



# ACS High-Latitude Survey: Scheduling Issues

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# The Issues

- Optimizing observing efficiency
- Minimizing backgrounds
- Campaigns
- Scheduling to allow variability studies
- Coordination with other observatories

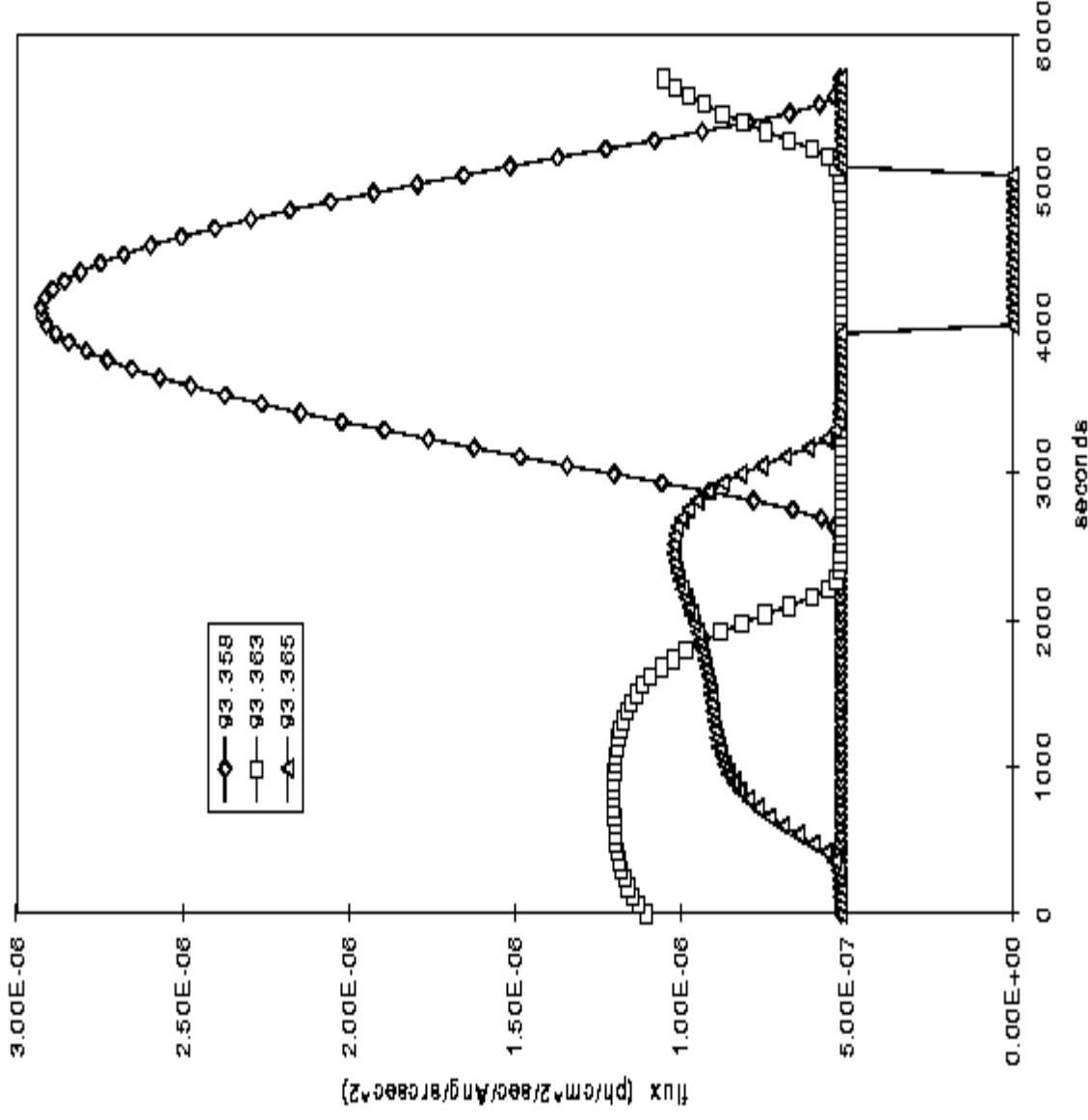
# Maximizing observing efficiency

- The HST continuous viewing zone
  - 59–67 deg declination (both north & south)
  - Factor of ~2 improvement in observing efficiency
  - Needs careful scheduling to avoid high scattered backgrounds
- If HST alone were the driver, it would make sense to choose a field in the CVZ.

# HST scattered light in the CVZ

Scattered earthshine can be the limiting source of background. The periods of high & low background beat against the SAA passages. Careful scheduling is required (not automated) to optimize.

Examples of F606W Orbital Background



# SIRTF Observing constraints

(NGST constraints  
are nearly identical.)

High ecliptic latitudes  
are also desirable for  
minimizing  
background for  
SIRTF, HST and  
NGST.

