I. Timing Results for APEX

The table below lists the results of timing tests using APEX on the simulated IRAC and MIPS datasets. The computer used here is a SunBlade 100 with 400MGz CPU and 1Gb memory. The tests were done only for APEX in the multi-image mode, where the source detection was done on the mosaiced image and the source photometry was measured from the original individual images. We note that the mosaic pixels are 1/2 of the original detector pixel size in all cases. Using smaller pixel size may run slower. Also in Table 1 we list two timing results —- the first is the time APEX took to run from the initial image interpolation, and image mosaicing to the final photometry; the second is the time APEX took to finish just doing source detection and photometry extraction.

We should note that the time required for APEX is a strong function of a number of sources as well as the size of the input images. For example, IRAC channel 1 images have much higher source surface density than IRAC channel 4 data, therefore, it takes much longer to run APEX on IRAC 3.6μm data than on IRAC 8.0μm images.

II. Completeness and Reliability

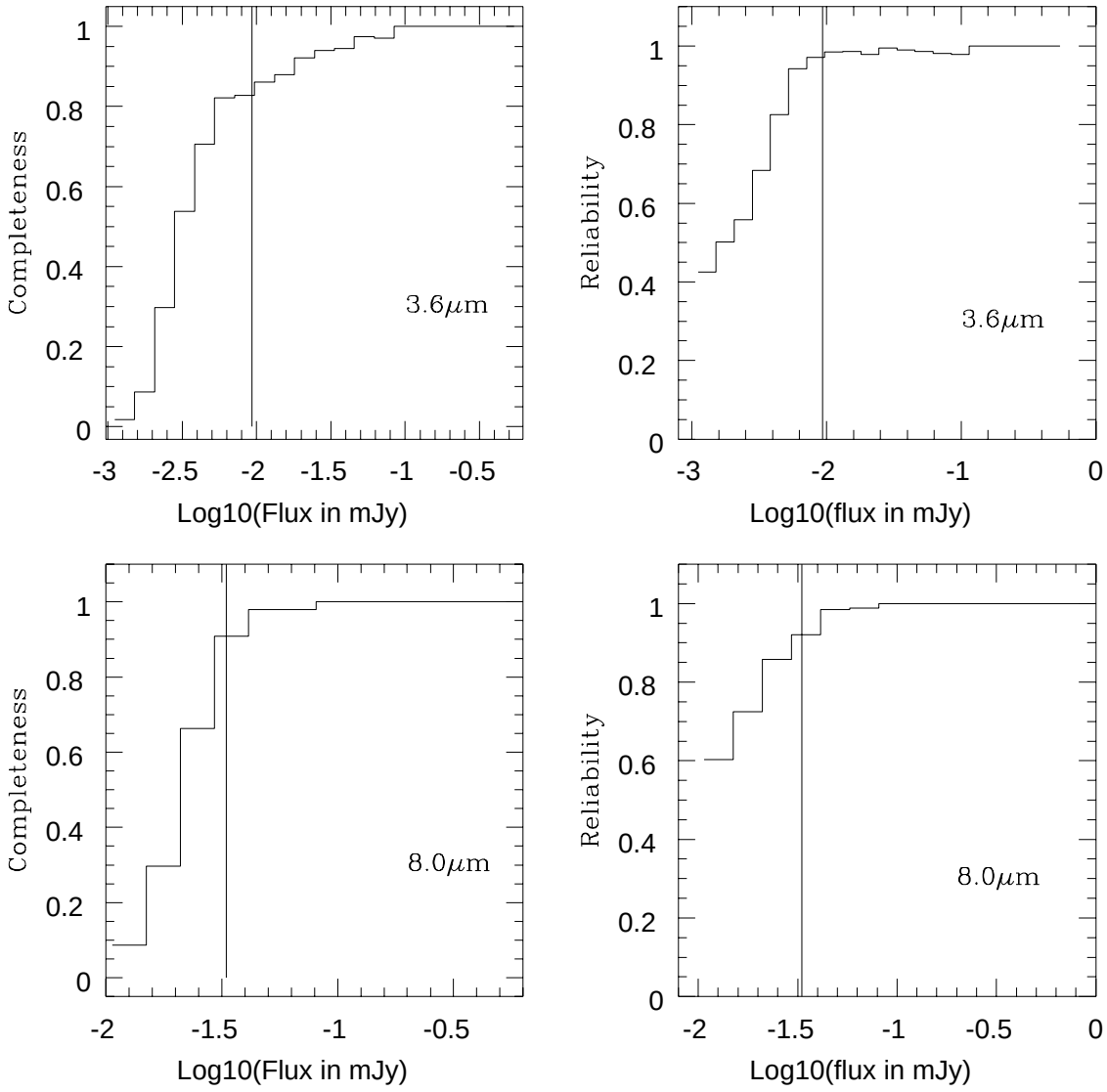
Here we summarize the results of our analyses of APEX completeness and reliability (C&R) using the simulated images in the IRAC channel 1, channel 4, MIPS 24 and MIPS 70 bands. The exact parameter file used to derive the C&R for each band is also included in this package. The test was done using APEX in the multi-image mode, where the source detection was done in the moaiced image and the source photometry was measured in the original individual images. We found that in the multi-image mode the profile fitted fluxes by APEX are much more accurate than extraction from the mosaic image, when compared to the truth fluxes input to the simulated images. This is shown in Figure 2. We also note that overall the small flux calibration difference could also be due to how the simulated images were made. In Figure 1 below, we include the noise limits which were calculated by quadratic summation of the confusion noise (40 beams/source) and the 5σ

