

## SNR 0525-66.1

### 1 Summary

- Common Name: N 49
- Distance: 50 kpc (distance to LMC, **Westerlund(1990)** )
- Position of Central Source (J2000): ( 05 25 59.9, -66 04 50.8 )
- X-ray size: 85" x 65"
- Description: ??

### 1.1 Summary of Chandra Observations

Sequence	Obs ID	Instrument	Exposure <sub>uf</sub> (ks)	Exposure <sub>f</sub> (ks)	Date Observed	Aimpoint (J2000) ( $\alpha, \delta$ )
500043	747	ACIS-7	40.9	39.9	2000-01-04	( 05 26 00.7, -66 04 35.0 )

Exposure<sub>uf</sub> → Exposure time of un-filtered event file  
 Exposure<sub>f</sub> → Exposure time of filtered event file

- The whole remnant is covered by chip ACIS-S3(CCD\_ID=7)
- Subarray was used and it does not cover whole remnant.

### 1.2 Chandra Counts and Fluxes

Region	Energy Range (keV)	Signal (counts)	Rate (counts s <sup>-1</sup> )	F <sub>X</sub> <sup>abs</sup> (ergs cm <sup>-2</sup> s <sup>-1</sup> )	F <sub>X</sub> (ergs cm <sup>-2</sup> s <sup>-1</sup> )	L <sub>X</sub> (ergs s <sup>-1</sup> )
total (747)	0.3 - 10.0	2.026e+05	5.083e+00	1.63e-11	7.35e-11	2.19e+37
	0.3 - 2.1	1.984e+05	4.979e+00	1.44e-11	7.16e-11	2.13e+37
	2.1 - 10.	4.212e+03	1.057e-01	1.88e-12	2.00e-12	5.94e+35
central object (747)	0.3 - 10.0	1.050e+04	2.633e-01	1.49e-12	4.21e-12	1.25e+36
	0.3 - 2.1	9.081e+03	2.278e-01	7.99e-13	3.49e-12	1.04e+36
	2.1 - 10.	1.459e+03	3.661e-02	6.97e-13	7.25e-13	2.16e+35
shell (747)	0.3 - 10.0	2.097e+05	5.262e+00	1.48e-11	6.99e-11	2.08e+37
	0.3 - 2.1	2.063e+05	5.176e+00	1.37e-11	6.87e-11	2.05e+37
	2.1 - 10.	3.469e+03	8.704e-02	1.18e-12	1.27e-12	3.78e+35

- $N_{\text{H}} = 0.34$  ( $10^{22} \text{ cm}^{-2}$ )
- Assumed distance: 50 kpc (distance to LMC, **Westerlund(1990)** )
- nH was derived from the spectrum of the central source
- because observation did not cover the whole remnant, some flux values are partial values.

### 1.3 Nearby Sources

Obs ID	Position (J2000)	Size	Net Count	Count rate	Note
747					

- (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 and Milne, 1998 AJ, 115, 1057 : ATCA
- Hughes et al., 1998 ApJ, 505, 732 : ASCA
- Westerlund, 1990 A&ARv, 2, 29 : Distance to LMC

## 2 Fit Detail

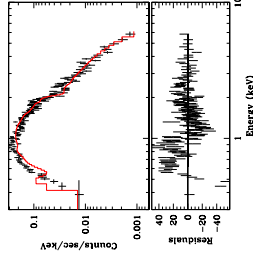
- See spectrum page for used regions.

nH was derived from central source.

### 2.1 Central Object:

- spectrum from **central object**
- does not fit well in the low energy regime.
- derived nH is rather large compared to the value(2.5 2.6) given by **Hughes et al.(1998)**.

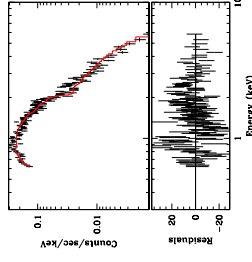
```
source=(xswabs * powlaw1d)
reduced  $\chi^2$  = 1.17965
nh = 0.4528 1.022/cm2
```



### 2.2 Point Source(2):

- spectrum was re-fitted with ignoring energy below 0.6 keV.
- this nH value was used in estimating the flux value.

