

SNR 0535-66.0

1 Summary

- Common Name: N 63A
- Distance: 50 kpc (distance to LMC, **Westerlund(1990)**)
- Center of X-ray emission (J2000): (05 35 43.6, -66 02 15.1)
- X-ray size: 88" x 72"
- Description:

1.1 Summary of Chandra Observations

| Sequence | Obs ID | Instrument | Exposure _{uf} (ks) | Exposure _f (ks) | Date Observed | Aimpoint (J2000) (α , δ) |
|----------|--------|-------------|--------------------------------|-------------------------------|---------------|---|
| 500073 | 777 | ACIS-235678 | 45.1 | 41.4 | 2000-10-16 | (05 35 44.1, -66 02 14.0) |

Exposure_{uf} → Exposure time of un-filtered event file

Exposure_f → Exposure time of filtered event file

- The whole remnant is covered by chip ACIS-S3(CCD_ID=7)

1.2 Chandra Counts and Fluxes

| Region | Energy Range (keV) | Signal (counts) | Rate (counts s ⁻¹) | F _X ^{abs} (ergs cm ⁻² s ⁻¹) | F _X (ergs cm ⁻² s ⁻¹) | L _X (ergs s ⁻¹) |
|---------|-----------------------|--------------------|-----------------------------------|---|--|---|
| total | 0.3 - 10.0 | 1.091e+06 | 2.637e+01 | 7.46e-11 | 2.62e-10 | 7.81e+37 |
| (777) | 0.3 - 2.1 | 1.073e+06 | 2.594e+01 | 6.96e-11 | 2.57e-10 | 7.66e+37 |
| | 2.1 - 10. | 1.830e+04 | 4.422e-01 | 5.06e-12 | 5.34e-12 | 1.59e+36 |

- N_H = 0.26 (10²² cm⁻²)
- Assumed distance: 50 kpc (distance to LMC, **Westerlund(1990)**)

1.3 Nearby Sources

| Obs ID | Position (J2000) | Size | Net Count | Count rate | Note |
|--------|-----------------------------|---------|-----------|------------|------|
| 777 | (05 34 48.3, -66 08 56.4) | < 15.1" | 272.0 | 6.03e-03 | |
| | (05 35 07.2, -66 02 05.4) | < 3.4" | 187.0 | 4.14e-03 | |
| | (05 35 22.4, -66 02 32.4) | < 2.2" | 100.0 | 2.22e-03 | |
| | (05 35 22.5, -66 12 55.6) | < 22.0" | 1450.0 | 3.21e-02 | |
| | (05 35 23.8, -65 59 15.9) | < 2.4" | 44.6 | 9.88e-04 | |
| | (05 35 29.3, -66 09 21.8) | < 12.4" | 73.7 | 1.63e-03 | |
| | (05 35 32.0, -66 07 30.7) | < 7.6" | 66.1 | 1.46e-03 | |
| | (05 35 32.7, -66 02 29.5) | < 1.7" | 329.0 | 7.29e-03 | |
| | (05 35 34.5, -66 01 15.1) | < 0.9" | 31.0 | 6.87e-04 | |
| | (05 35 38.2, -66 05 41.5) | < 3.9" | 90.0 | 1.99e-03 | |
| | (05 35 46.4, -66 00 36.4) | < 1.1" | 10.7 | 2.37e-04 | |
| | (05 35 47.9, -66 02 51.0) | < 2.5" | 62.5 | 1.38e-03 | |
| | (05 35 50.0, -66 02 37.0) | < 1.1" | 15.5 | 3.43e-04 | |
| | (05 35 50.8, -65 58 50.1) | < 1.6" | 22.0 | 4.87e-04 | |
| | (05 35 59.9, -66 01 23.3) | < 1.0" | 36.7 | 8.13e-04 | |
| | (05 36 00.7, -66 03 06.6) | < 2.0" | 61.0 | 1.35e-03 | |
| | (05 36 01.3, -66 05 01.8) | < 3.1" | 58.5 | 1.30e-03 | |
| | (05 36 01.4, -66 03 35.8) | < 3.0" | 35.7 | 7.91e-04 | |
| | (05 36 03.5, -65 55 18.0) | < 5.7" | 59.7 | 1.32e-03 | |
| | (05 36 12.6, -66 05 29.8) | < 6.9" | 86.2 | 1.91e-03 | |
| | (05 36 17.9, -65 52 14.0) | < 13.8" | 65.4 | 1.45e-03 | |
| | (05 36 24.1, -66 11 07.7) | < 18.0" | 47.2 | 1.05e-03 | |
| | (05 36 31.7, -65 58 25.3) | < 4.4" | 252.0 | 5.58e-03 | |
| | (05 36 32.4, -65 56 40.0) | < 6.0" | 477.0 | 1.06e-02 | |
| | (05 37 04.2, -66 06 52.6) | < 11.4" | 52.3 | 1.16e-03 | |
| | (05 37 23.9, -65 59 04.6) | < 13.1" | 102.0 | 2.26e-03 | |
| | (05 37 37.2, -65 58 09.5) | < 18.1" | 65.8 | 1.46e-03 | |
| | (05 38 07.5, -66 06 49.5) | < 34.1" | 157.0 | 3.48e-03 | |

(note) 1. This nearby source list is incomplete.

All the above sources are originally from the "src2.fits" file which is distributed with standard chandra processing. Only sources with significant count rate and which are clear to visual inspection are included.

2. The size given above is the size of the region used in detecting that source.
3. For each source, background was subtracted from annular region around the source.

1.4 References

- Dickel et al., 1993 A&A, 275, 265 : ATCA 3.5cm
- Hughes et al., 1998 ApJ, 505, 732 : ASCA spectrum

- Westerlund, 1990 A&ARv, 2, 29 : Distance to LMC

2 Fit Detail

- See spectrum page for used regions.

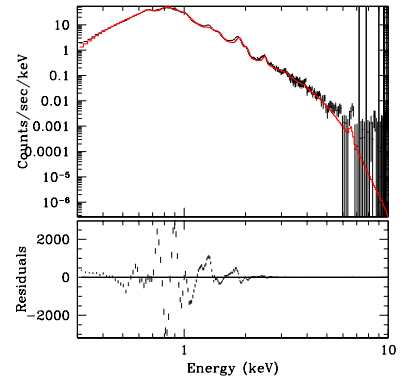
2.1 Total:

- Two thermal plasma model with abundance set to 0.3
- **Hughes et al.(1998)** gives $nH=0.14$

source=(xswabs * (xraymond + xraymond))