photometric noise. These limits are 9.39μJy, 33.2μJy, 0.48mJy and 13.0mJy for 3.6μm, 8.0μm, 24μm and 70μm respectively. The four panels in Figure 3 show the positional errors (measured positions compared with the truth positions) as a function of truth fluxes for all four bands. As expected, at the faint fluxes the positional errors are larger.

APEX Timing Results

Band	Image Size pixels	No. of Images	Extracted Source Density per sq.arcmin	Time1 min.	Time2 min.
IRAC 3.6μm	256x256	36	46	52	45
IRAC 8.0μm	256x256	36	5	11	3
MIPS 24μm	128x128	1082	3	39	10
MIPS 70μm	32x32	1392	1.1	44	42

Time1 — This is the time APEX took to run from the very begining (eg. image interpolation) to the final photometry extraction.
Time2 — Here we skip the initial image interpolation. This is the time APEX took to only do source detection and photometry extraction.


Completeness
Log10(Flux in mJy)
3.6μm
Reliability
Log10(flux in mJy)
3.6μm
Completeness
Log10(Flux in mJy)
8.0μm
Reliability
Log10(flux in mJy)
8.0μm

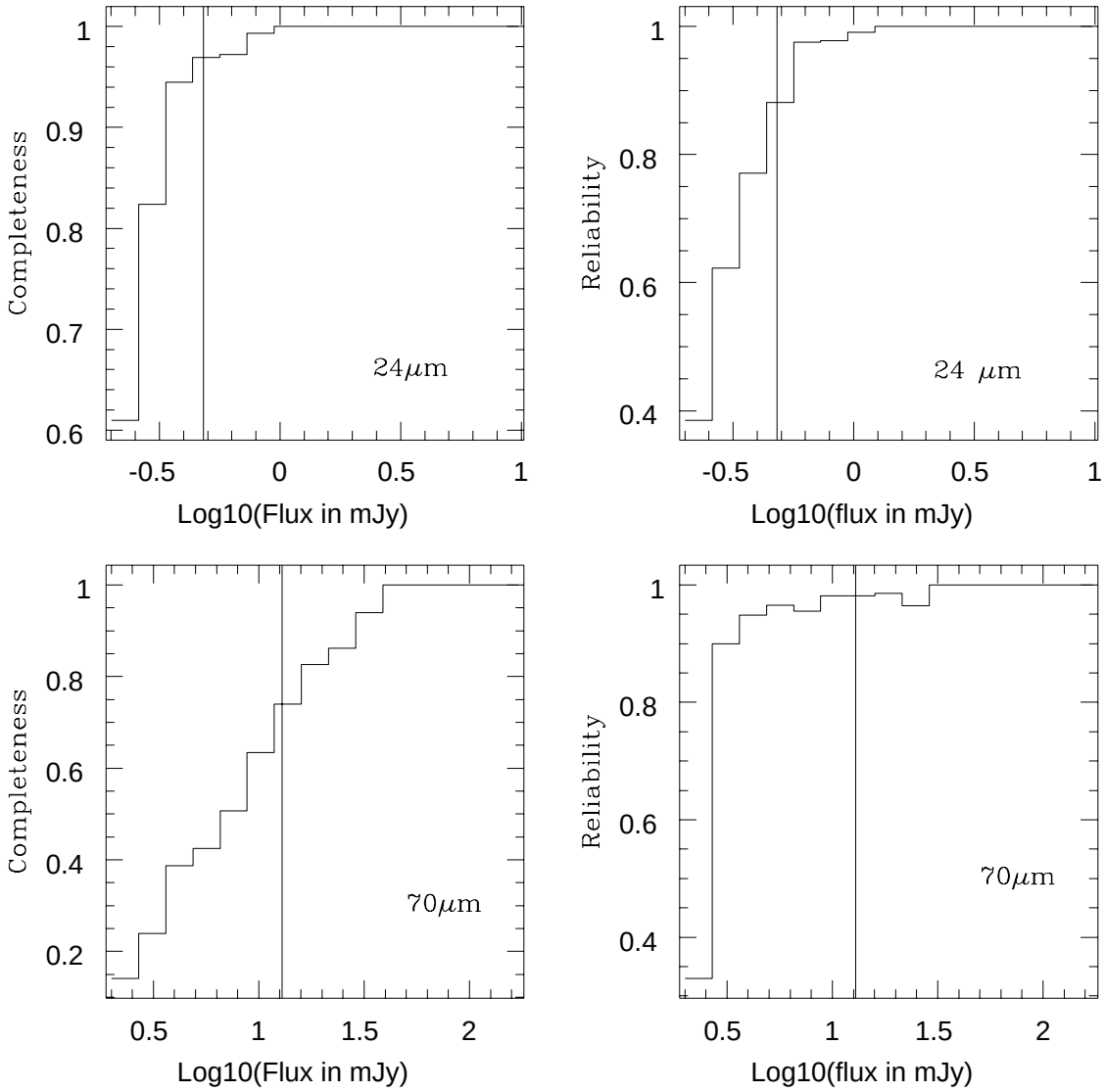
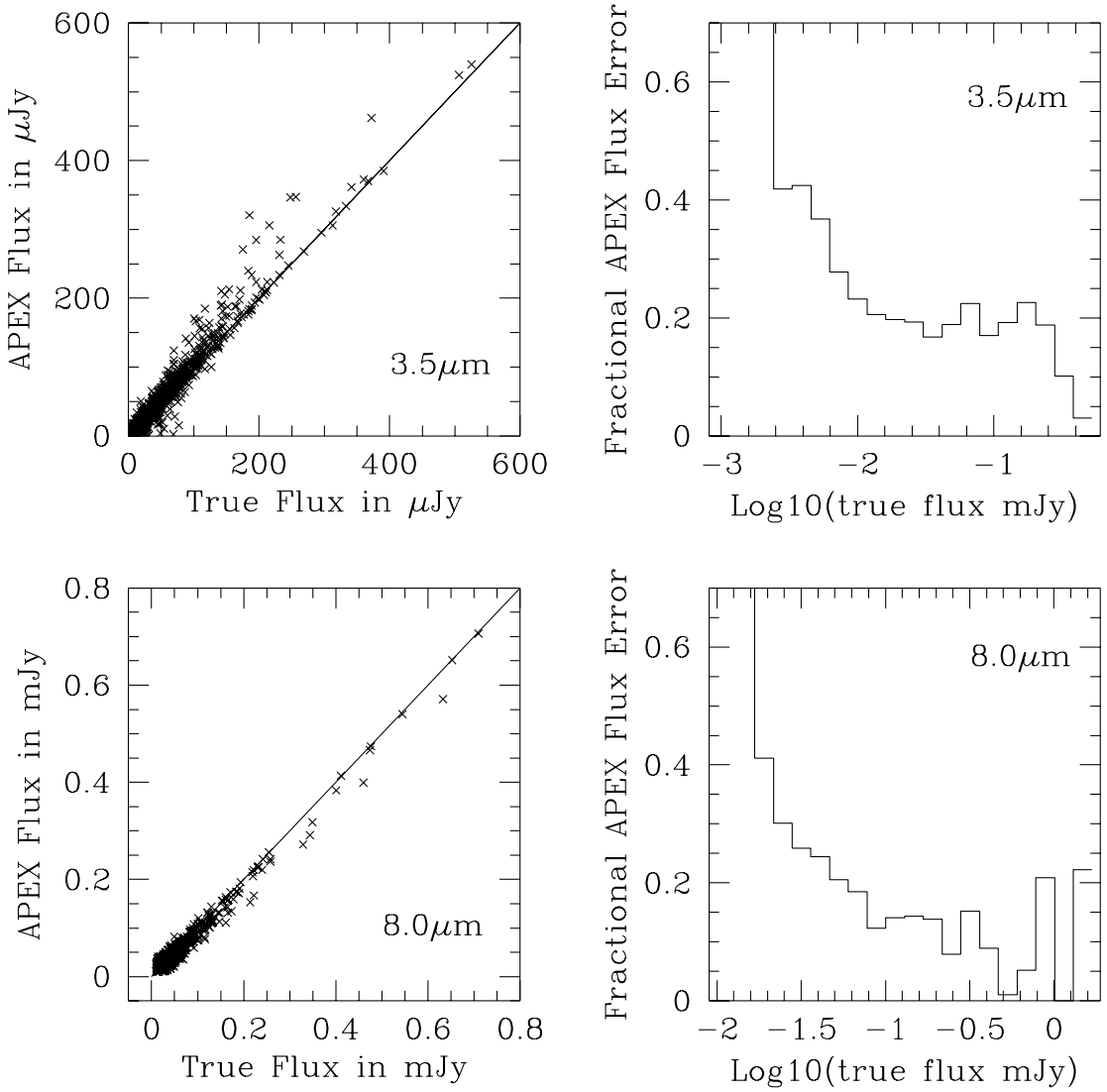