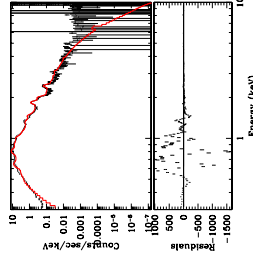
```
source=(xswabs * powlaw1d)
reduced  $\chi^2$  = 0.557086
nh = 0.3391 1.022/cm2
```



### 2.3 Shell:

- spectrum from **shell**
- nH was fixed at the value derived above.
- two thermal plasma model.

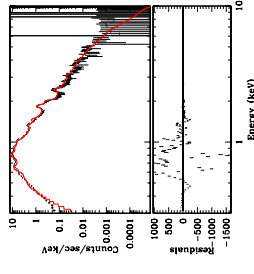
```
source=(xswabs * (xstraymond + xstraymond))
reduced  $\chi^2$  = 20.05
nh = 0.3373 1.022/cm2
```



### 2.4 Total:

- spectrum from **total**
- nH and power-law component for point source was fixed at the derived value in the previous fit.

```
source=(xswabs * ((powlaw1d + xstraymond) + xstraymond))
reduced  $\chi^2$  = 19.7735
nh = 0.3373 1.022/cm2
```

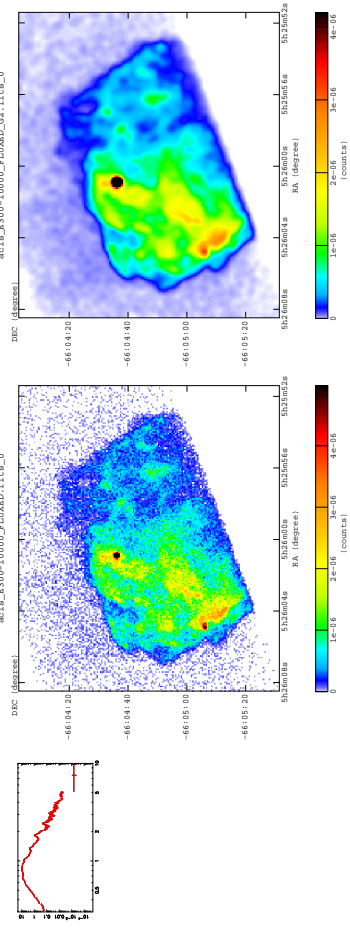


### 3 Chandra Images : Band Images

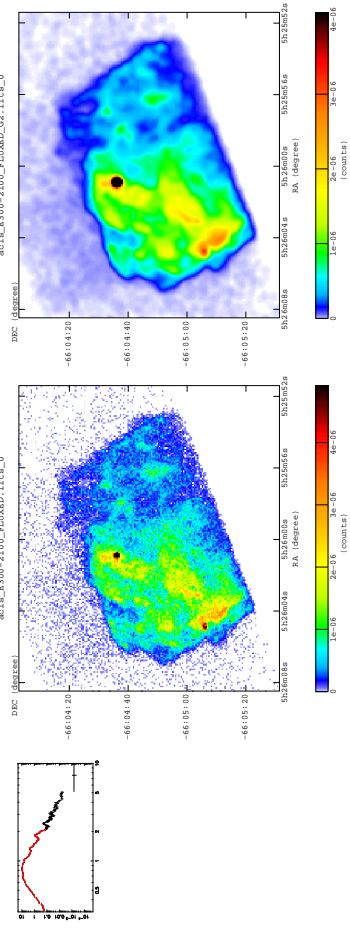
- Left : raw images, binned by 1x1 pixel
- Right : gaussian smoothed version of above (  $\sigma = 2$  pixel)