reduced $\chi^2 = 20.7338$

nh = 0.2648 $10^{22}/\text{cm}^2$

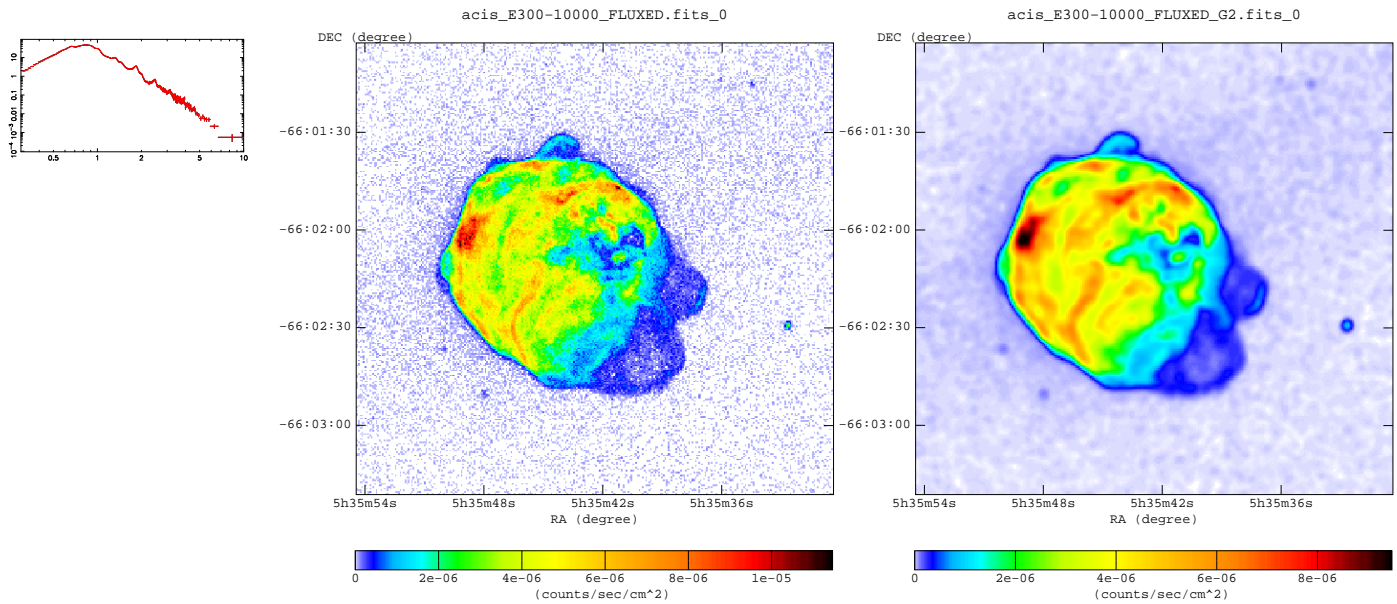


3 Chandra Images : Band Images

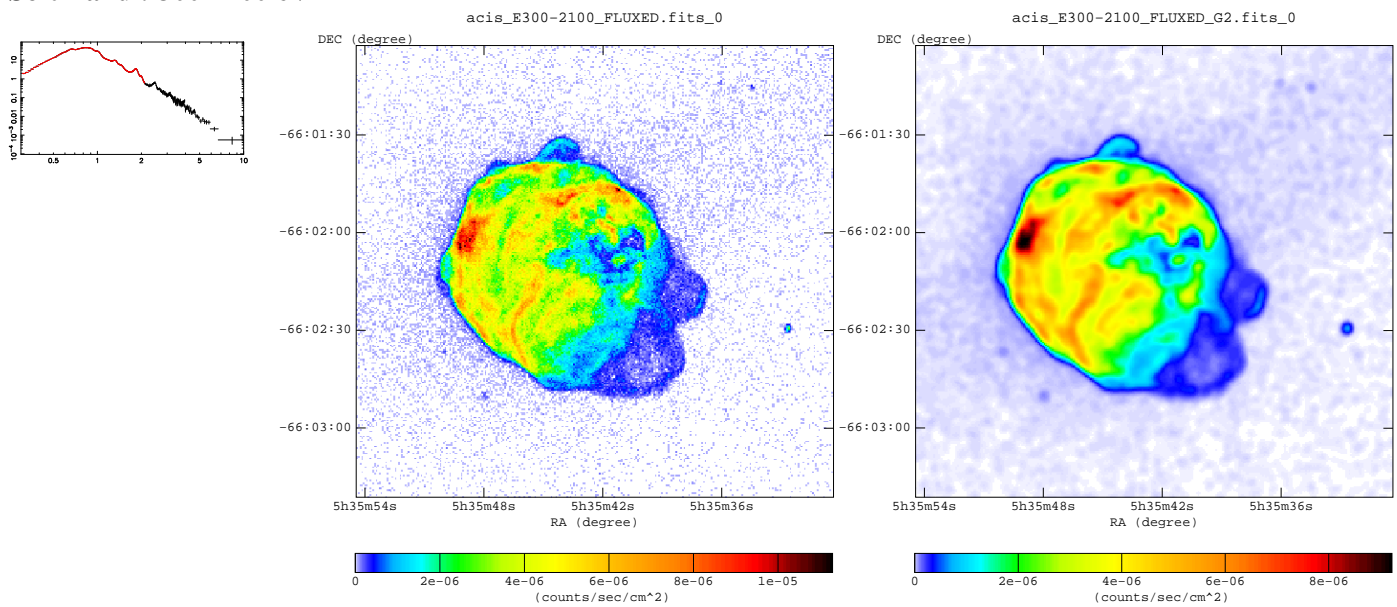
- Left : raw image, binned by 1x1 pixel
- Right : gaussian smoothed version of above ($\sigma = 2$ pixel)

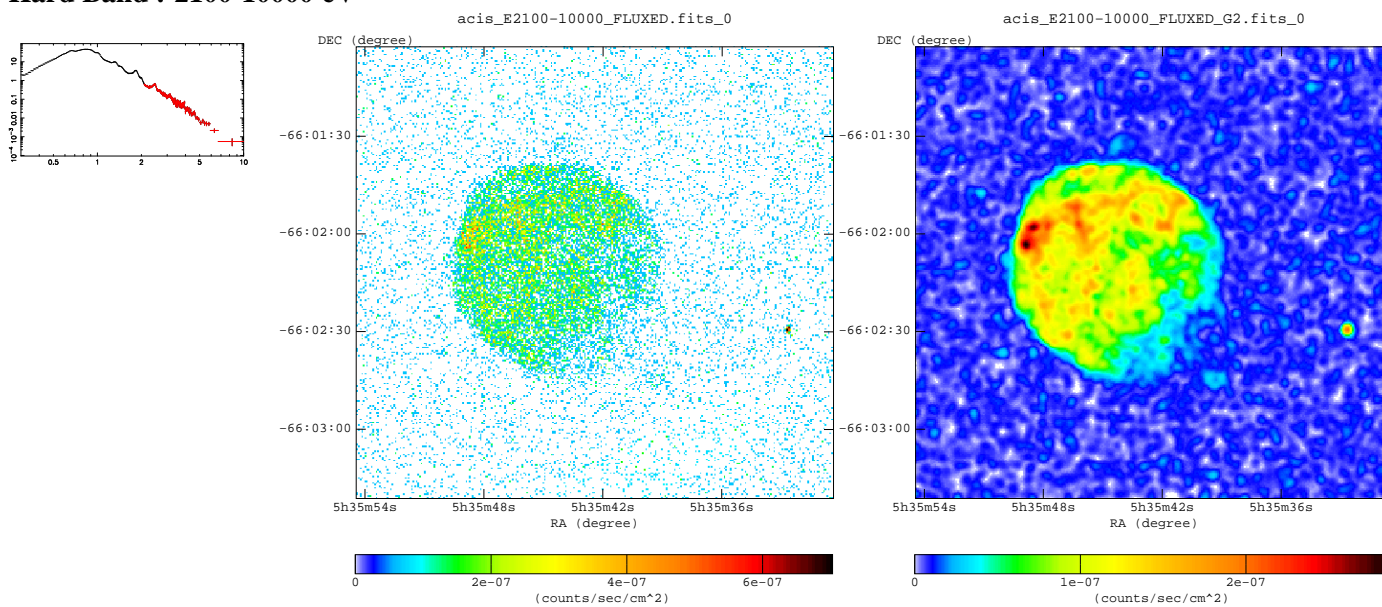
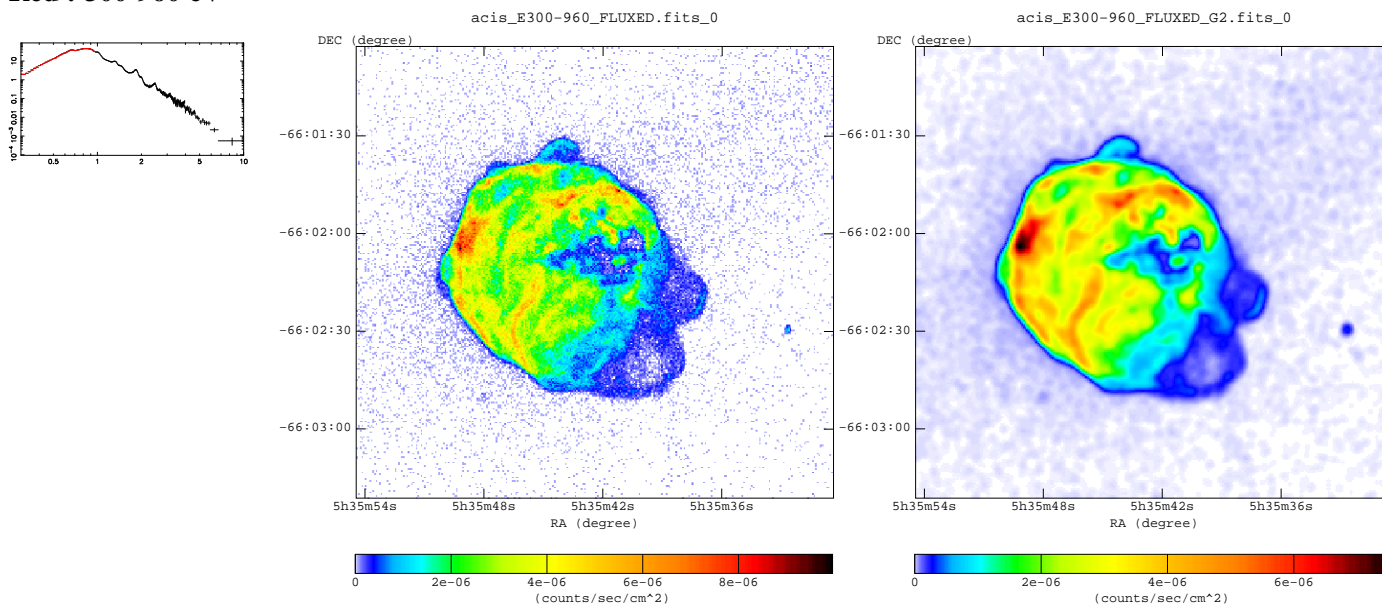
3.1 Wide Band Images