SIRTF Viewing Statistics for Inertial Targets

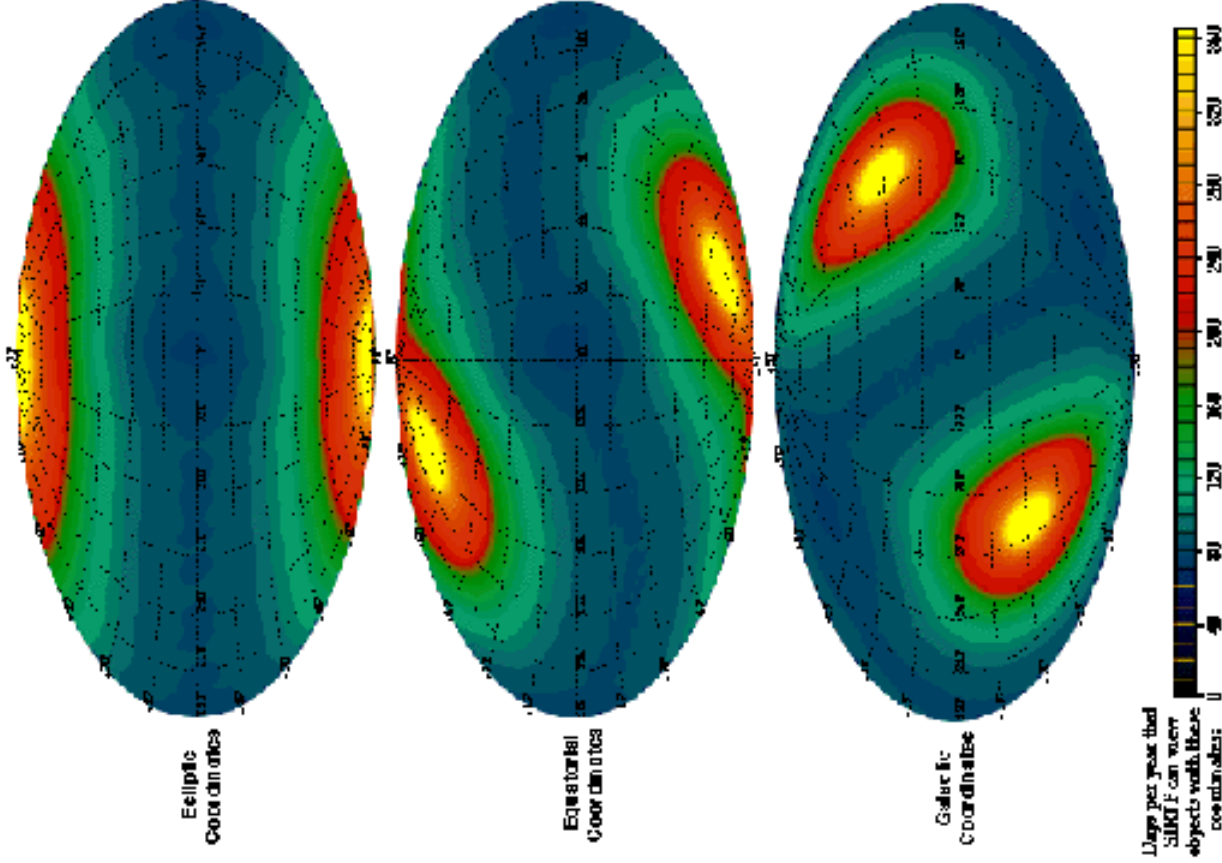


Figure 3-7: Total days of visibility per year in equatorial, ecliptic and galactic projections.