Figure 1: Completeness and reliability measured for the simulated IRAC channel 1, 4 and MIPS 24, 70μm images. The straight lines mark the total noise, combining quadratically the confusion noise (40 beams/source) and the 5σ photometroc noise, for each band.


APEX Flux in μJy
True Flux in μJy
3.5μm
Fractional APEX Flux Error
Log10(true flux mJy)
3.5μm
APEX Flux in mJy
True Flux in mJy
8.0μm
Fractional APEX Flux Error
Log10(true flux mJy)
8.0μm

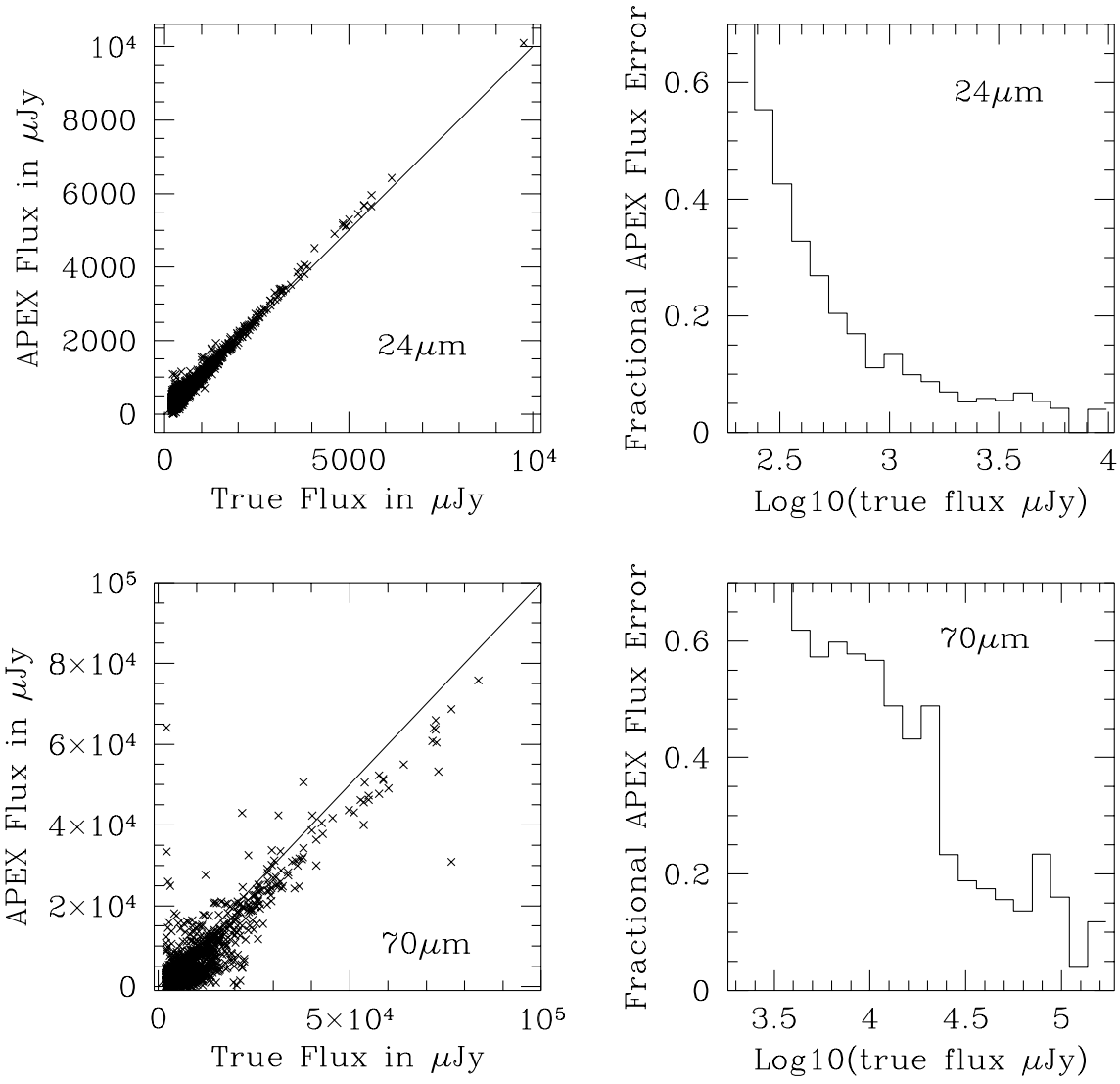


Figure 2: We compare the profile fitted fluxes from APEX with the truth fluxes which are used for the simulated images in the IRAC channel 1, 4 and MIPS 24, 70 μm images. The straight lines in the APEX flux vs. truth flux plots represent the relation of APEX flux = truth flux.

