Continuum Observing

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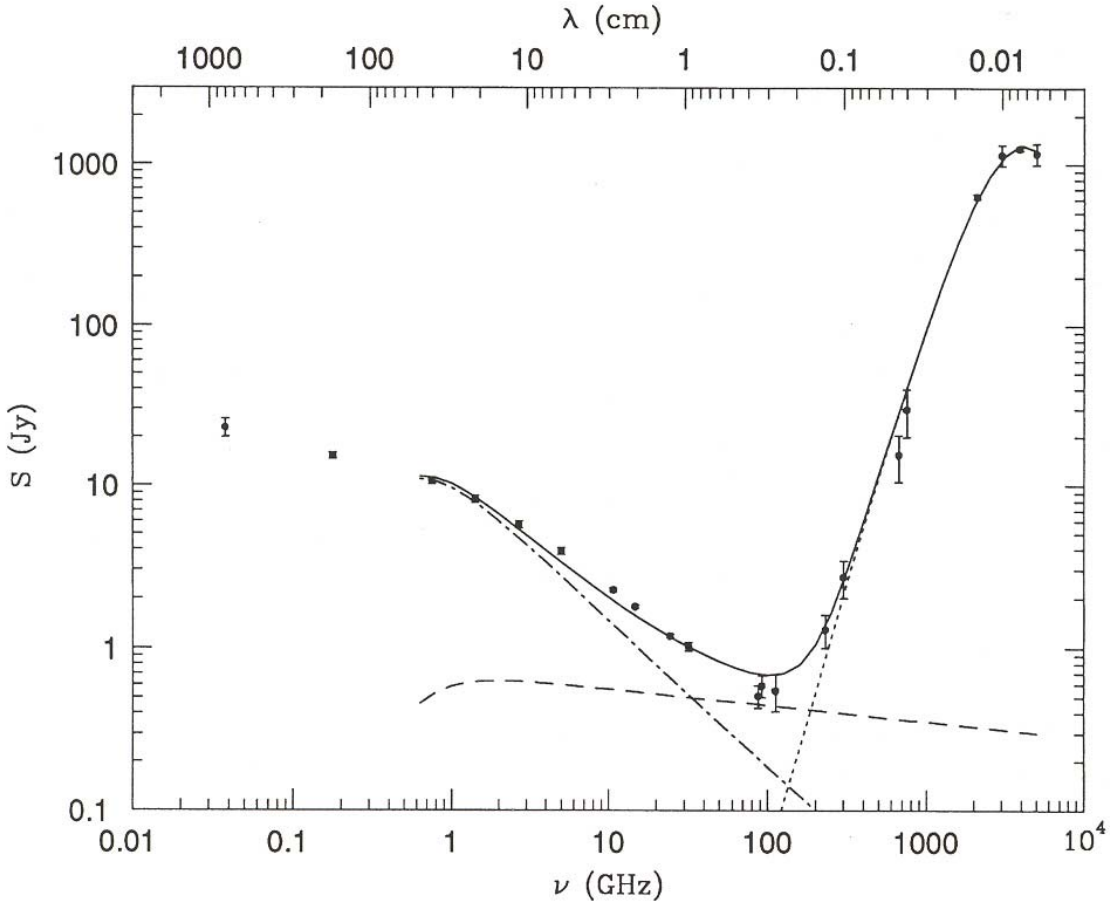
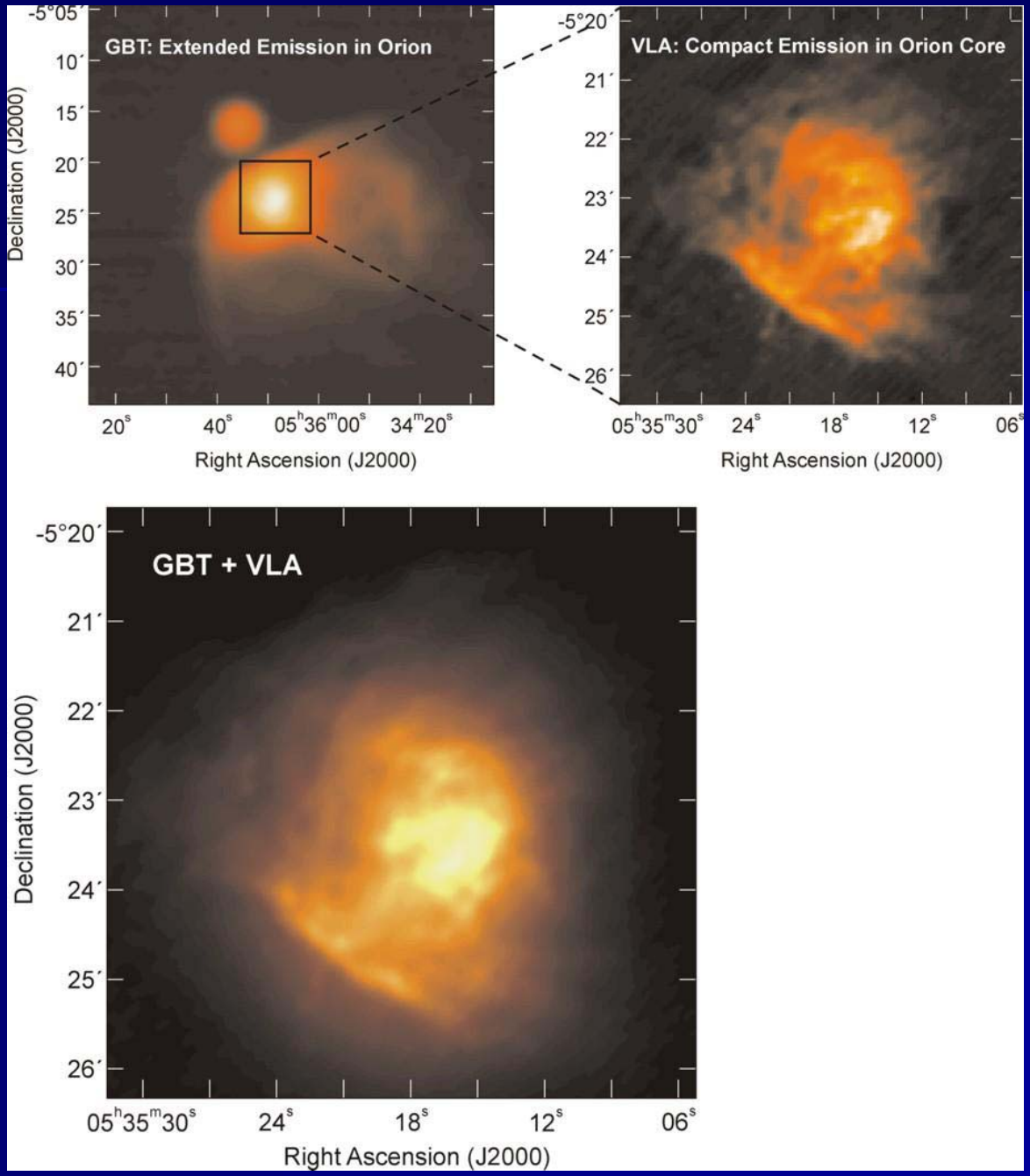
Continuum spectrum of M82 showing synchrotron radiation (dot/dash line), free-free emission (dashed line) and thermal emission from dust (dotted line).