# Chandra observing constraints

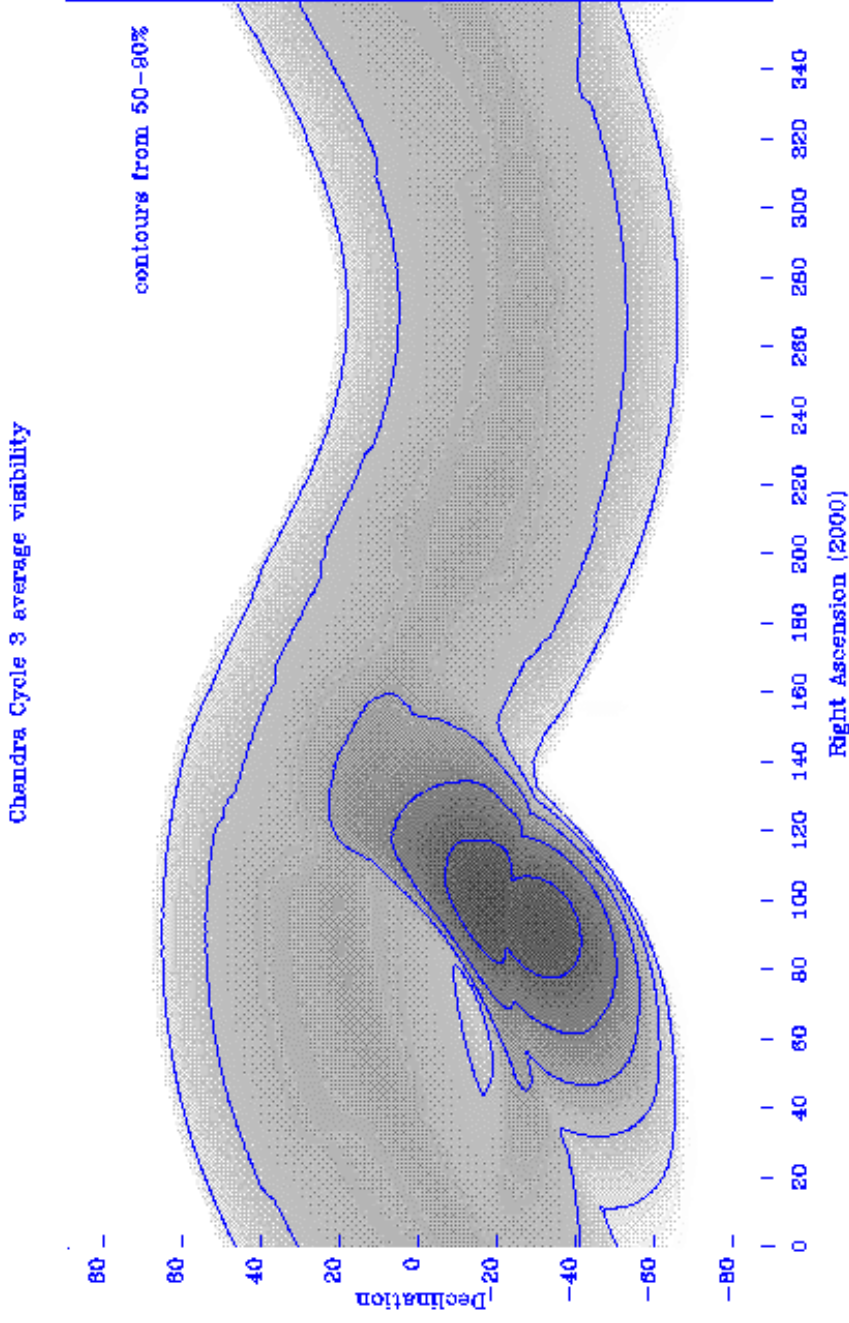
