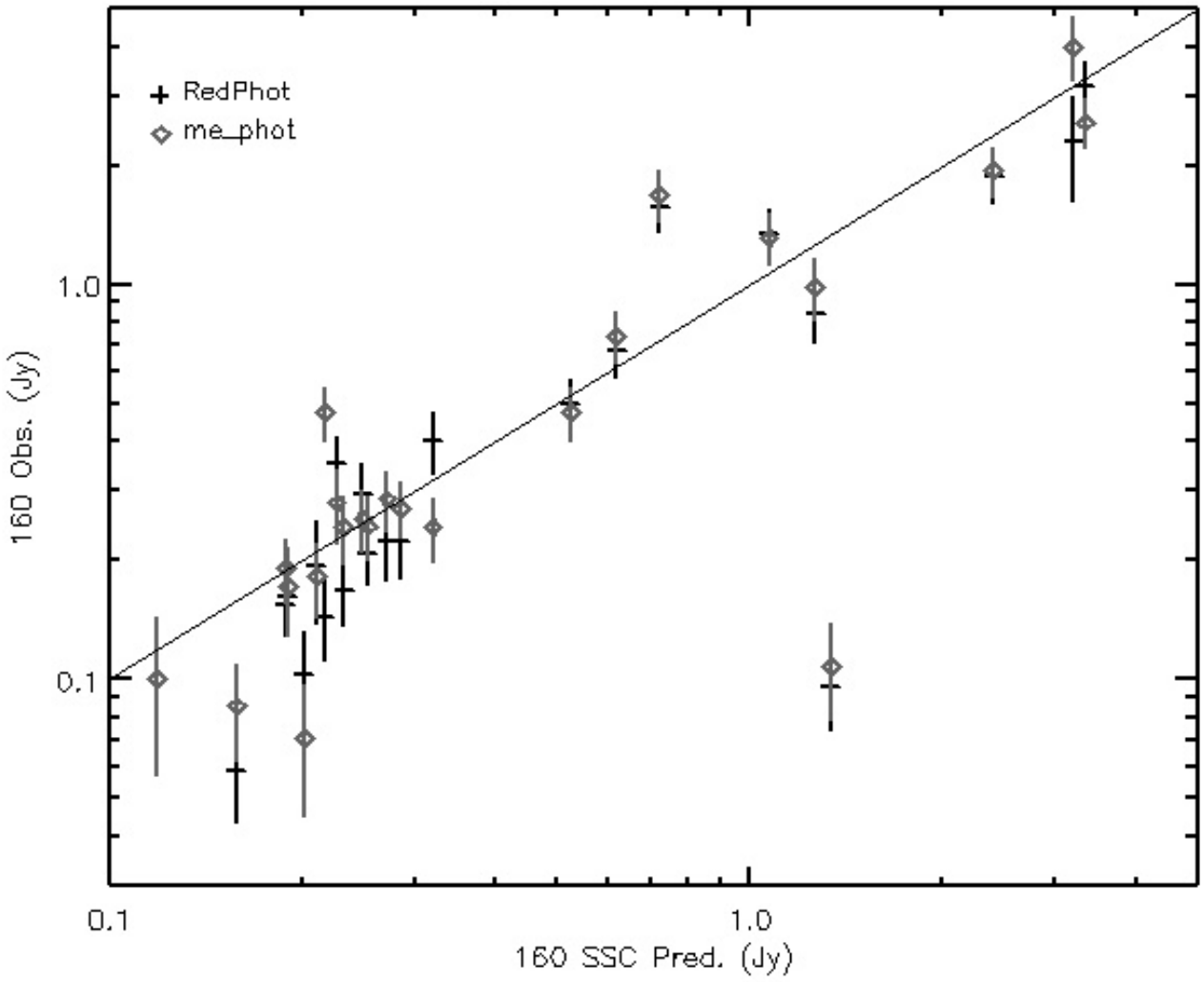
70um Photometry vs. SSC Predictions



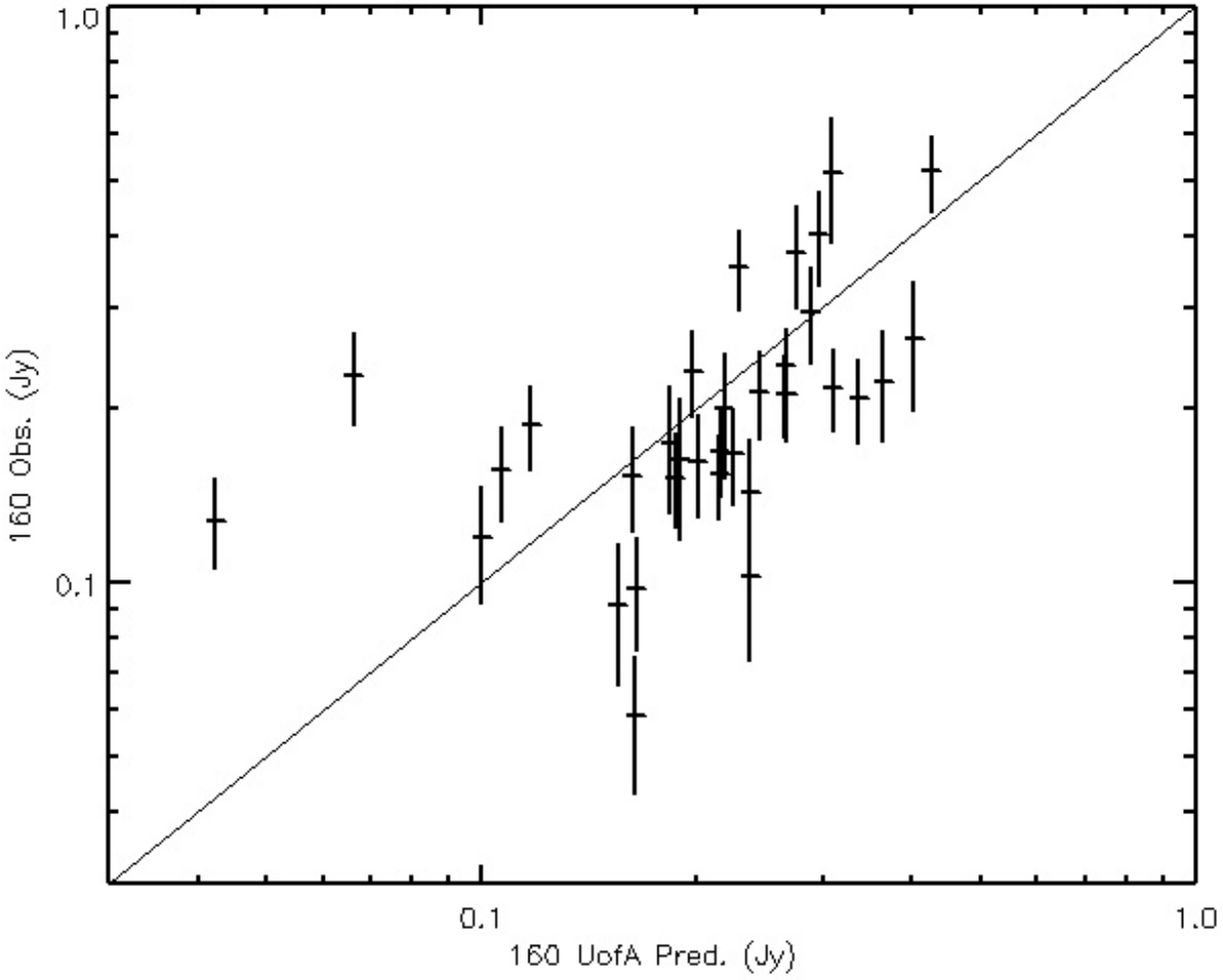
70um Photometry vs. UofA Fits



160um Photometry vs. SSC Predictions (1)



160um Photometry vs. UofA “Prediction”



Conclusions

- The observations and approach seem to be adequate
  - No indication so far that the 160um cal factor needs to be revised
    - Change in 24 and 70 cal factors may impact this conclusion

- The data analysis and modeling need to be done more systematically
  - IRAS-based predictions are inadequate for cal purposes
  - Inhomogeneous reduction and mosaicking
  - Human-tended photometry or centroiding needed

- There is interesting science here
  - The albedos and diameters we find disagree w/ those from IRAS
  - We can also derive beaming param from our data