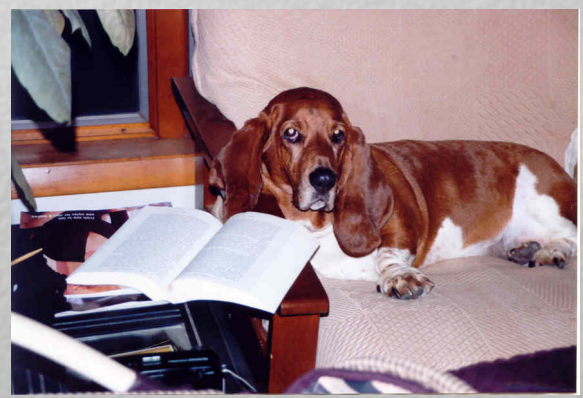
Science Policies Update

STUC Meeting
26 October 2006



Outline

- Great Observatories Workshop
- Cycle 16 Call for Proposals
- ACS Contingency plans
- Possible Cycle 17 schedule

Great Observatories Workshop

Origin:

1. Limited response to joint HST/Spitzer proposal option
2. Examine the future science priorities for HST

Workshop Goals:

1. Encourage multi-wavelength, multi-observatory proposals
2. Identify key science programs that should be tackled in the near future, either as high priority science in their own right or as precursors to future Great Observatory (both ground & space) programs

Meeting held in Pasadena – May 22-24 2006
Organised jointly with Spitzer & Chandra

Workshop Program

Review talks by:

Planets & planetary systems: Drake Deming
Stars: Jim Liebert
Nearby galaxies and stellar populations: Rob Kennicutt
Galaxy formation: Michael Strauss
Large scale structure & cosmology: David Weinberg
AGNs & QSOs: Niel Brandt
Star formation & the ISM: Ed Churchwell
Galaxy clusters: Megan Donahue

Panel sessions: Harry Ferguson, Anne Hornschemeier, Jon Gardner, Bill Latter, Jeremy Mould, Lisa Storrie-Lombardi, Belinda Wilkes

Reviews without portfolio: Richard Ellis & Meg Urry

Outcome

- ~85 registered participants plus local walk-ins
- Active breakout discussion sessions
  - Stars and planets
  - Nearby galaxies
  - Galaxy formation
  - Cosmology
  - AGNS & QSOs
  - Star formation and the ISM
- Presentations from most speakers and summaries of the discussion sessions are available on the website http://ssc.spitzer.caltech.edu/mtgs/greatobs/
- Summary compiled by INR & LSL, based on notes by David Weinberg
- Main conclusion: no obvious gaps in the Great Observatories science programs
  - Deep field programs should wait for WFC3 and SM4
  - Widespread, but not unanimous, feeling that there should be more opportunities for medium/large joint GO programs (esp. HST & Spitzer) → see CP16
  - General concensus that the responsibility for moving forward on synergistic programs rests with the astronomical community
- Meeting generally well received

Cycle 16: Schedule

- CP16 release – 13 October 2006
- APT available – early December 2006
- Proposal deadline – 26 January 2007
- HST TAC meets – 19-23 March 2007
  - TAC Chair: Meg Urry, Yale
  - All TAC/panel members in place
- Results circulated to community – early April
- Cycle 16 begins – 1 July 2007

Cycle 16: Principal changes

- SM4 update
- Addition of HST-Spitzer Coordinated Programs
- Addition of GO Survey Programs
- Restructuring of Snapshot Programs

SM4 in the CP

- CP Section 1.2
  - "Cycle 16 will start in July 2007 and is likely to be shorter than the usual duration of one year. NASA is in the early stages of planning for a Servicing Mission 4 (SM4) to the Hubble Space Telescope, subject to final authorization by the NASA Administrator. Current plans are to schedule SM4 during the nominal Cycle 16 period, potentially as early as January 2008. Cycle 16 will terminate at that point. Cycle 17 will commence with the new suite of instrumentation, including Wide Field camera 3 (WFC3), the Cosmic Origins Spectrograph (COS) and, possibly, a refurbished Space Telescope Imaging Spectrograph (STIS). An attempt to refurbish STIS will be made on a best effort basis. "
  - All three cameras on ACS are expected to be available in Cycle 16

Joint HST-Spitzer Proposals

- Standard HST-Spitzer proposals are limited to <50 hours of Spitzer time (submitted to HST) or <30 orbits HST time (submitted to Spitzer)
- Many participants at the Great Observatories Workshop (Pasadena, May 2006) supported the creation of an additional opportunity for larger multi-Great Observatory Programs
  - Principal concern is exploiting Spitzer fully before cryogen exhaustion – limited to Cycles 4 & 5 for large-scale programs
- In collaboration with the Spitzer Science Center, we have created a new category of joint HST-Spitzer proposal
  - Endorsed by HST STIC and Spitzer oversight committee
- Chandra is not participating in current scheme
  - Chandra has lesser lifetime concerns
  - The Chandra schedule for the CP & TAC (meets in June) make combined scheduling logistically difficult