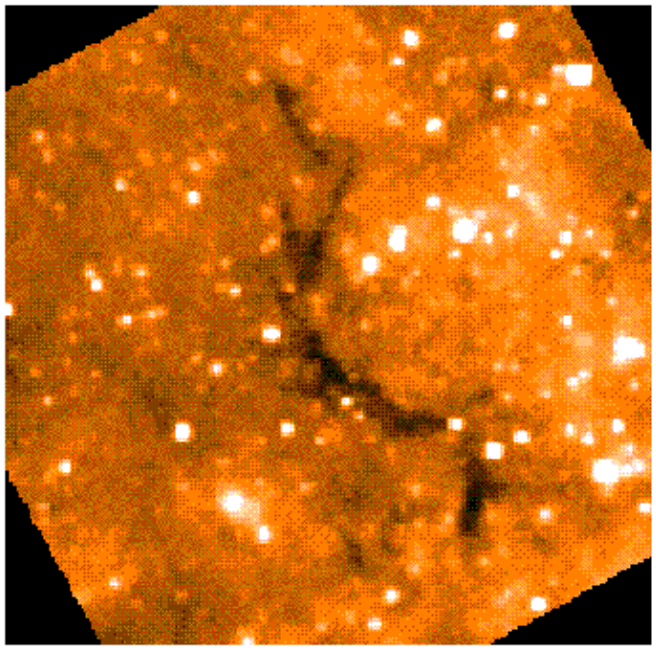


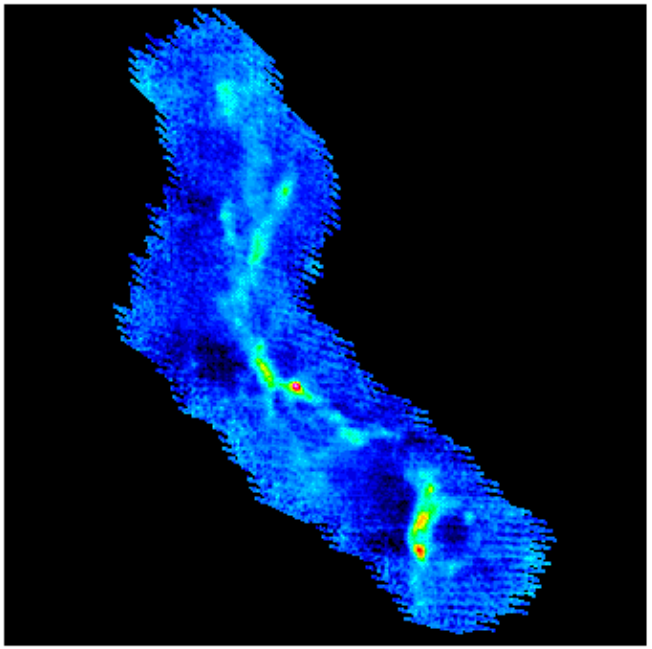
4.85 GHz sky over Green Bank

Orion
Nebula
HII region
8.4 GHz

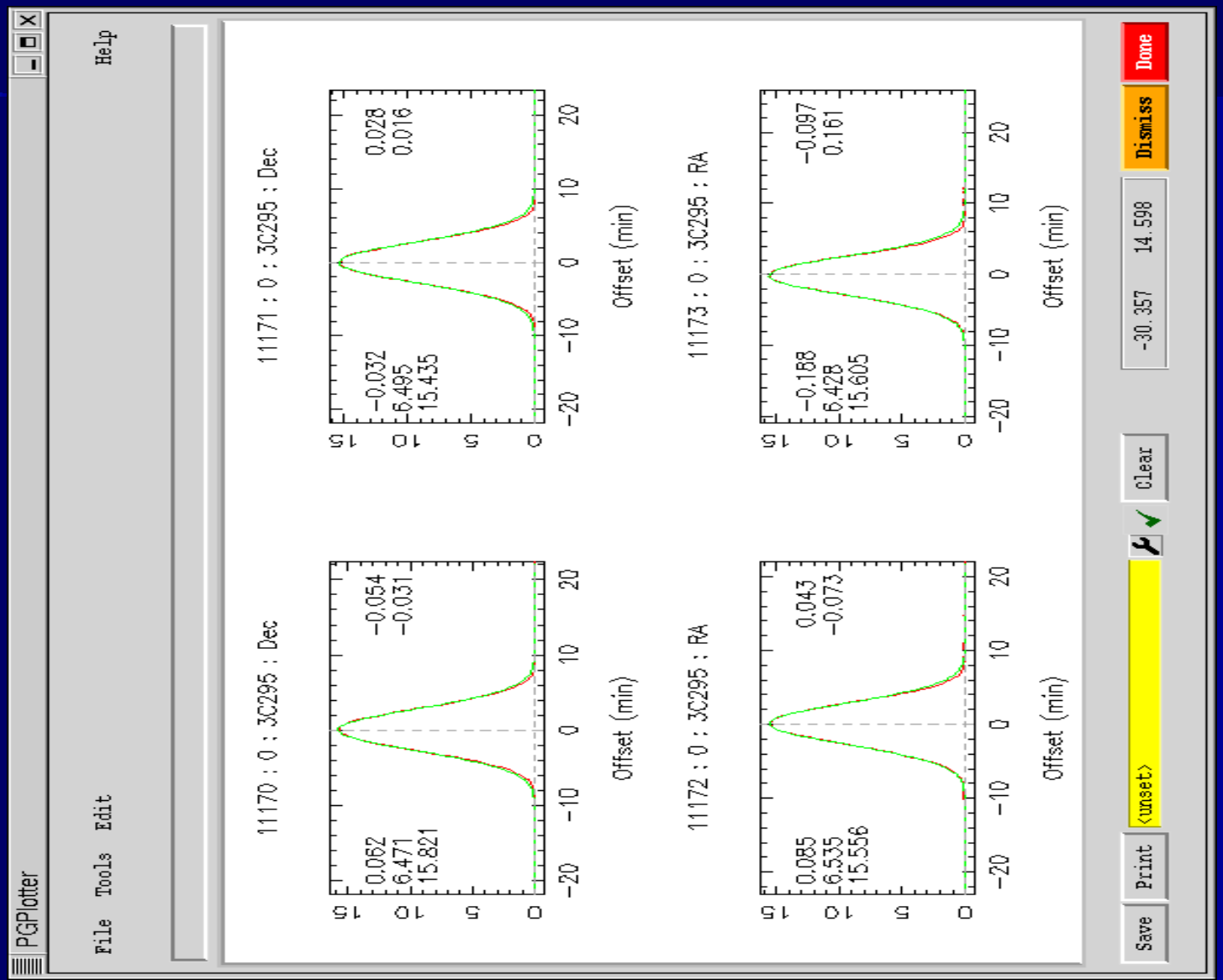


The Galactic dark cloud G11.11-0.12 in absorption at 8 microns (left) and emission at 850 microns (right)