#### 3.1 Wide Band Images

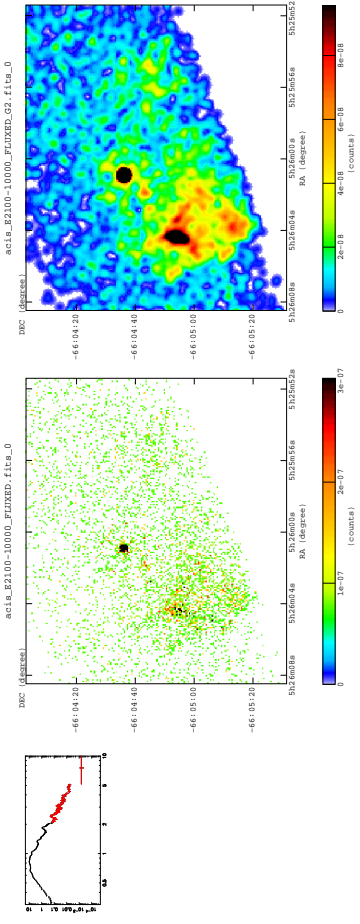
Total : 300-10000 eV



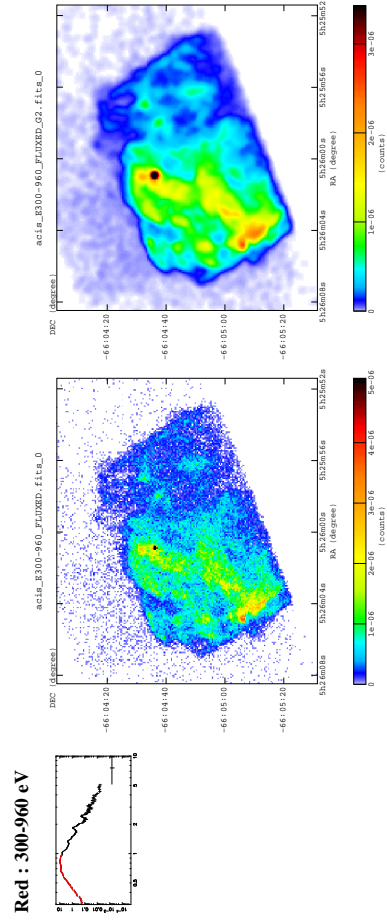
#### Soft Band : 300-2100 eV



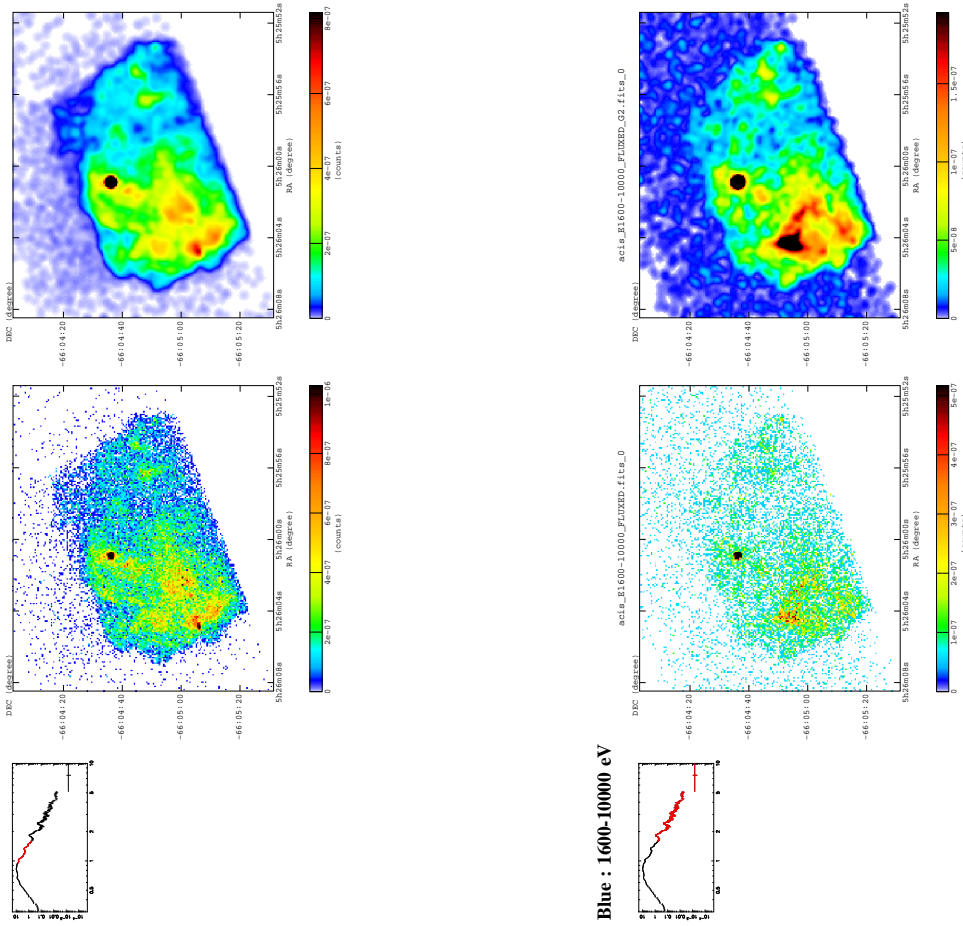