Total : 300-10000 eV

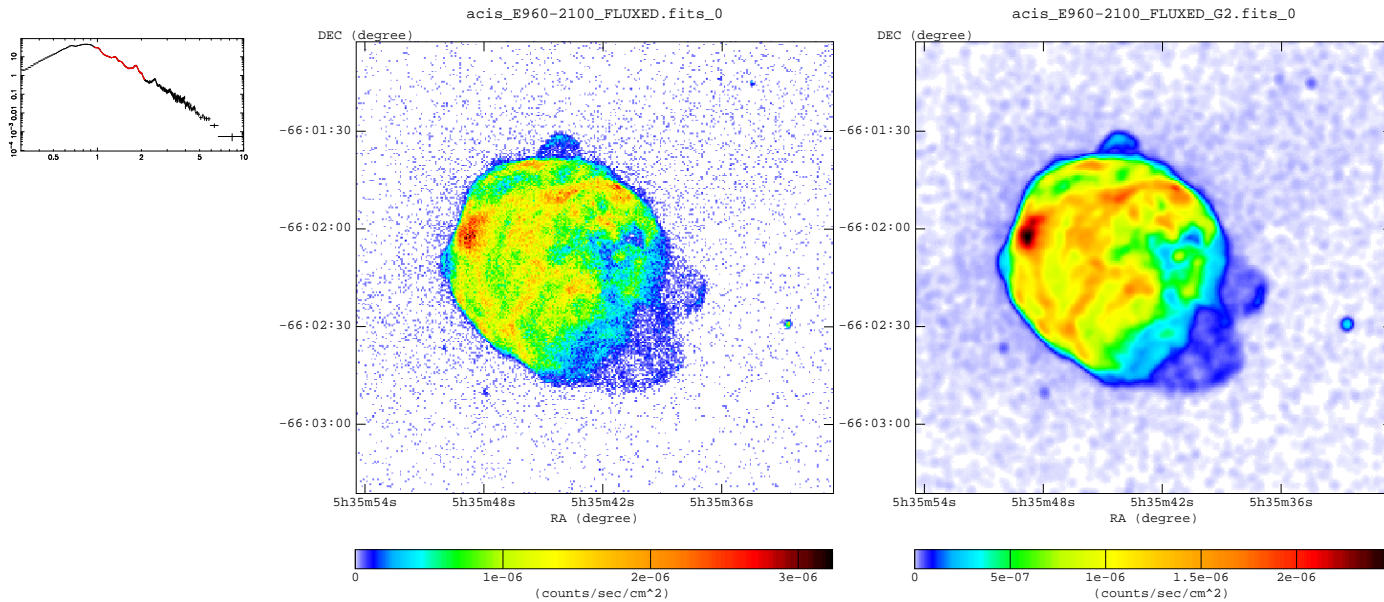


Soft Band : 300-2100 eV

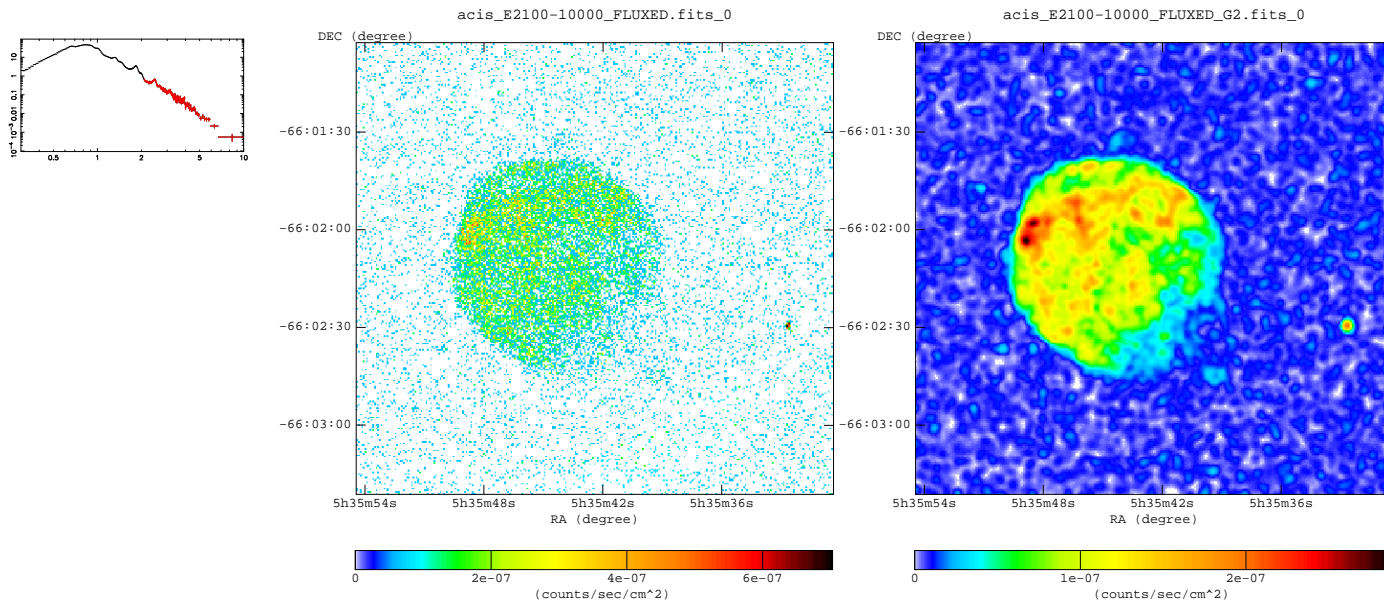


Hard Band : 2100-10000 eV**3.2 Band images used in true color image.****Red : 300-960 eV**