Coordinated HST-Spitzer Proposals

- Coordinated HST-Spitzer proposals require at least 70 orbits of HST observations and at least 50 hours of Spitzer time
  - The expectation is that there will be relatively few proposals in this category
- HST will allocate *up to* 300 orbits and Spitzer *up to* 500 hours for this new category
- To avoid double jeopardy, the proposals will be reviewed by a joint HST/Spitzer TAC, comprising a subset of the respective TAC members (Section 6.1.3)
- Prospective PIs must submit a (non-binding) Notice of Intent by 1 Dec, known co-Is, short abstract
  - Permits selection of appropriate TAC members for joint TAC
  - Confirm likely number of proposals
- Proposals are submitted to both HST and Spitzer, using the respective formats, by the HST deadline, 26 Jan 2007
- Proposals circulated to joint TAC members and reviewed (by telecon) ~1 week before the HST TAC in March 2007
- Allocations (if any) ratified by HST and Spitzer TACs

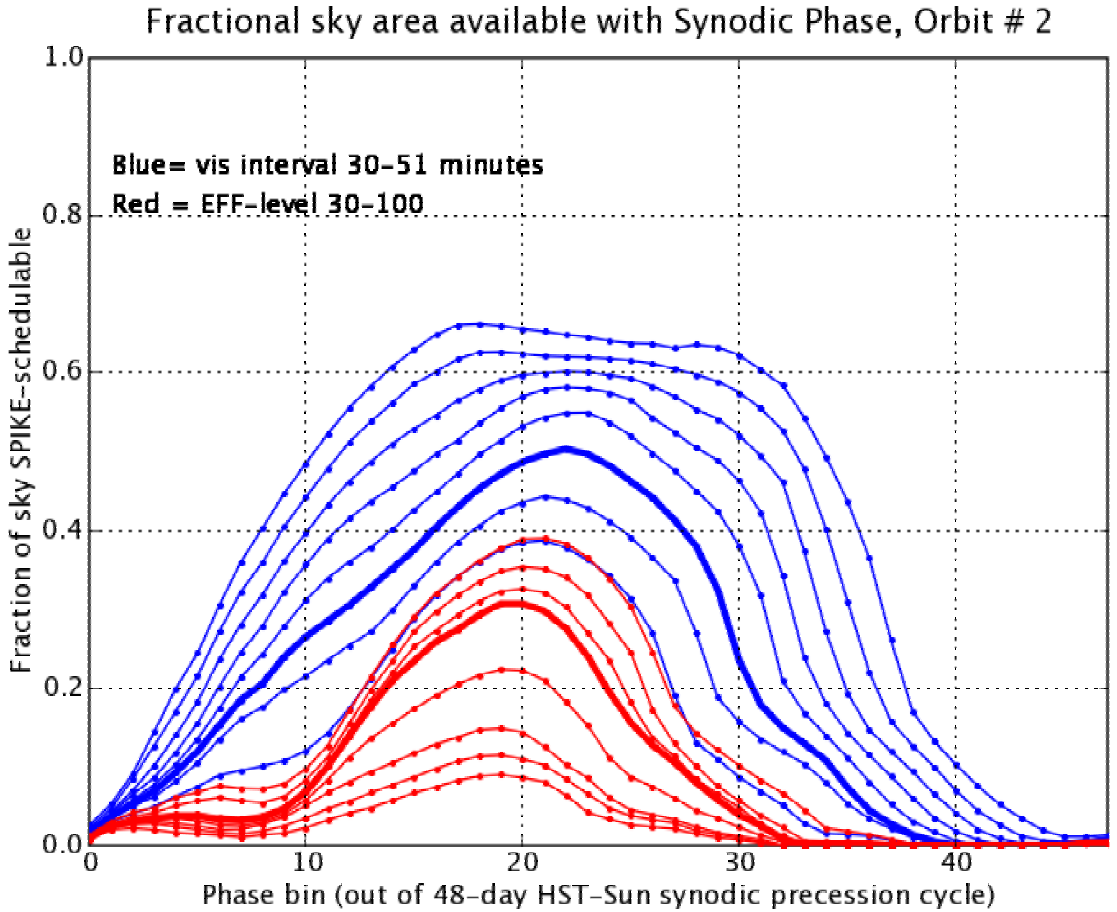
GO Survey Programs - background

- Statistical programs remain powerful scientific tools for astronomical research
- Increased HST scheduling efficiency, combined with Two-Gyro operations, has led to fewer Snapshot opportunities in recent cycles (only ~400 Snaps in Cycle 14)
- The category of GO Survey Program has been created to provide additional scheduling opportunities for statistical programs