#### Hard Band : 2100-10000 eV



#### 3.2 Band images used in true color image.

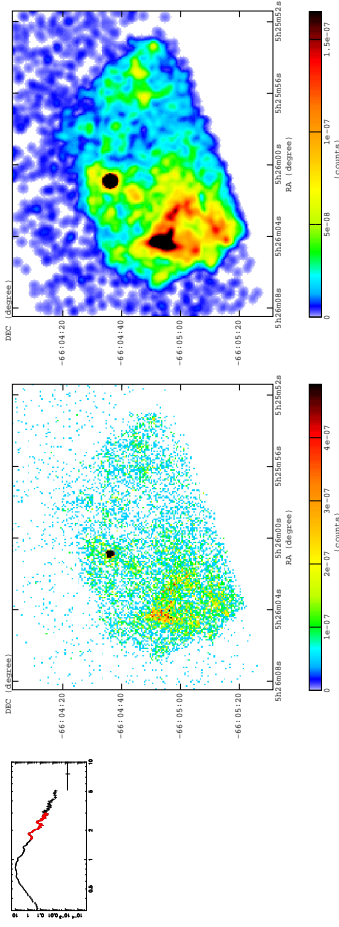


**Green : 960-1600 eV**



**3.3 Misc.**

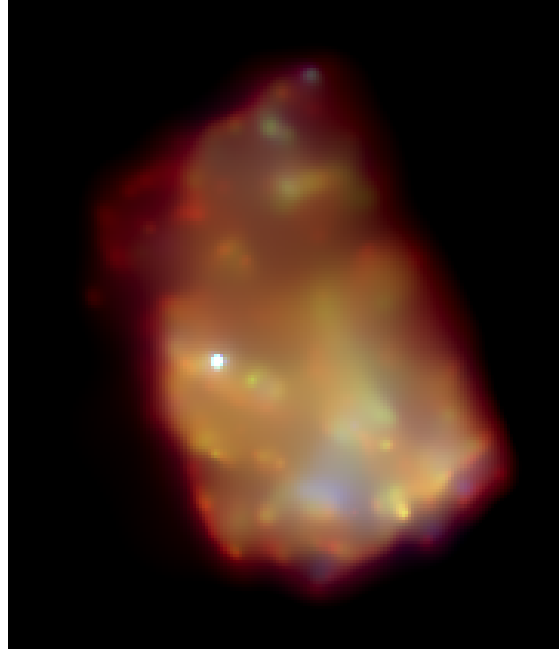
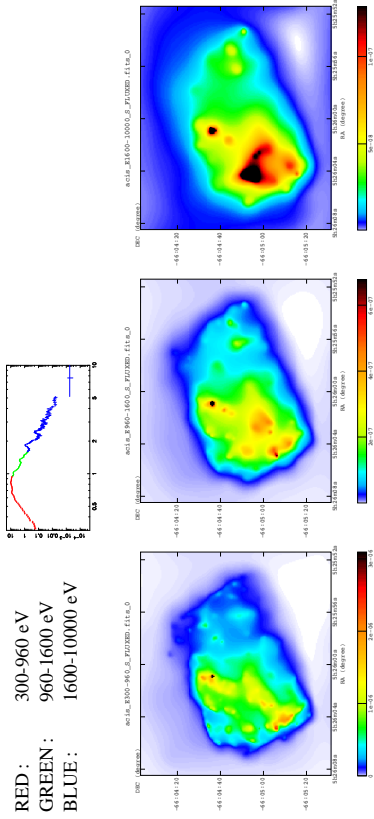
**: 1600-3000 eV**