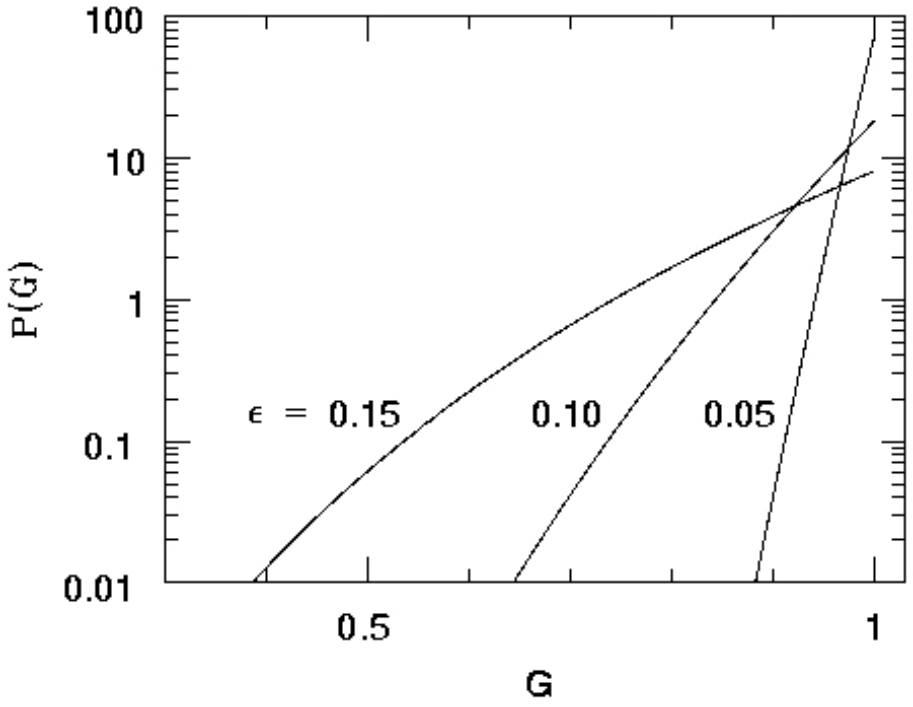




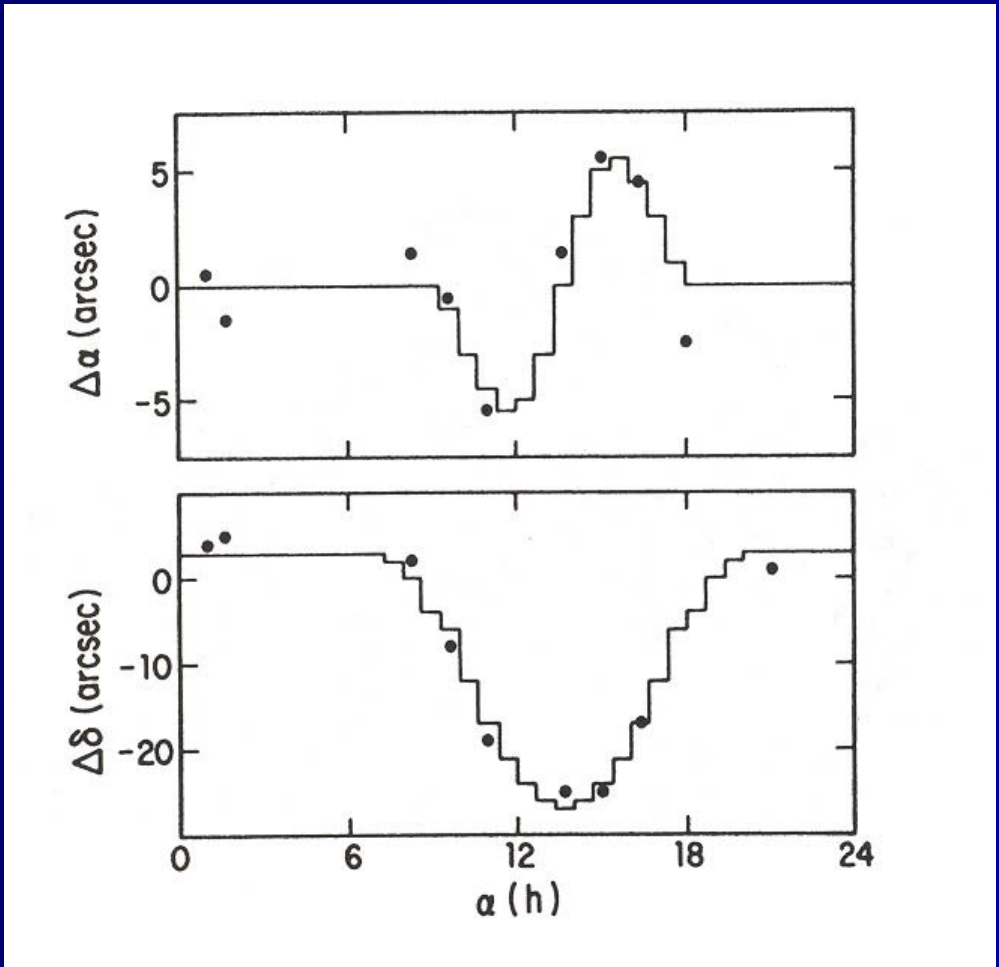
Calibration data and Gaussian fits from a cross scan on 3C 295 made with the GBT at 2 GHz yielding the pointing offset, beamwidth, and antenna temperature



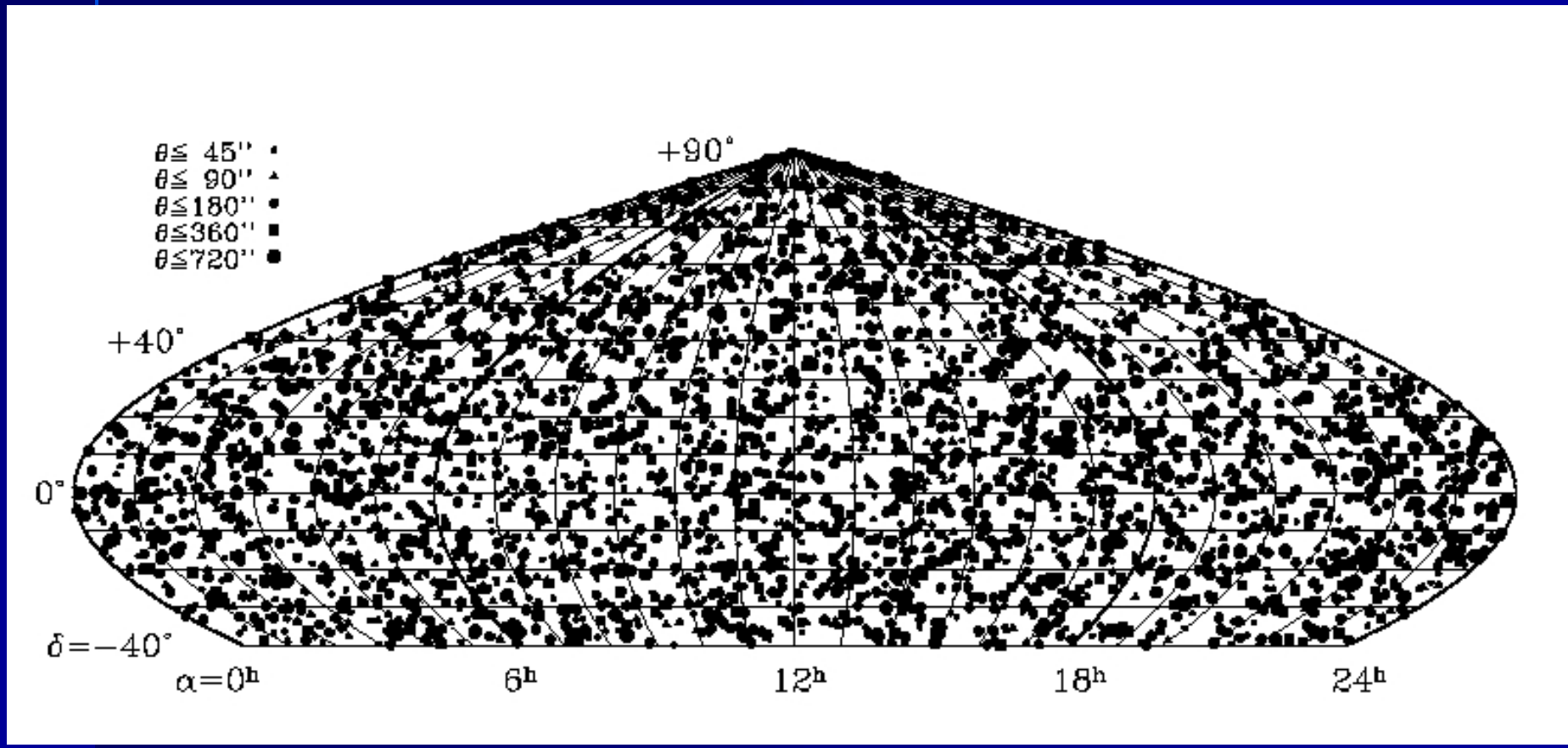
Distributions of normalized gain G resulting from Gaussian pointing errors with rms ε beamwidths



Differential expansion resulting from solar heating made the 300-foot telescope bend away from the Sun, located near α = 13h 20m.