Green : 960-2100 eV

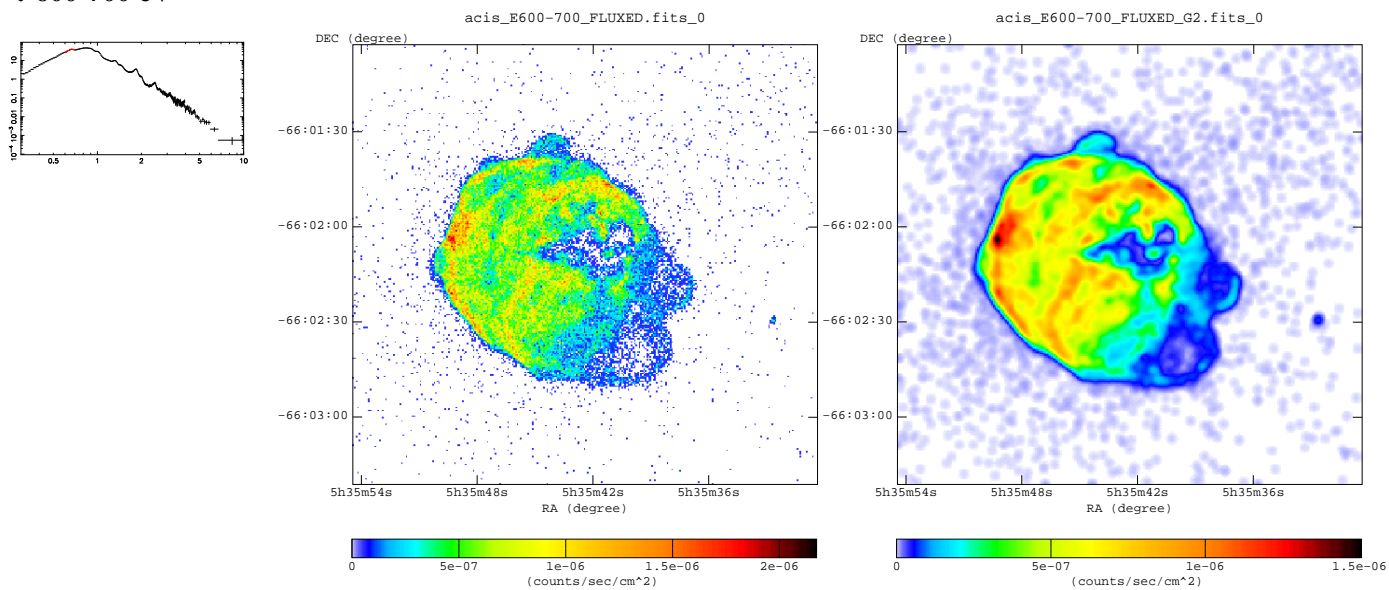


Blue : 2100-10000 eV

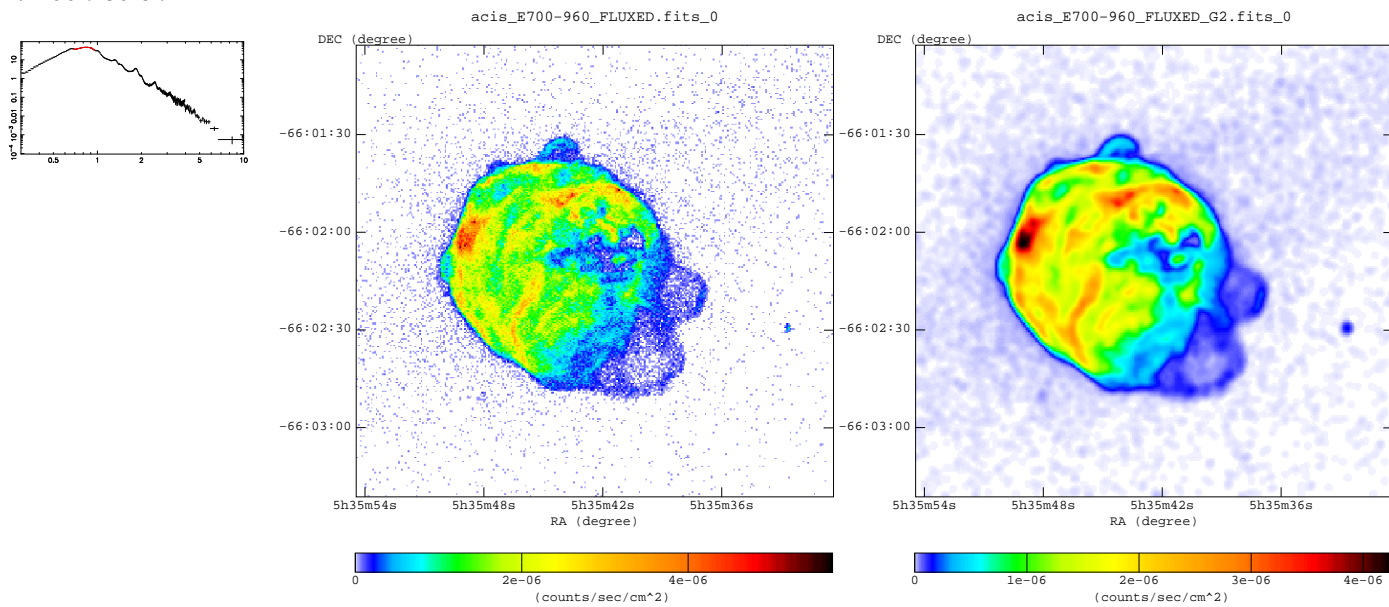


3.3 Misc.

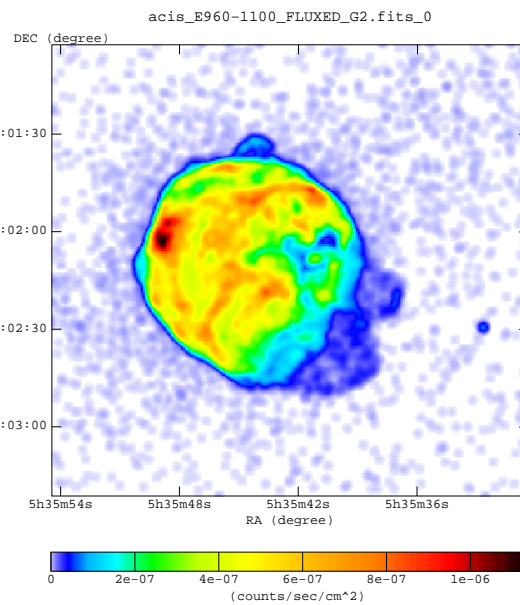
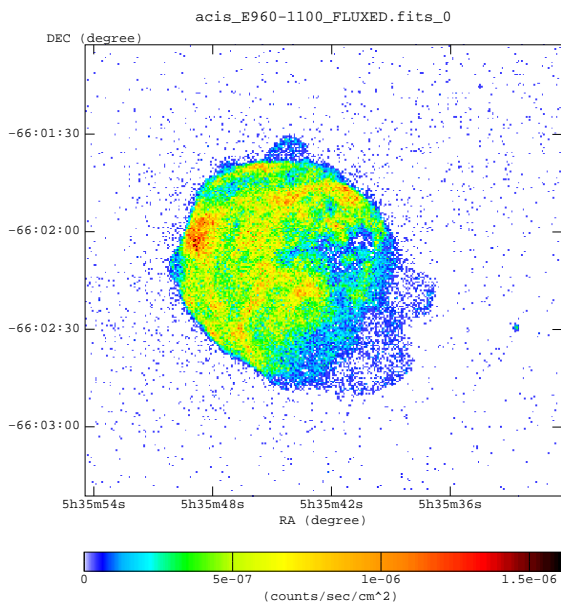
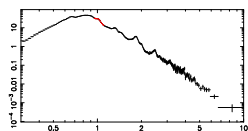
: 600-700 eV