#### 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 : 960-1600 eV  
 BLUE : 1600-10000 eV



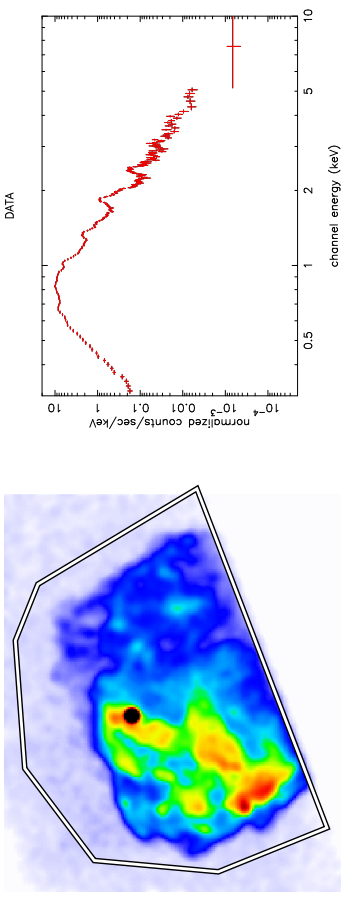
#### 5 Chandra Spectrum

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

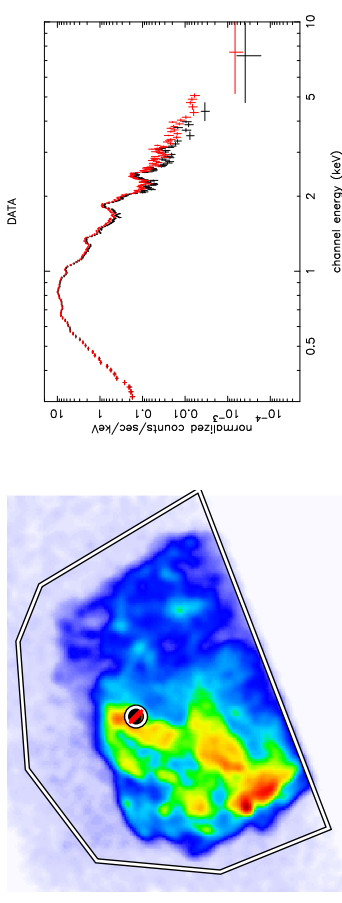
##### 5.1 ObsID 747

- Background was subtracted from the region around the SNR.