This dense grid of pointing calibrators can be used to reduce tracking errors north of δ = -40°.



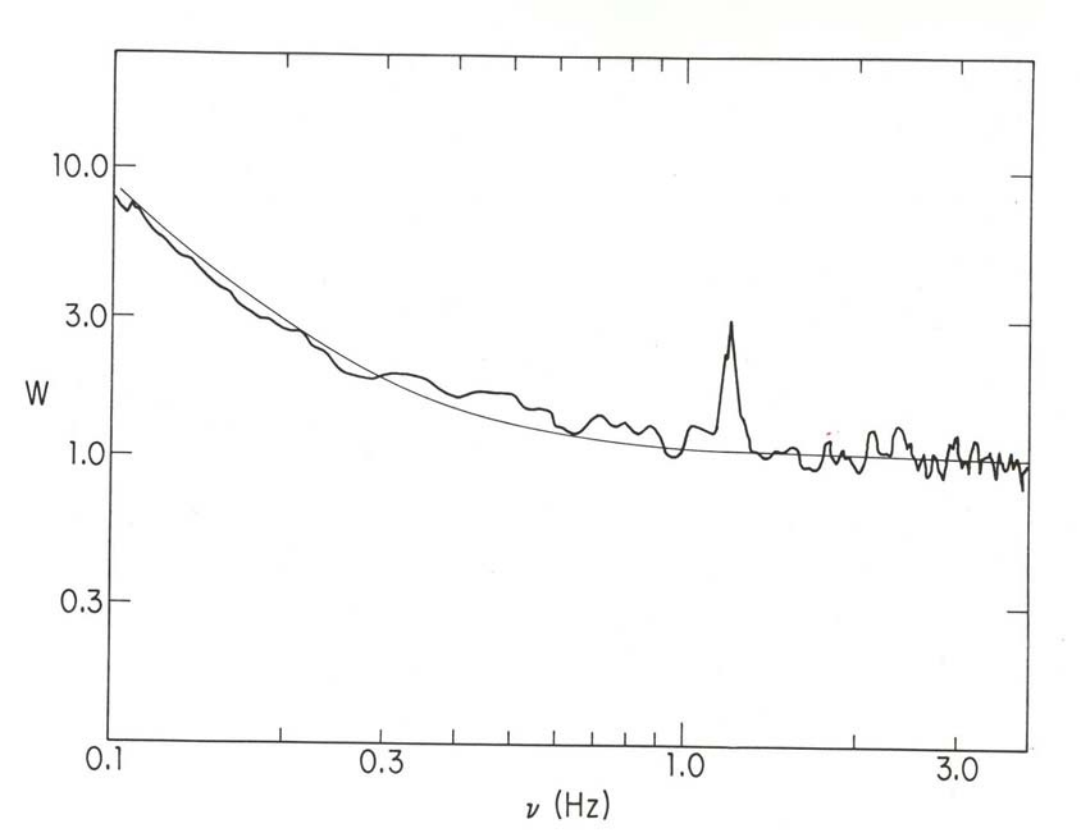
Radiometer Equation

$$\sigma = \frac{T_S}{(B\tau)^{1/2}}$$

Radiometer Equation

Beware: 1/f noise and confusion

Postdetection power spectrum showing 1/f noise at low frequencies and refrigerator microphonics near 1.2 Hz.

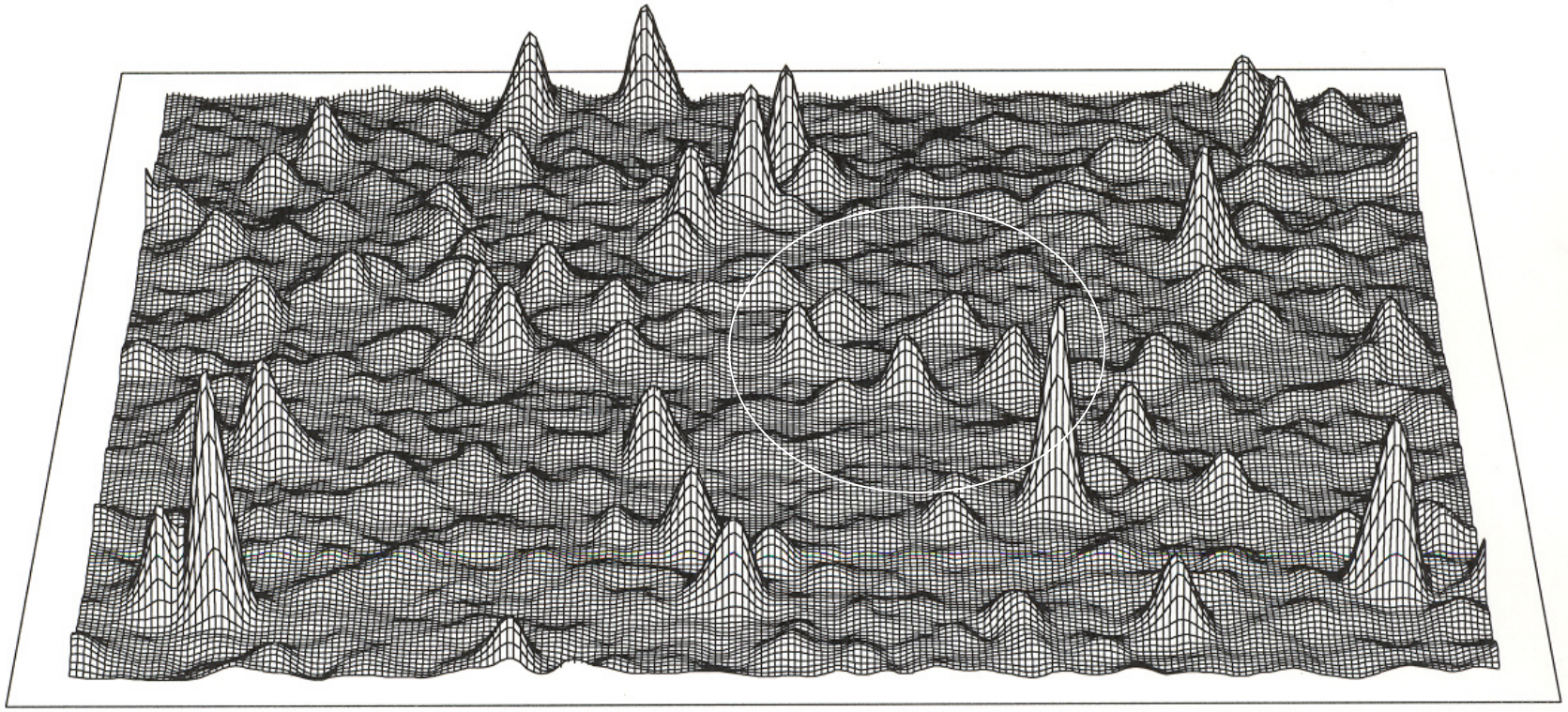


Radiometer equation for unstable receiver

$$\sigma = T_{\mathrm{s}} \left[\frac{1}{B\tau} + \left(\frac{\Delta G_{\mathrm{r}}(f)}{G_{\mathrm{r}}} \right)^2 + \left(\frac{\Delta T_{\mathrm{s}}(f)}{T_{\mathrm{s}}} \right)^2 \right]^{1/2}$$