: 700-960 eV



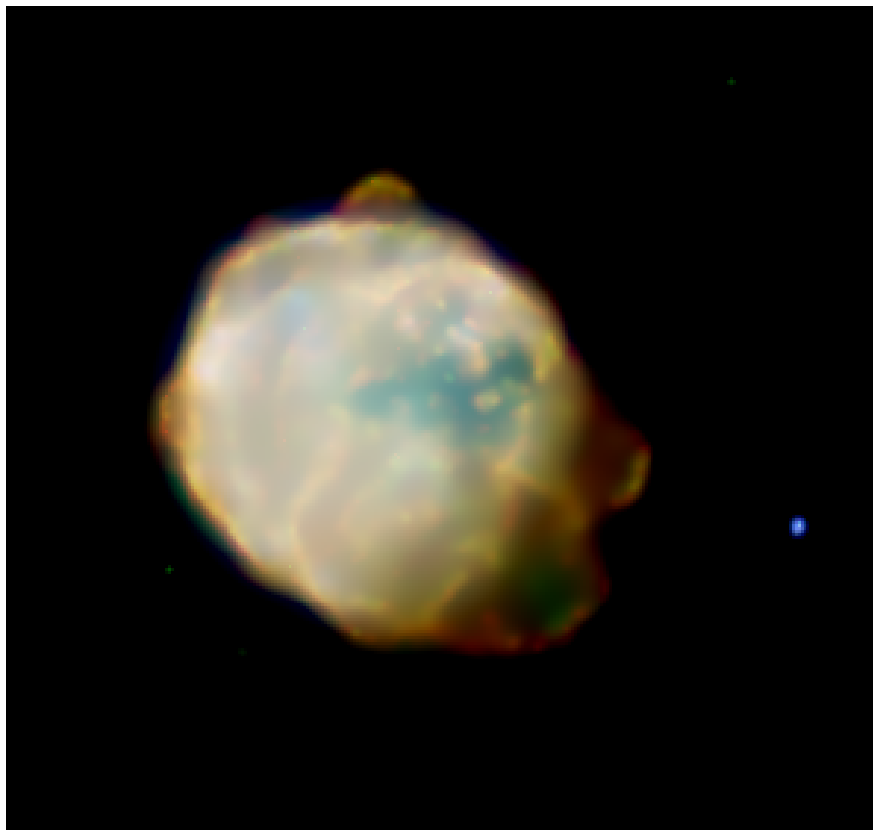
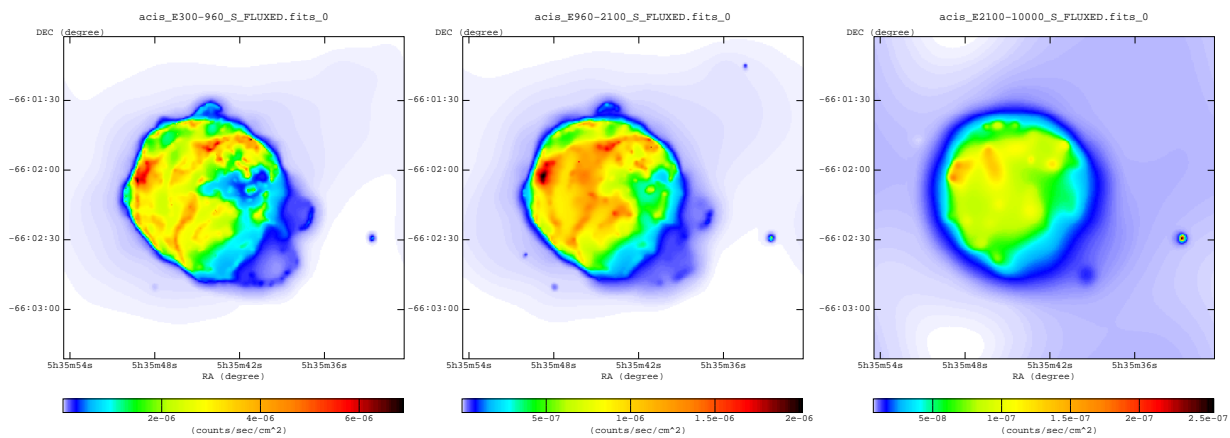
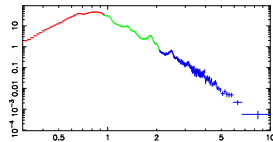
: 960-1100 eV



4 Chandra Images : True Color

- Individual images are adaptively smoothed.
- Warning : the adaptive smoothing process sometimes produces artifacts.
- convolution method : fft
- kernel type : gauss
- significance (min , max) : (3 , 5)

RED : 300-960 eV
 GREEN : 960-2100 eV
 BLUE : 2100-10000 eV

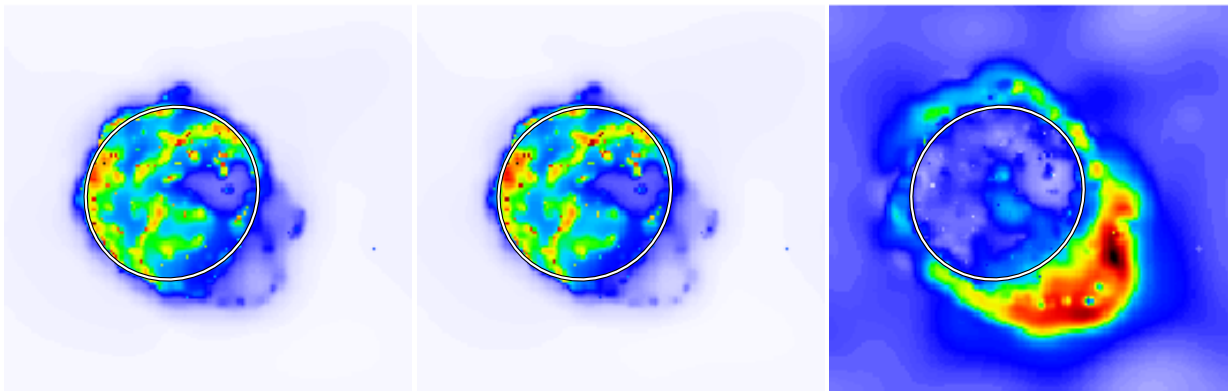
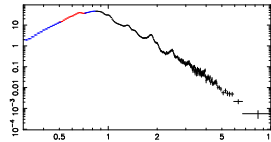


5 Chandra Images : Equivalent Width Map

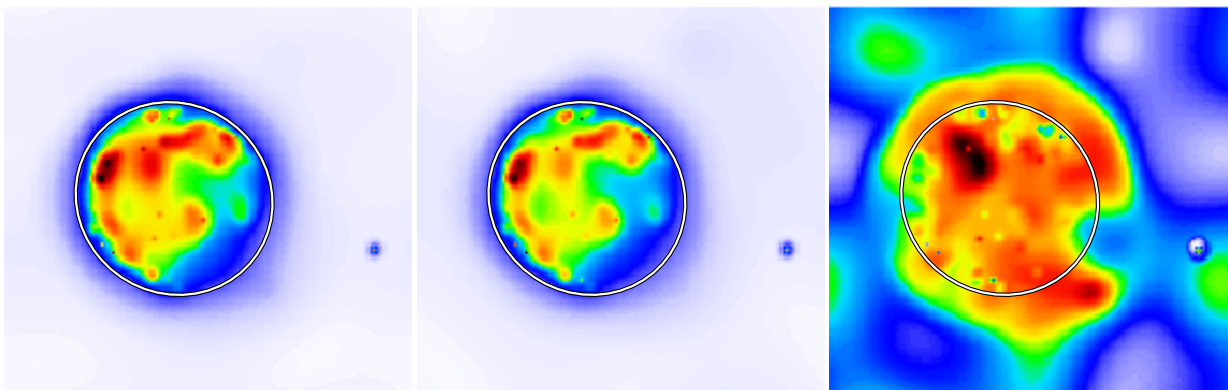
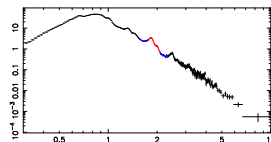
5.1 Equivalent Width Images

- individual images(line and two continuum) are binned by given pixel size and then adaptively smoothed.
- same scale map (from the least count images) was used for all three images.
- continuum at given line position was estimated by linear interpolation of two continuum image in pixel-by-pixel base.