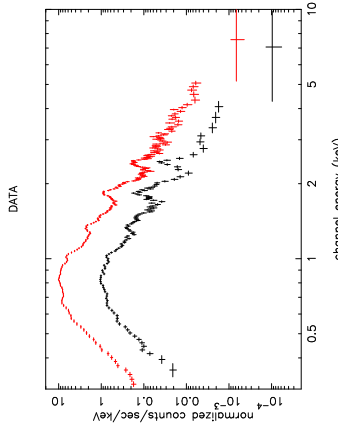
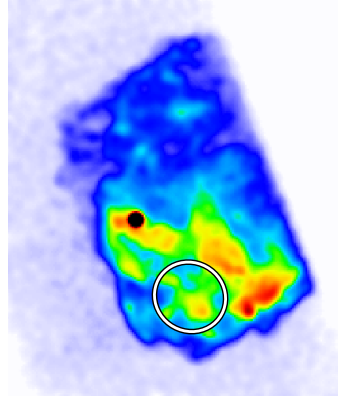
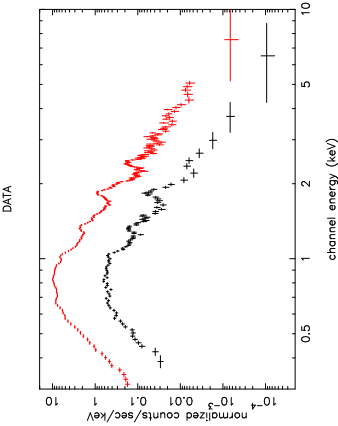
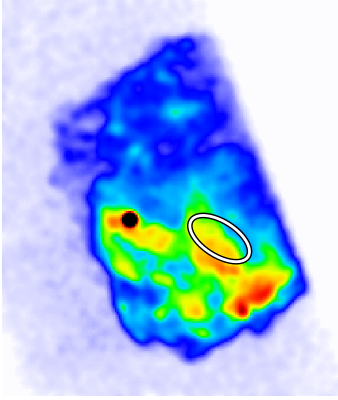
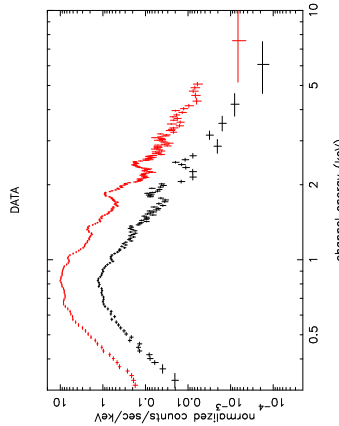
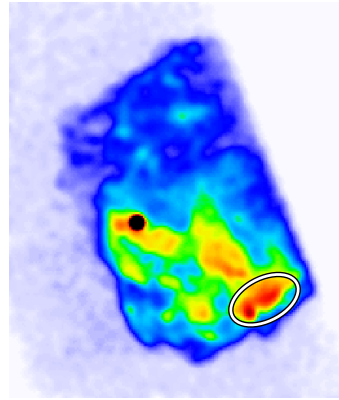
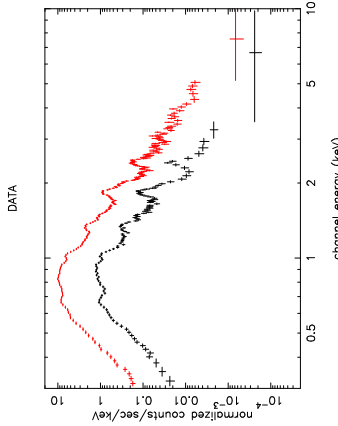
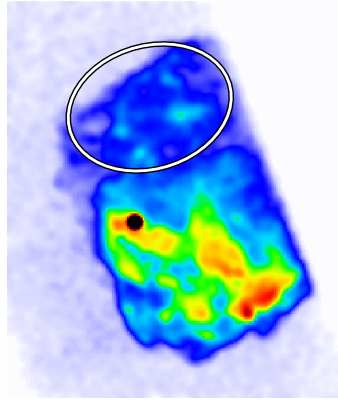
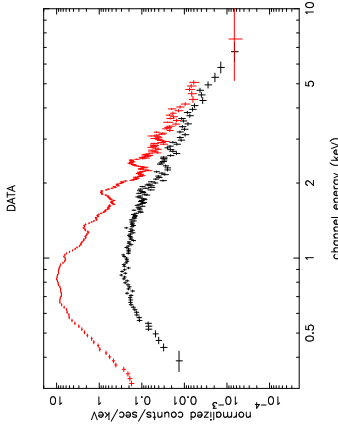
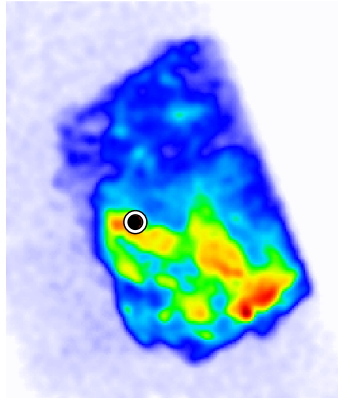
total



shell



central object

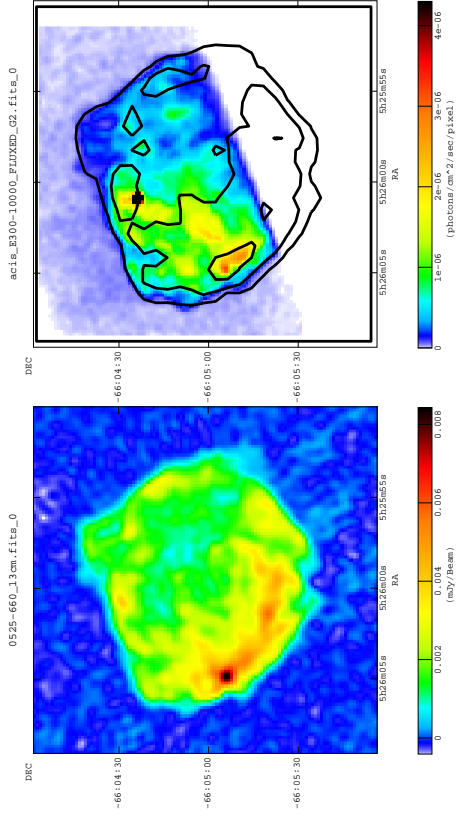


6 Radio Image

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

13-cm

- 13-cm flux density: 0.96 Jy
- Image from **Dickel and Milne(1998)**
- Chandra image has transformed to the same scale of the radio one.