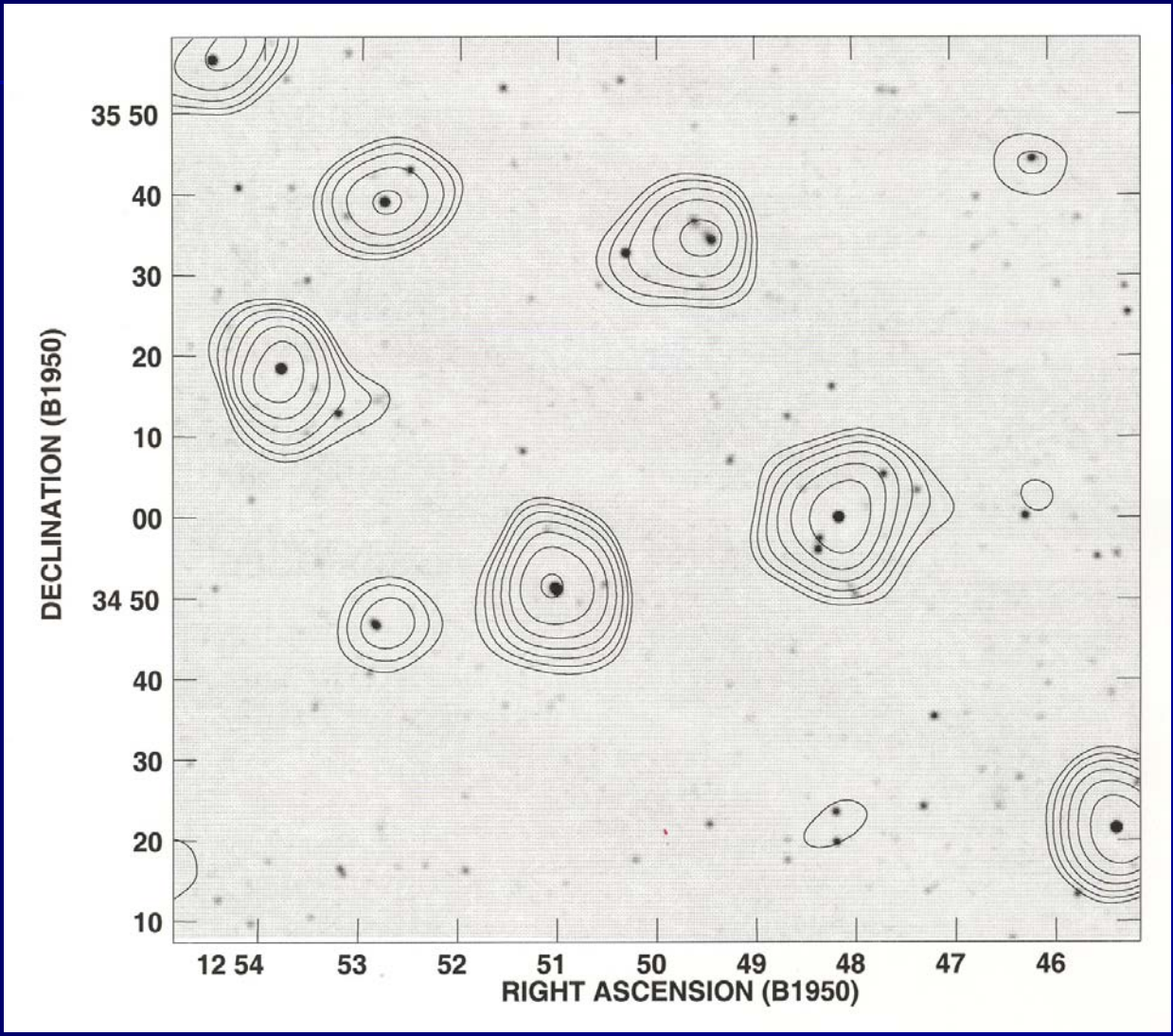
Confusion!

Profile plot of 45 deg² near the NGP imaged with 12 arcmin resolution at 1.4 GHz. The strongest source shown has S ≈ 1.5 Jy.

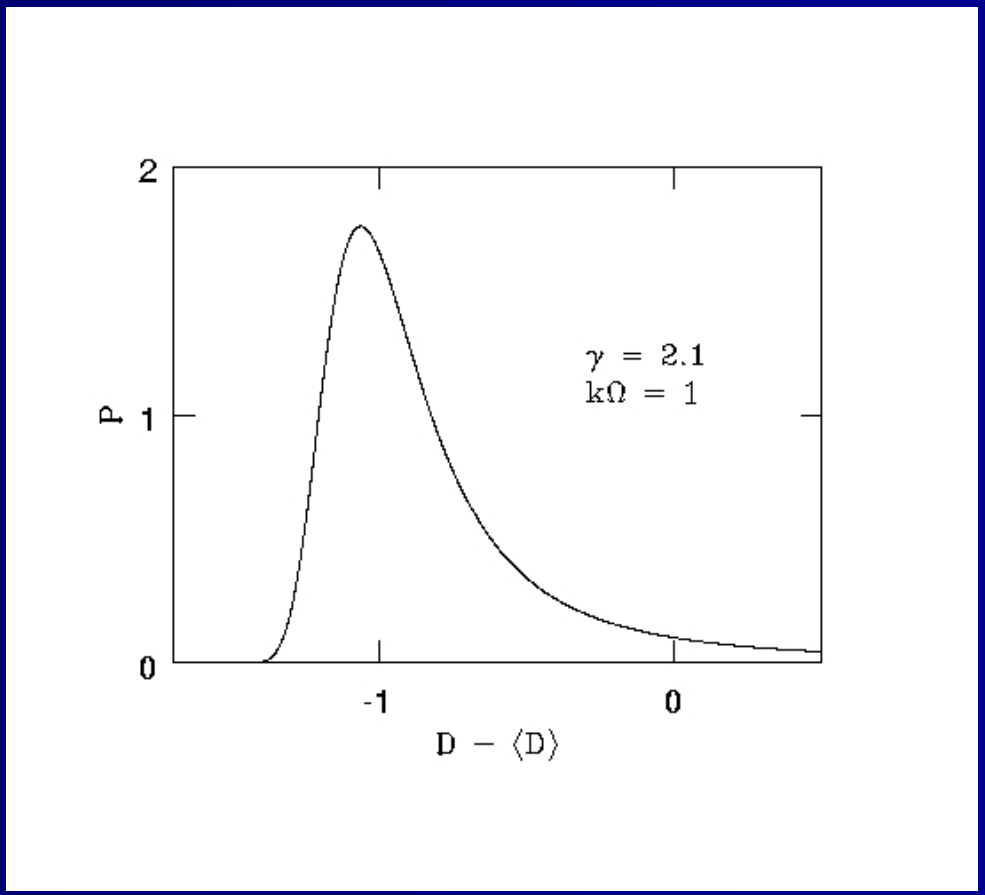


NVSS (45 arcsec) grayscale under GB6 (12 arcmin) contours reveals source blending.

(Lowest contour is 2σ = 45 mJy/beam, contour spacing is √2)



A typical confusion amplitude distribution P(D). Beware the long positive-going tail.