continuum : 300-510 eV
 line : 510-730 eV
 continuum : 730-820 eV



continuum : 1570-1750 eV
 line : 1750-2090 eV
 continuum : 2090-2300 eV



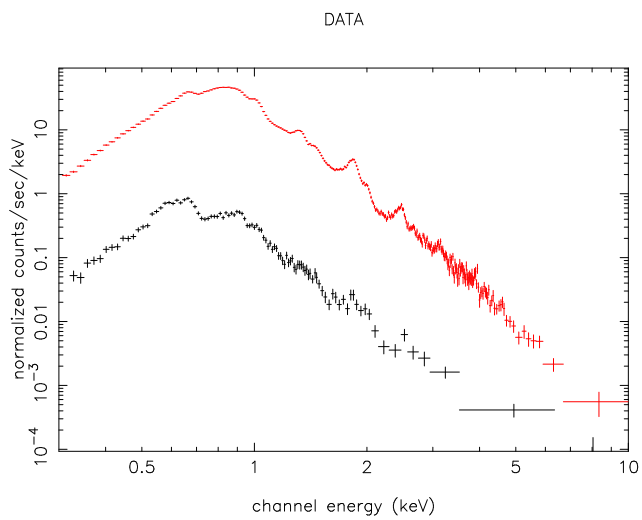
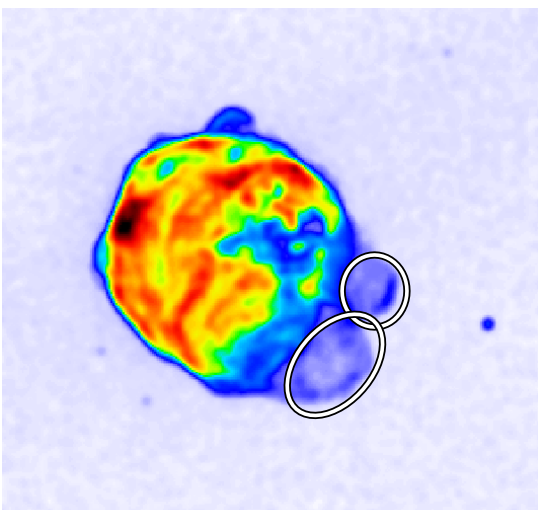
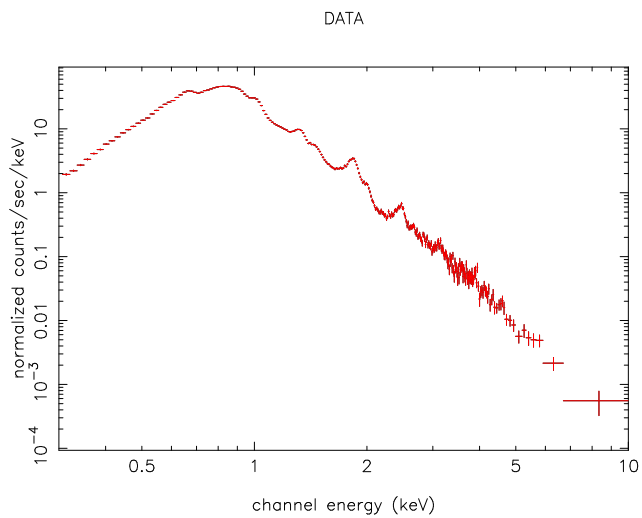
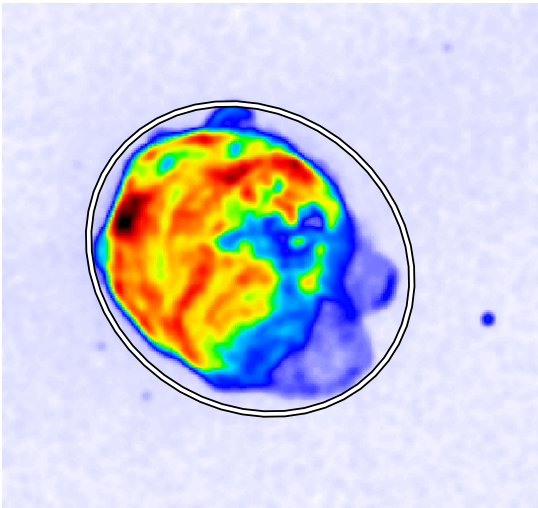
6 Chandra Spectrum

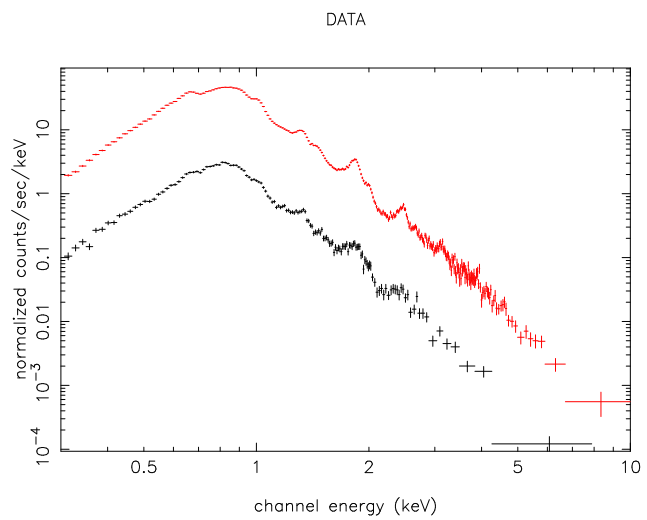
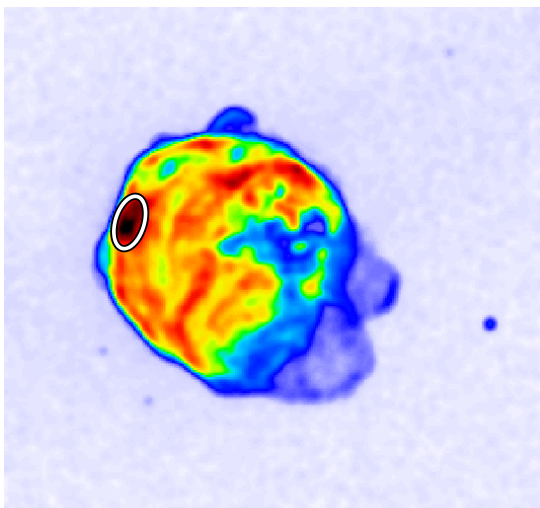
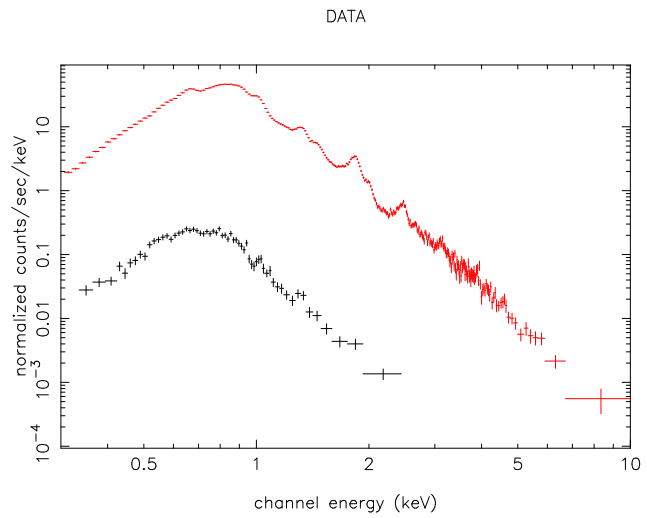
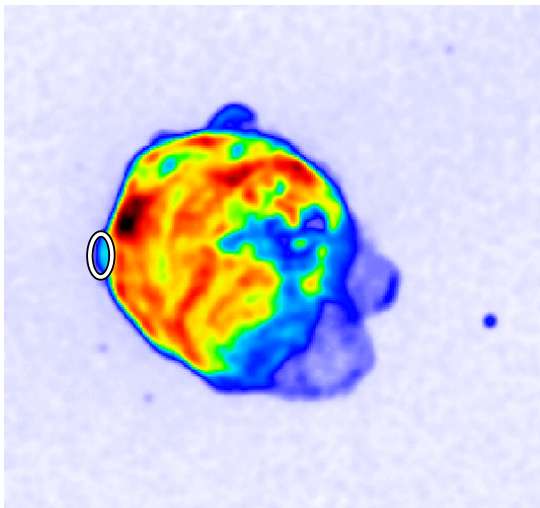
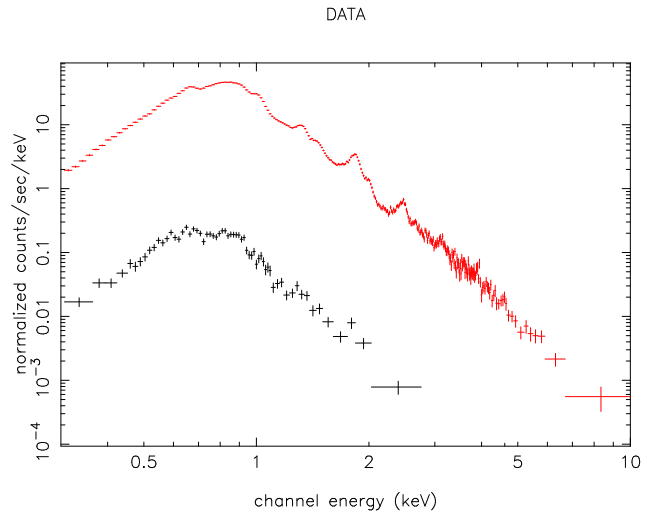
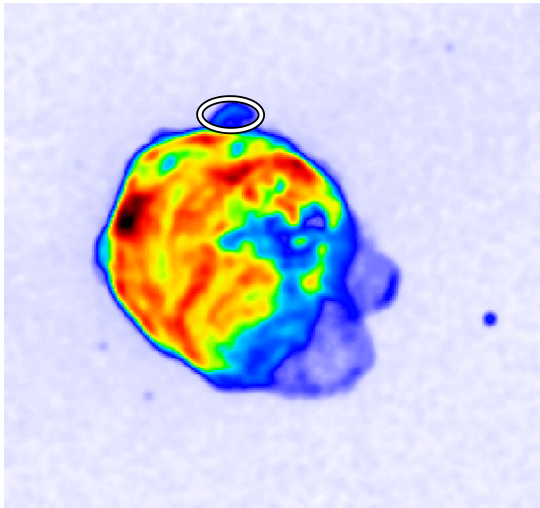
- Images show Regions used to extract spectra
- Regions with red strikes are excluded