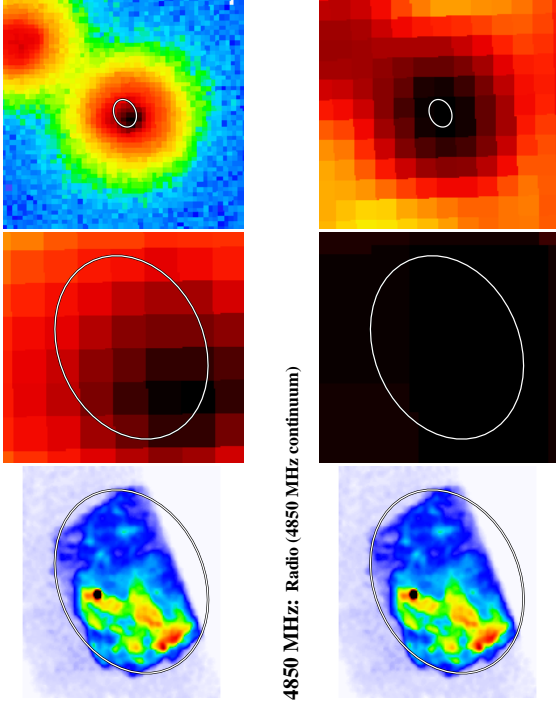
Summary of Observation

Telescope	.....	Australia Telescope Compact Array
Date	.....	1992 March 22, April 2
Frequency	....	2.368 GHz
Beam size	....	3.0"x3.0"
1 sigma noise	..	0.08 mJy / beam

7 Images from Survey Missions

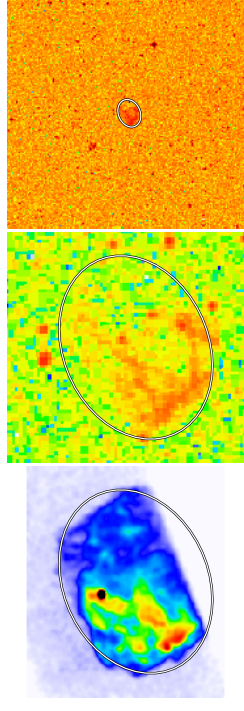
- Left : Chandra Image (0.3-10. keV)
- Center : Images from *SkyView* with the same scale
- right : Images from *SkyView* with a reduced scale

ROSAT PSPC (2.0 deg): X-ray (0.1-2.4 keV)

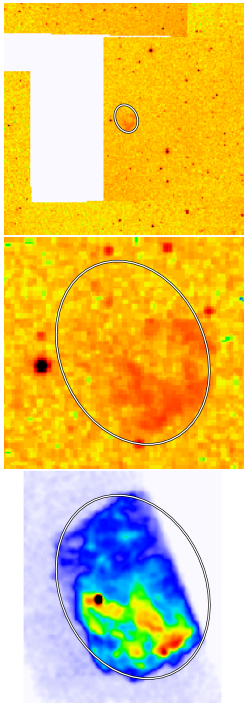


4850 MHz: Radio (4850 MHz continuum)

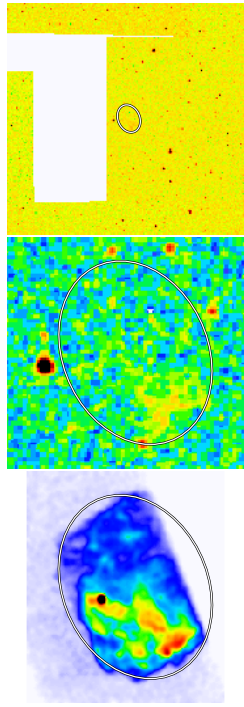
Digitized Sky Survey: Optical (J or E band images with a few exceptions)



The Two Micron All Sky Survey (H-band): IR (1.65 microns)



The Two Micron All Sky Survey (K-band): IR (2.17 microns)



The Two Micron All Sky Survey (J-band): IR (1.25 microns)