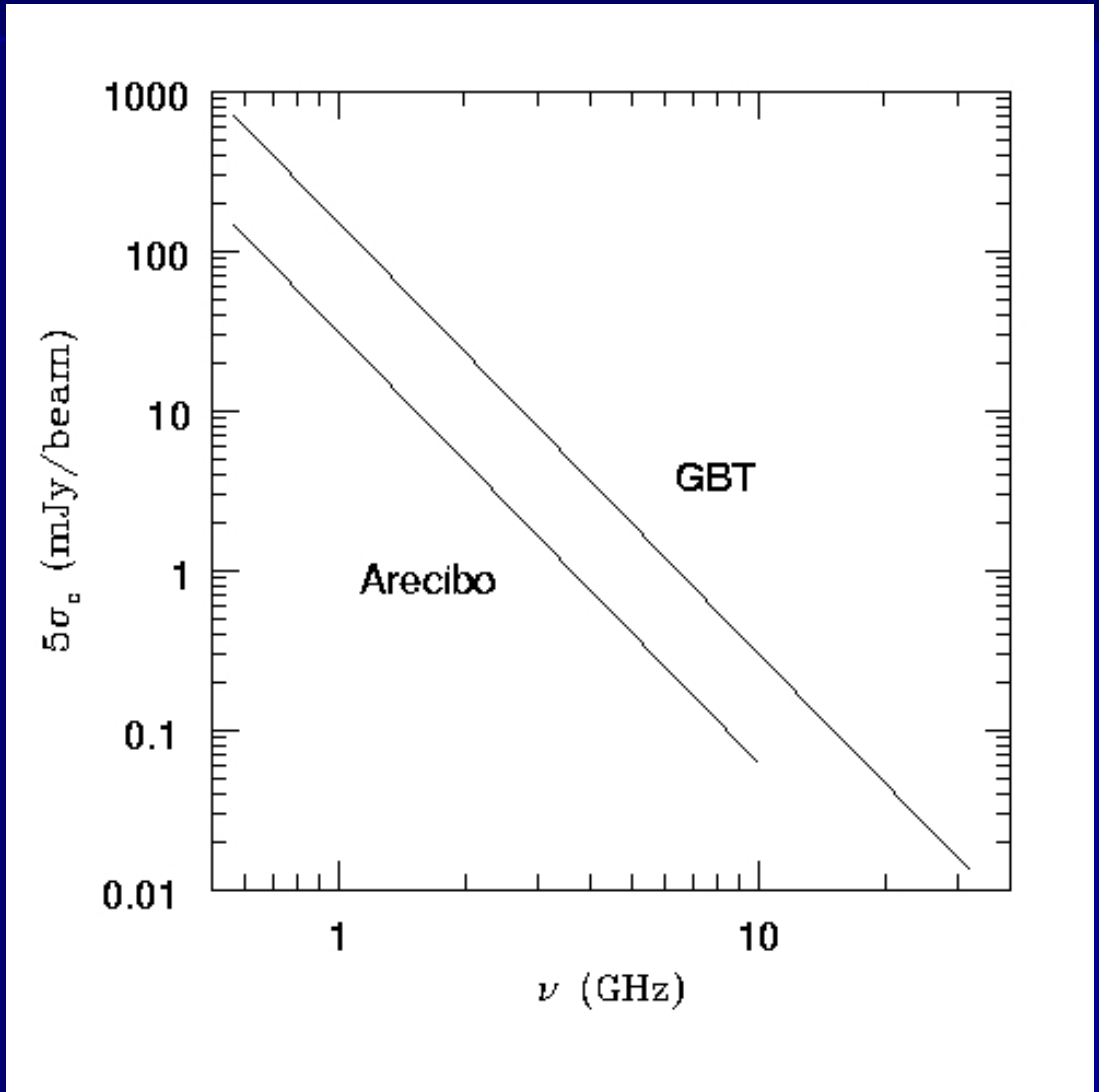


RMS confusion

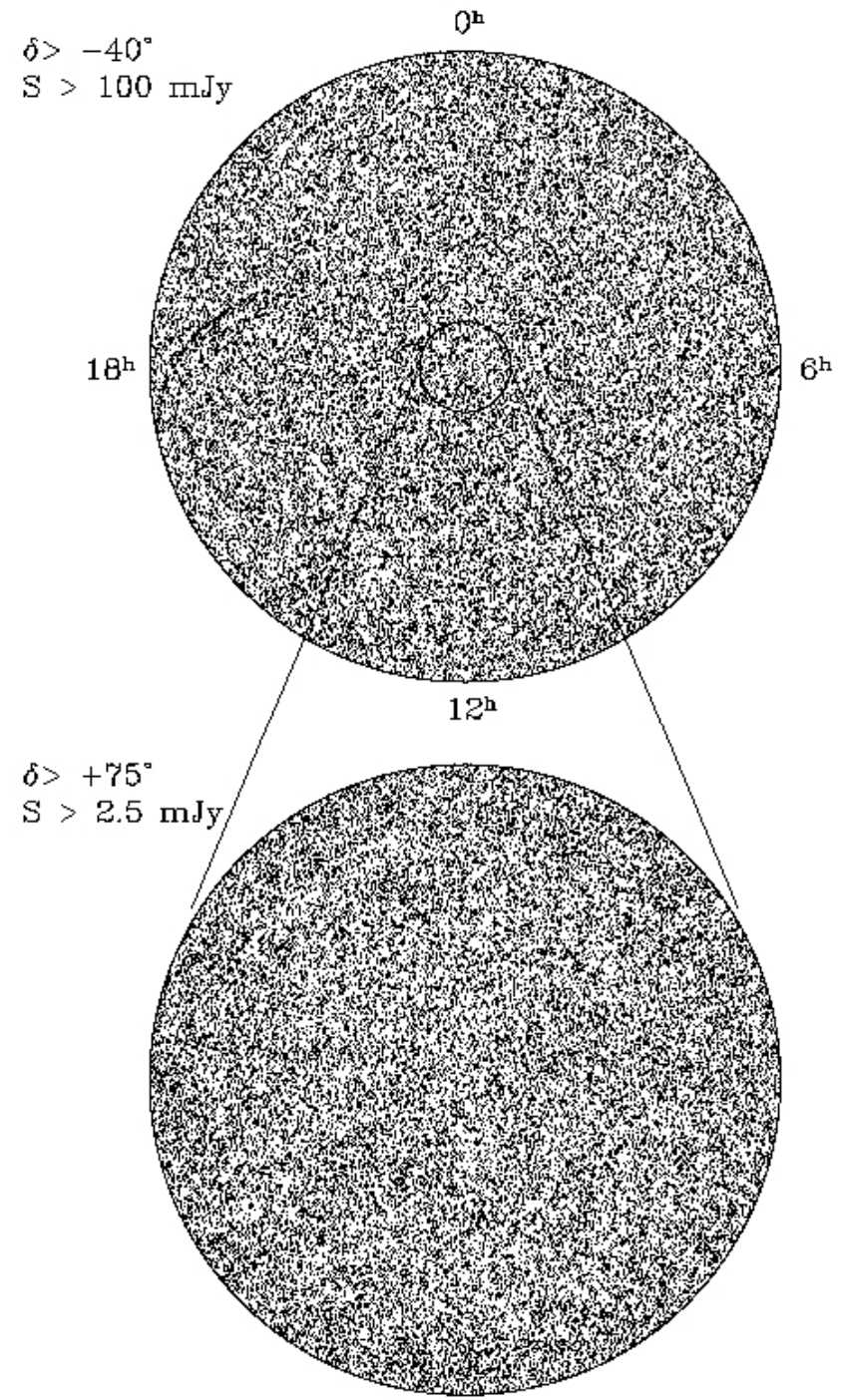
$$\left(\frac{\sigma_{\rm c}}{\rm K}\right) \approx 0.07 \left(\frac{\nu}{\rm GHz}\right)^{-2.7}$$

$$\left(\frac{\sigma_{\rm c}}{\rm mJy\ beam^{-1}}\right) \approx 0.2 \left(\frac{\nu}{\rm GHz}\right)^{-0.7} \left(\frac{\theta_{\rm M}\theta_{\rm m}}{\rm arcmin^2}\right)$$