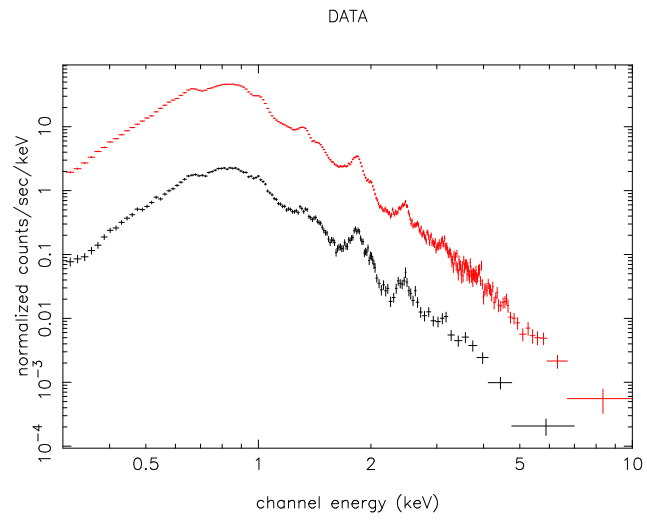
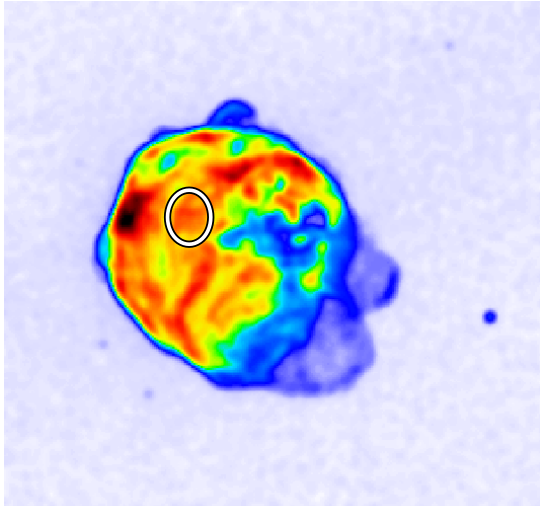
6.1 ObsID 777

- Background was subtracted from the region around the SNR.

total





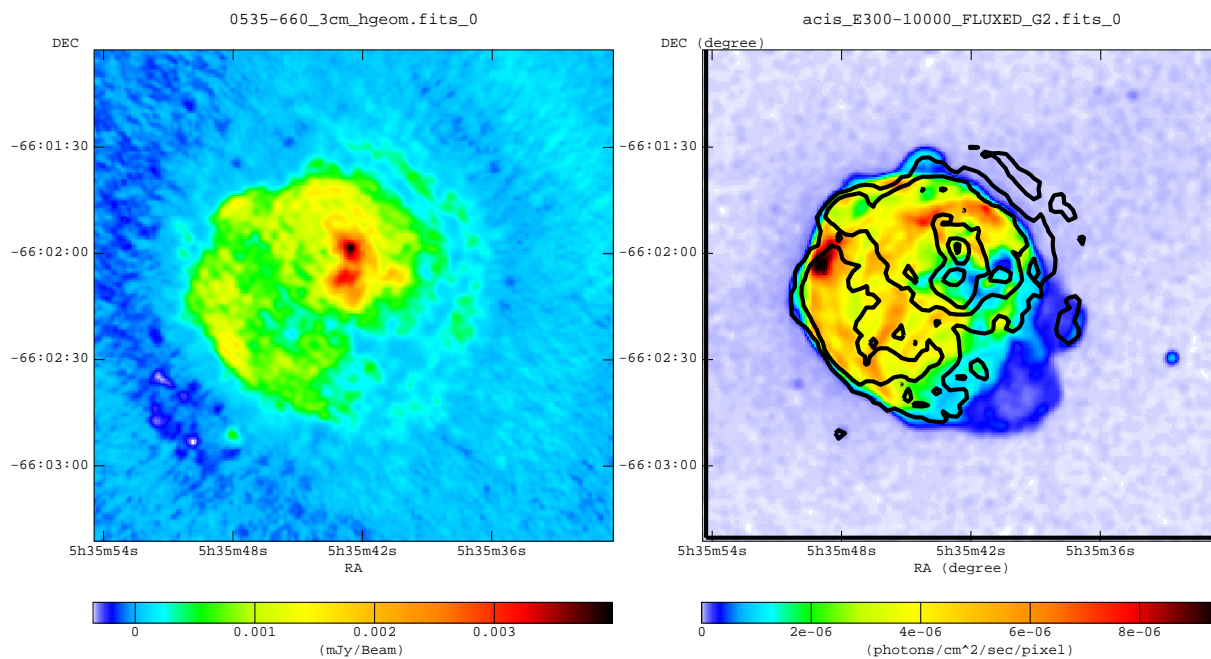


7 Radio Image

- left : radio image
- right : chandra x-ray image with radio contour lines

3.5-cm

- . Image from **Dickel et al.(1993)**
- . 3.5-cm flux density: 0.45 Jy



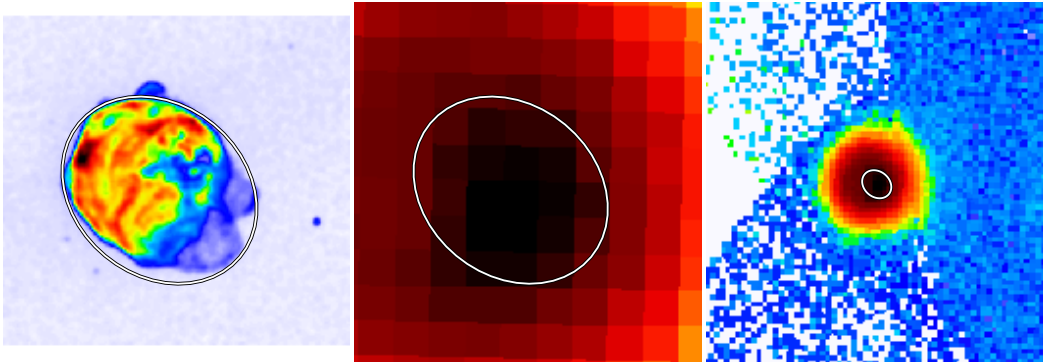
Summary of Observation

| | |
|-------------------------|-----------------------------------|
| Telescope | Australia Telescope Compact Array |
| Date | 1991 May, 1992 August, October |
| Frequency | 8.638 GHz |
| Beam size | 2.7"x2.7" |
| 1 sigma noise | 0.05 mJy beam-1 |