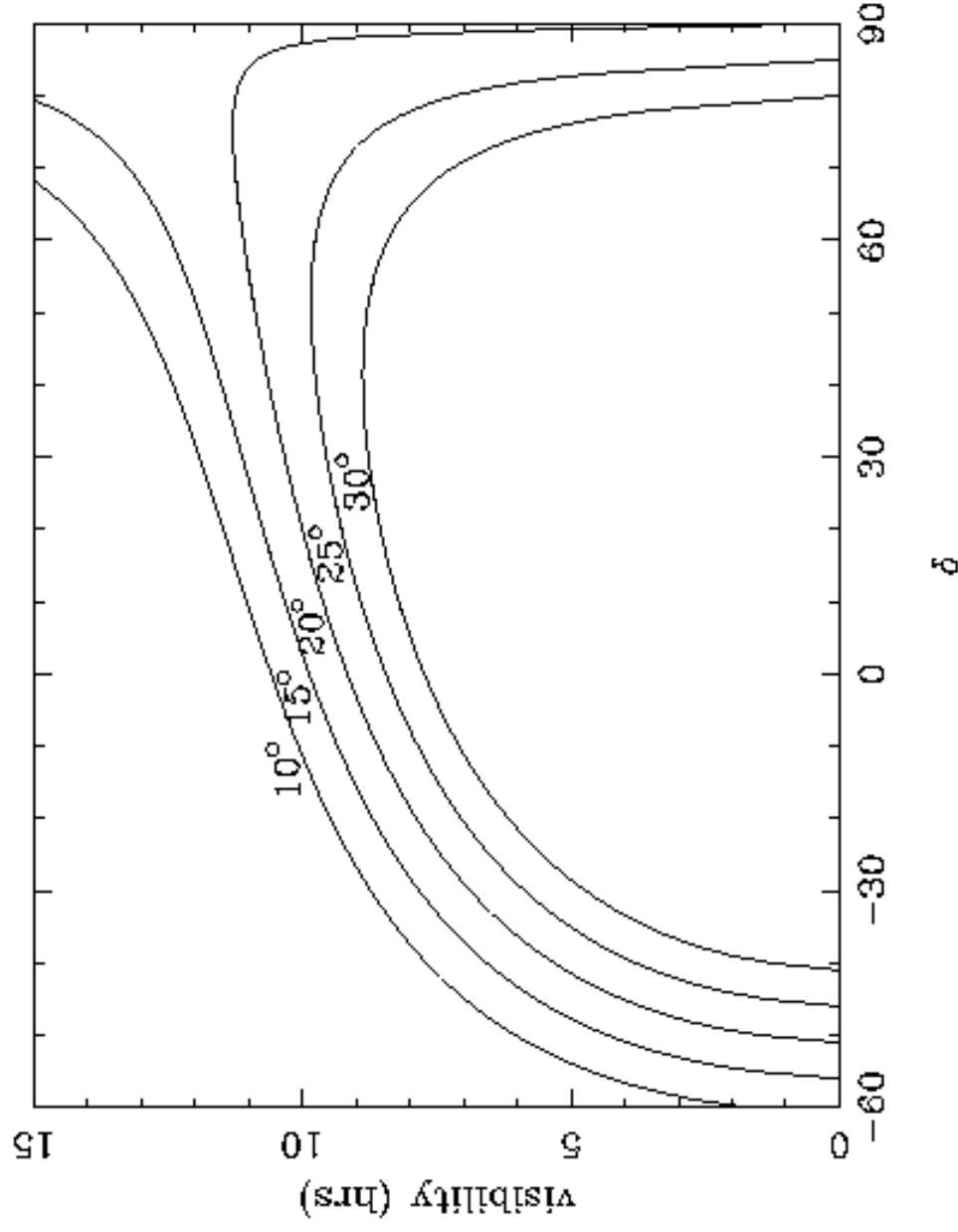