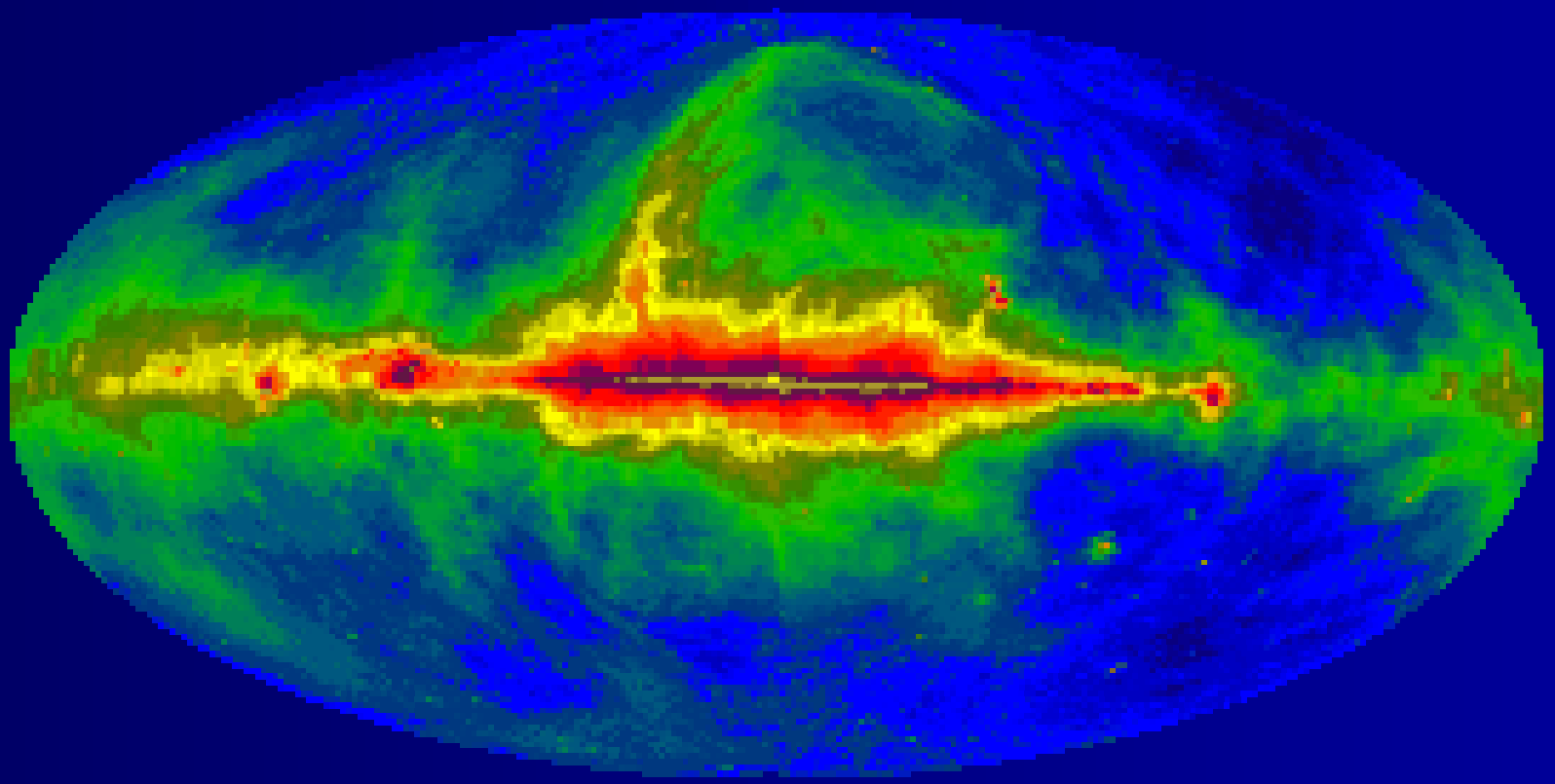
The 5σ extragalactic confusion limits for Arecibo (d = 220 m) and the GBT (d = 100 m).