GO Survey Programs - implementation

- Survey are GO programs that are allocated a particular number of orbits, in competition with other GO programs, as part of the panel review process
- Survey programs are designed for statistical projects that require observations of N targets, but don't require observations of any particular target
  - PIs submit a superset of M targets, 1.5 N < M < 3N
  - STScI will select targets as part of the normal planning process
- Survey targets should be well distributed in Right Ascension
  - Maximises scheduling opportunities
- Survey observations must be completely unconstrained (no orients, time constraints)
- Survey observations are limited to durations less than 48 minutes/orbit
  - Allows increased flexibility for scheduling in SAA-impacted orbits
  - Combined with absence of constraints, should lead to a larger number of orbits available for GO programs

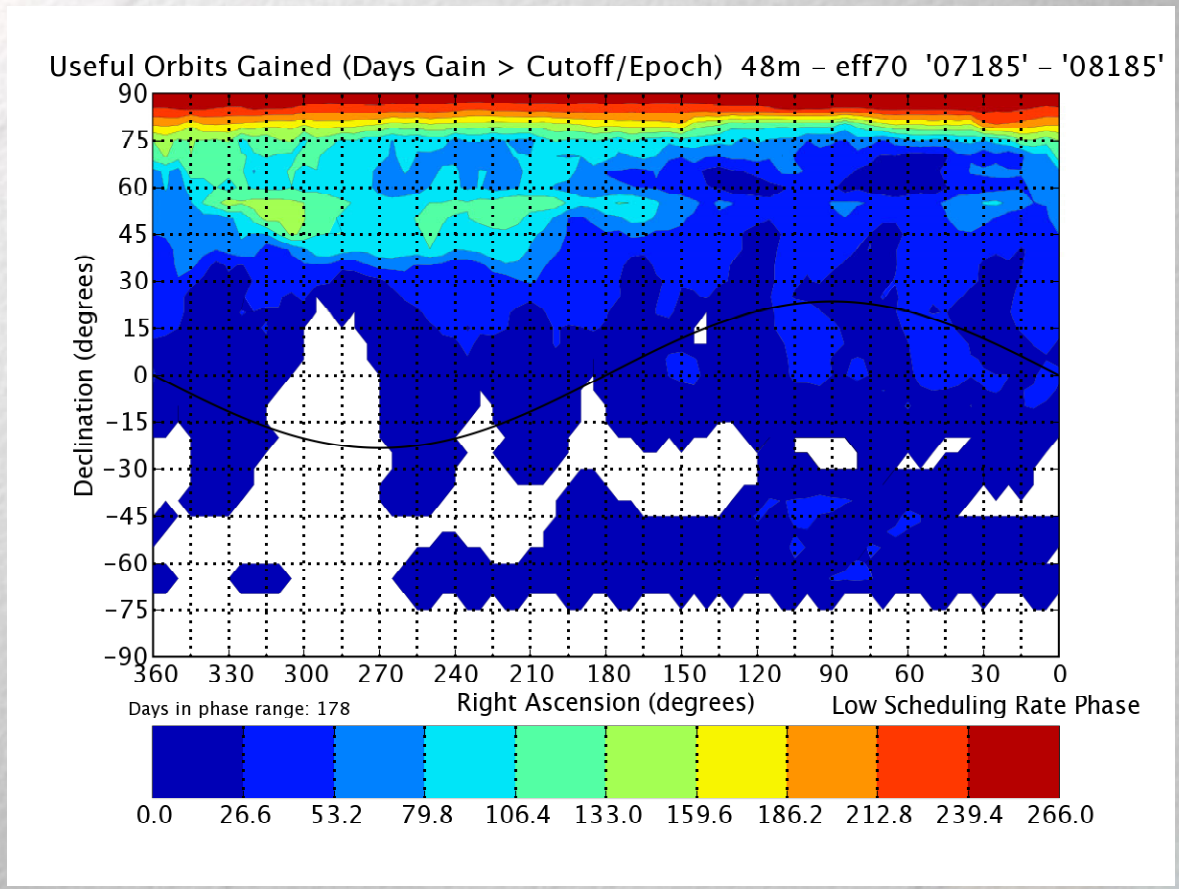
SAA-Impacted Orbit #2 Schedulability



The shorter the orbit duration, the greater the likelihood of scheduling observations during an SAA impacted orbit