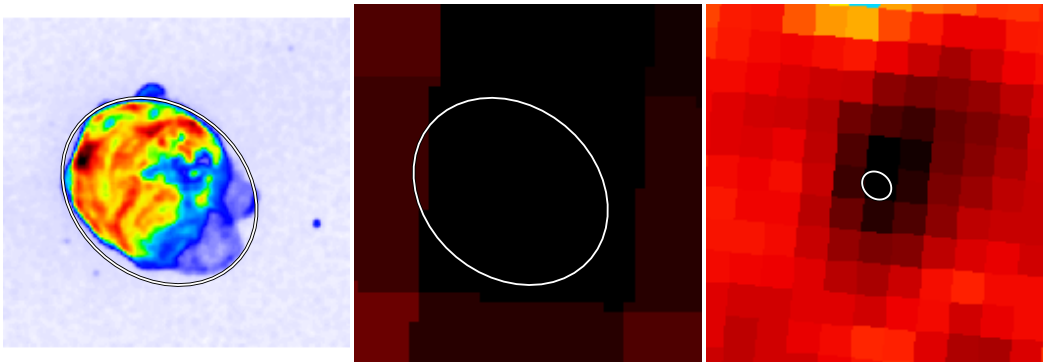
8 Images from Survey Missions

- Left : Chandra Image (0.3-10. keV)
- Center : Images from *SkyView* with the **same** scale
- right : Images from *SkyView* with a **reduced** scale

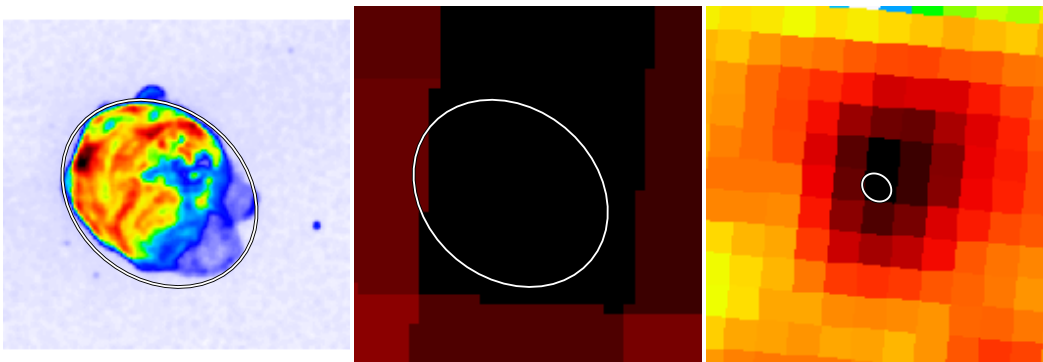
ROSAT PSPC (1.0 deg): X-ray (0.1-2.4 keV)

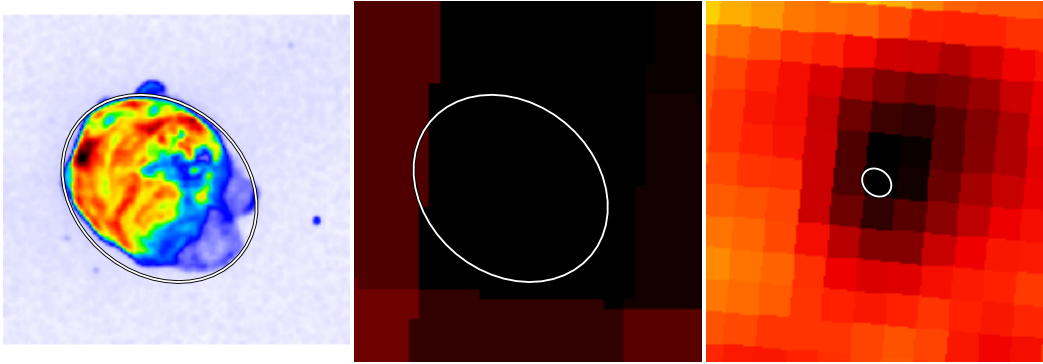
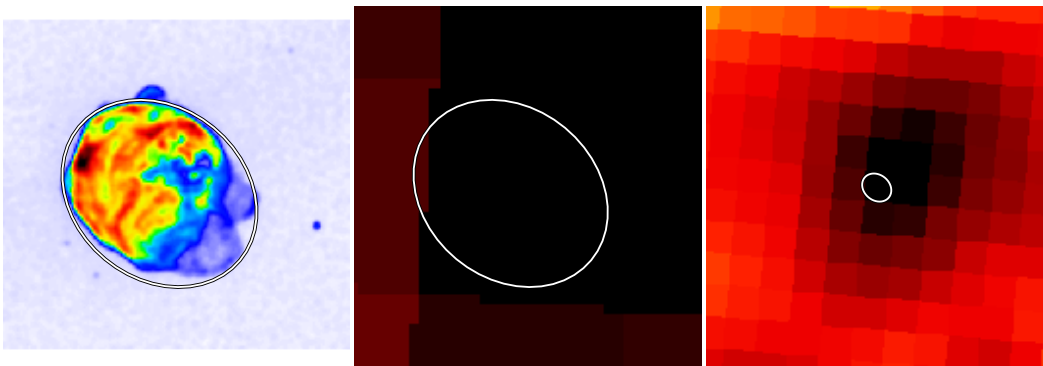
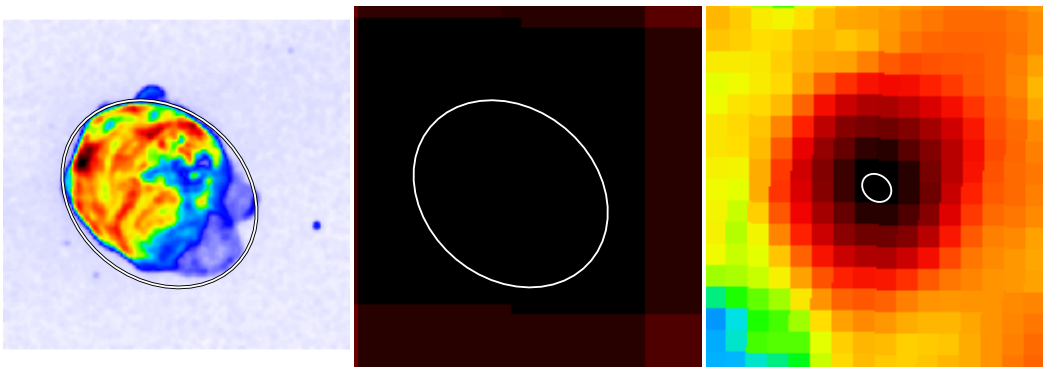


IRAS 12 micron: Infrared (12 micron)



IRAS 25 micron: Infrared (25 micron)



IRAS 60 micron: Infrared (60 micron)**IRAS 100 micron: Infrared (100 micron)****4850 MHz: Radio (4850 MHz continuum)****Digitized Sky Survey: Optical (J or E band images with a few exceptions)**