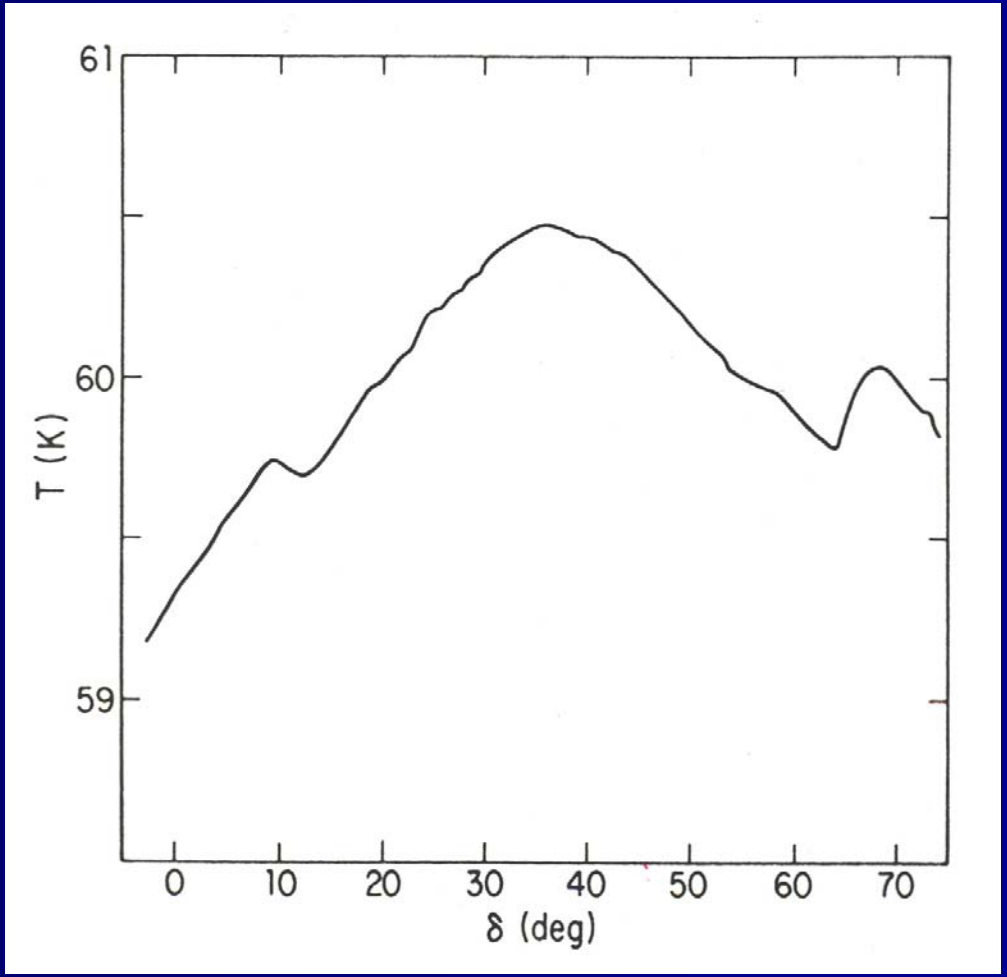
Isotropy of radio sources



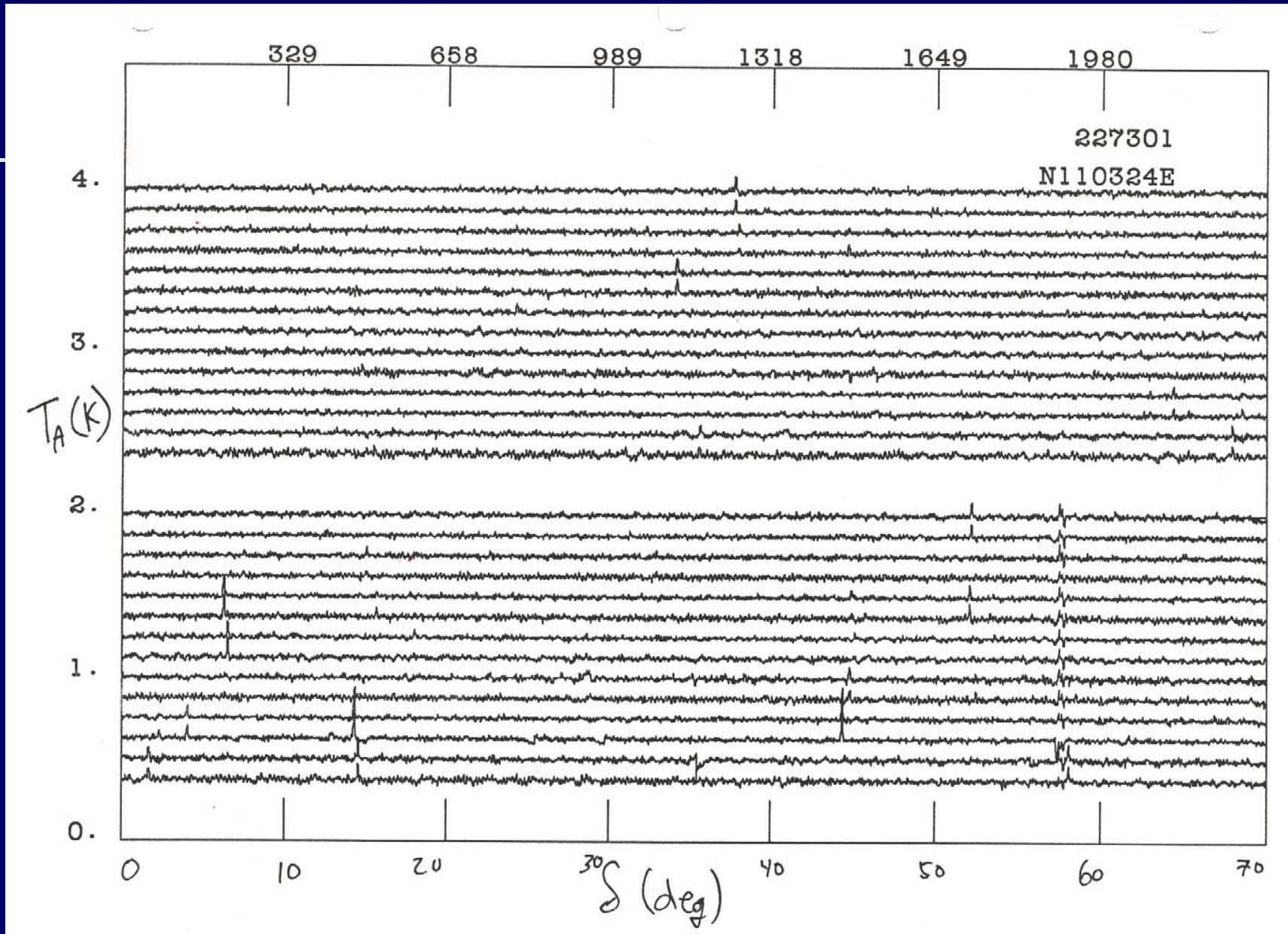
408 MHz continuum emission, galactic coordinates



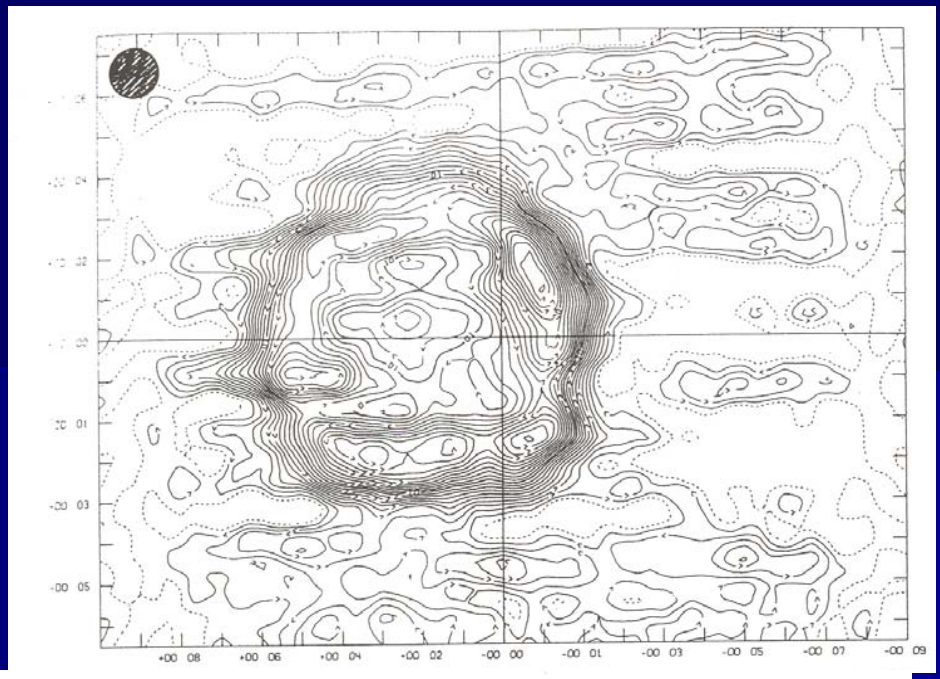
Total-power output from one receiver channel during a 4.85 GHz scan. The system temperature T ≈ 60 K includes receiver noise, atmospheric emission, spillover, leakage through the reflector mesh, etc.

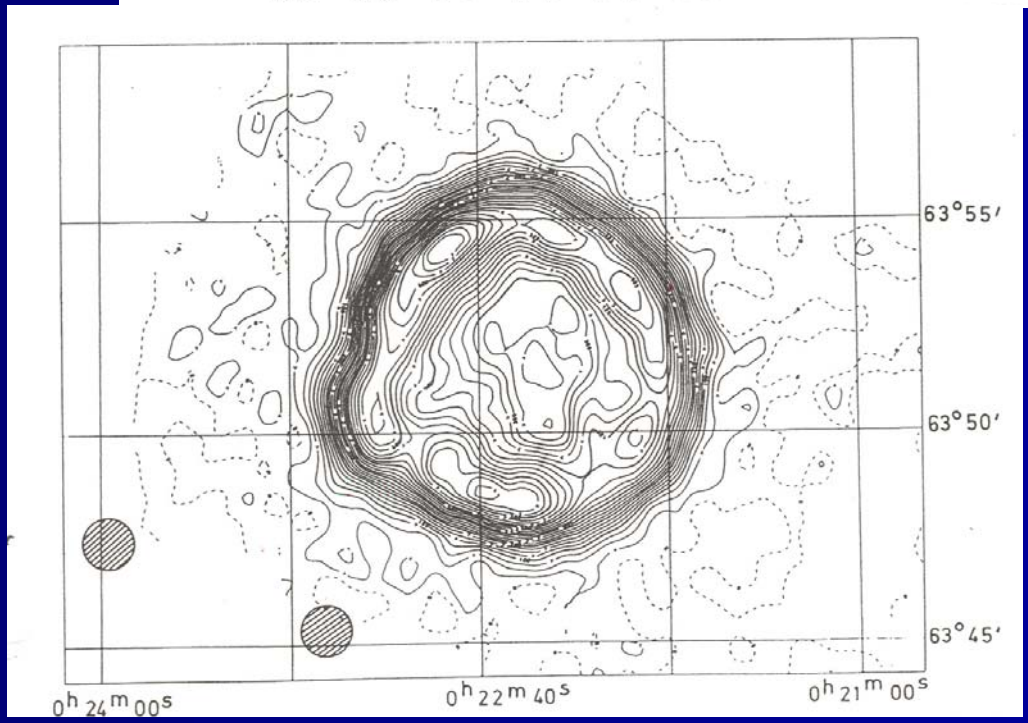


Running median baselines have removed atmospheric emission, spillover, 1/f noise, etc.



The SNR 3C 10 imaged at 10.7 GHz by horizontal scans (top) and by dual-beam basketweaving (bottom).





Calibrator references

Flux-density calibrators:

Baars, J. W. M., Genzel, R., Pauliny-Toth, I. I. K., & Witzel, A. 1977, A&A, 61, 99

`http://134.104.64.34/JN/effbg_rx/kalibrie.htm`

`http://www.aoc.nrao.edu/~gtaylor/calib.html`

`http://wwwnar.atnf.csiro.au/calibrators`

Position calibrators:

Condon, J. J., & Yin, Q. F. 2001, PASP, 113, 362

`ftp://ftp.cv.nrao.edu/NRAO-staff/jcondon/PCALS2.2`