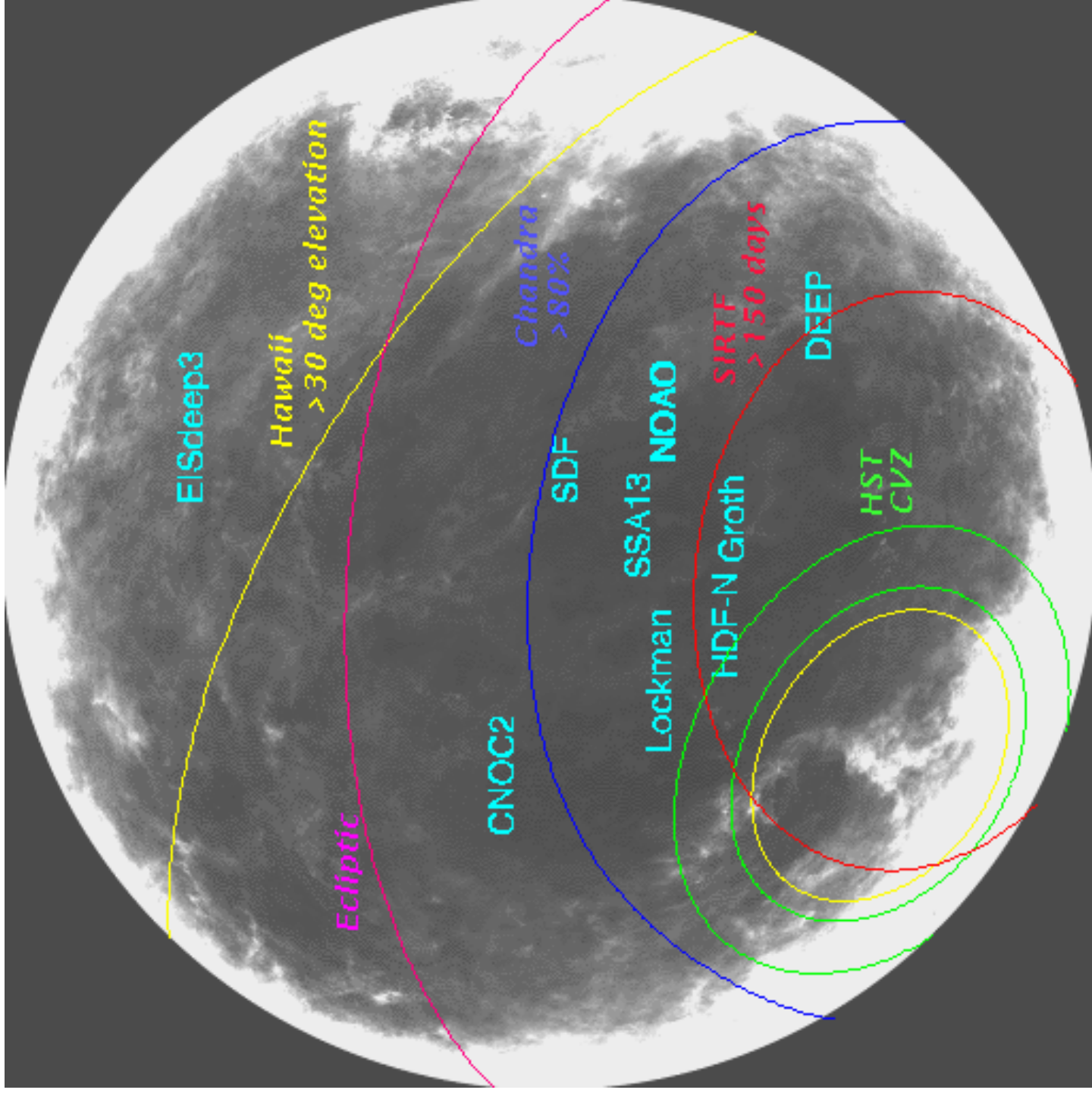
Figure 3.3: The *Chandra* visibility showing contours of fractional visibility averaged over the 12-month interval of Cycle 3. A value of 1.0 indicates that observations in this region are interrupted *only* by passes near perigee into the radiation belts, a value of 0.9 indicates that observations are available 90% of the time, etc. The darker the shade of grey, the lower the visibility. The lowest contour shown is 50% and is centered at  $RA \approx 95^\circ$ ,  $Dec \approx -25^\circ$ .