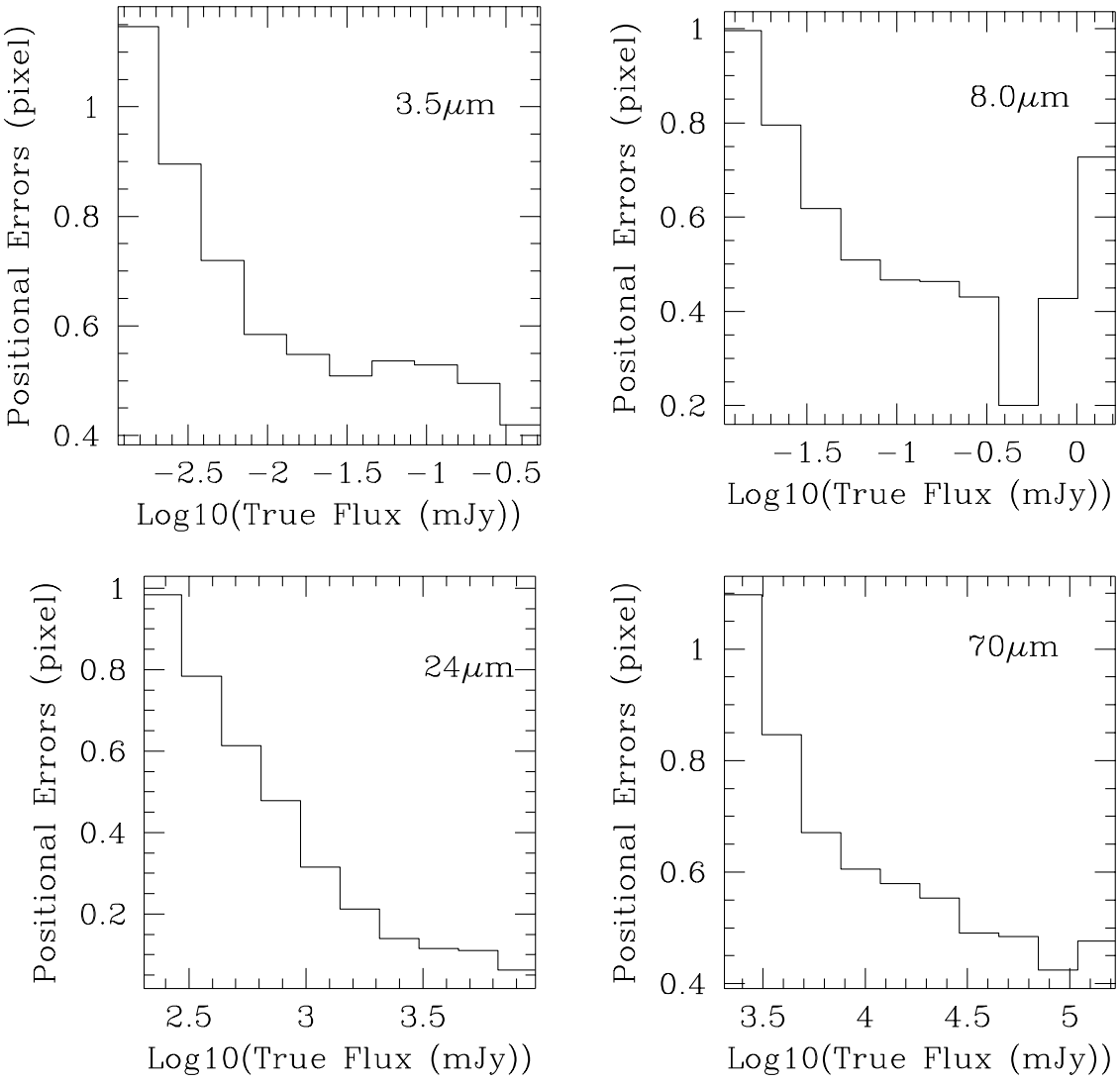


Figure 3: These four panels show the positional errors as a function of truth fluxes. Here the positional errors are calculated by comapring the measured positions with the truth positions in the simulation.