# Typical Groundbased Constraints (e.g. Hawaii)

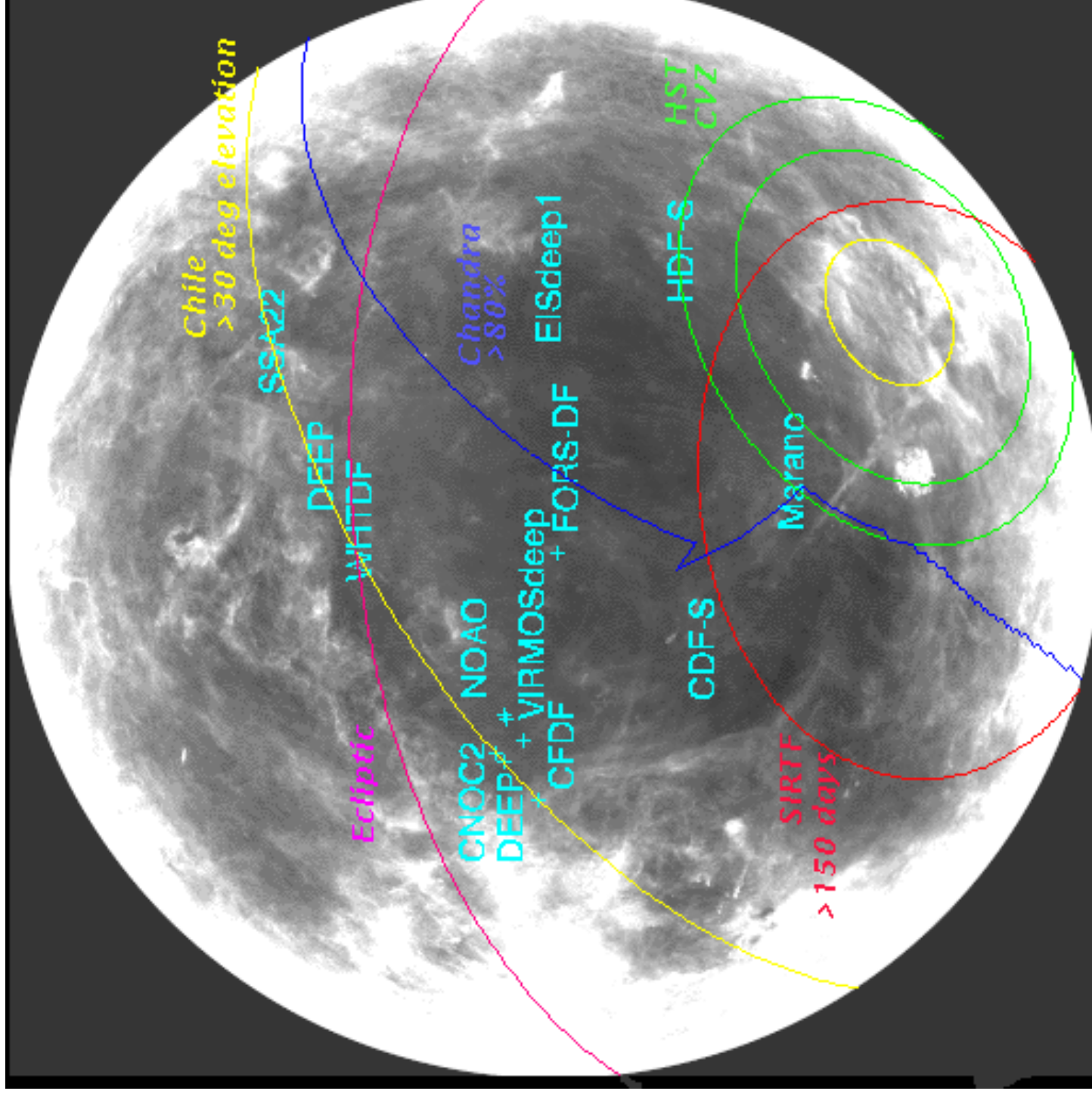


Northern hemisphere deep fields and favorable observing zones.

The image is Schlegel et al.'s E(B-V) map constructed from IRAS & COBE. The north Galactic pole is at the center.



Southern Hemisphere deep fields and favorable observing zones.



# Can we make use of bright time?

Band	Bright	Dark	Efficiency
F475W	787	507	0.64
F555W	1333	730	0.55
F606W	783	379	0.48
F850LP	9992	2739	0.27
FR388N	39550	33970	0.86
FR423N	17480	13860	0.79
F502N	37400	24700	0.66
F550M	2992	1555	0.52
F658N	53120	23330	0.44
F892N	11760 0	44220	0.38

Optical filters.  $V=26.0$  mag A star

# UV filters

Band	Bright	Dark	Efficiency
F220W	179300	164200	0.91
F250W	63630	54480	0.86
WFPC+F300W	20203	0	0
F330W	20030	18100	0.90
SBC+F140LP	1071	861	0.80
STISFUV+QZ	3168	3168	1.00

NUV is for V=26 mag A0 star

FUV is for V=26 mag B1 star

## CVZ summary

- Marginal gain from using CVZ is much smaller for ACS than it was for WFPC2.
- Narrowband or UV observations make the most sense.
  - UV observations are unique to HST, but FOV is very small.
  - Survey would likely end up as a patchwork of fields.

# Campaigns

- **Scheduling the survey as a campaign or campaigns would allow**
  - Special scheduling to minimize backgrounds
  - Rapid data reduction and release (harder to work this if the data trickle in.)
  - Coordination with other observatories for rapid followup
- **Campaigns are natural for CVZ observations, but not so obviously required for non-CVZ observations.**

# Variability studies

- If the survey is to have more than one orbit in a single band, it makes sense to separate into two epochs. This enables:
  - A search for high- $z$  supernovae
  - A search for AGN
  - For a deep survey, consider targeting known variable source (e.g. lensed QSO), perhaps in the STIS or NICMOS FOV.
- The square field of view of ACS makes repeat visits possible without much loss of area: orientations modulo 90 degrees are acceptable.

# Possible SN search strategy

- **Combine galaxy spectroscopy and SN spectroscopy (e.g. with DIEMOS or VIMOS).**
  - Define galaxy sample in advance based on ground-based observations + first epoch ACS.
  - Observe second epoch ACS and identify candidates.
  - Cut the slit mask.
  - Take spectra of all the SN candidates at once, along with the galaxies. (This is probably most relevant for galaxy studies wanting red spectral coverage.)
  - Target confirmed SNe for ACS followup to measure lightcurves