Solid blue line is 45 minutes duration
➔ 48 minutes offers significant gains over 51 or 53 minutes

Scheduling gains in Survey mode



Orbits gained = N_{orbits}(48 minute duration) – N_{orbit}(normal duration)
➔ Significantly more opportunities for Survey observations at high northern declinations

GO Survey Programs - implementation

- **Survey program characteristics:**
  - Can request multi-orbit visits for individual targets
  - Tailor individual visits (integration time, filters) for particular targets
  - Can request Moving Targets, if the scheduling windows are >1 month
  - Cannot be prioritised
  - Cannot request time in future cycles
- **Survey programs will be awarded an additional subsidy in the panel time allocation process:**
  - Sliding scale for subsidies for medium proposals (to minimise pain to panels)
  - Survey proposals will be granted an additional 15-20% (reflects anticipated gains in scheduling efficiency)

Revisions to Snapshot Programs

- Even with the addition of Survey Programs, some orbits (or part-orbits) are too short for GO programs ➔ Snapshot opportunities will remain
- To further distinguish Snapshot and Survey programs, Snapshots will be limited to durations < 40 minutes, including target acquisition
- Snapshots will no longer be prioritised
  - Led to some scheduling anomalies in implementation in 2-gyro operations
- This will require re-balancing orbit/snap allocations:
  - Orbits with visibility exceeding 40 minutes are available for Survey programs
  - Snapshot allocations reduced accordingly
  - Changes in GO vs Snap allocations (to TAC) still remain TBD – current estimate +100 GO, -200 SNAPs

ACS Contingency Plans

ACS has suffered two recent incidents

- ACS suspended on June 19 2006
  - Failure of +15 Volt power converter on side 1
  - ACS switched to side 2
  - Observations resumed July 2
- ACS suspended on September 23 2006
  - Failure of relay in HRC electronics box
  - WFC and SBC hardware not affected
  - WFC observations resumed October 1st
- Consequent significant loss in operational redundancy

There are no indications of a likely future failure – but it behooves us to prepare with that potential eventuality in mind

Covering for ACS anomalies

ACS is the main workhorse for HST science programs

- Primary instrument in 116/146 programs in Cycle 15
- Accounts for 80% of primary orbits

When STIS failed, we

- Re-assigned some programs to other instrumentation
- Filled in with lower-ranked (but acceptable) Cycle 13 proposals

However, in Cycle 15

- Many ACS programs may not be viable with WFPC2
- Only ~350 orbits of non-ACS time are low-ranked, but acceptable

Reviewing and revising programs takes time

➔ 4-5 weeks to repopulate with existing programs

➔ Observing efficiency declines from ~72 science orbits/week with ACS to ~45 in the first week; ~25-30 in week 2; ~20-25 in succeeding weeks

➔ We need a contingency plan that can be implemented rapidly

Characteristics of Backup Proposals

- Programs must
  - Use NICMOS, WFPC2 and/or FGS
  - Be of general scientific interest
  - Be comparable in scale to Large Programs, > 70 orbits
  - Avoid duplicating the scientific goals of Cycle 15 Large/Treasury Programs
  - Require as few constraints as possible for individual observations
- Additionally
  - Any time awarded is regarded as Director's Discretionary Time
  - Limited funding will be awarded for completion of Phase II proposals; no awards if time is scheduled, but subsequent Call for archival proposals
  - Any data acquired have no proprietary period

Accepted proposals are to be implemented only in the event of a significant component failure of ACS

Call for Backup Proposals #1

Procedure defined in consultation with STUC sub-committee and Cycle 15 TAC chair (R. Kudritzki)

1. Circulate call for proposals to community
   - 3 October 2006
2. Proposals submitted by e-mail to STScI
   - Deadline of 5:00 pm, 3 November 2006
3. Proposals collated and disseminated to Cycle 15 TAC for review
   - Target date 10 November 2006
   - Concurrent technical review by STScI staff
   - Limit review to ~25 proposals; if necessary, apply pre-selection by STScI scientists (DD time committee) with oversight by STUC
4. Cycle 15 TAC submit grades by e-mail
   - Target date 1 December 2006

Call for Backup Proposals #2

1. Based on TAC ranking and technical feasibility, Director selects 3-4 proposals for implementation
   - Target date 10 December 2006
2. Successful PIs are notified and asked to submit Phase II proposals
   - Target date 4 January 2007
   - Budgets for Phase II work submitted for consideration by FRC in mid-January
3. Cycle 16 TAC will be asked to comment on backup proposals
   - Rank science in comparison with Cycle 16 proposals
   - Recommend whether or not to issue second call
4. Backup proposals may be submitted as Cycle 16 proposals without jeopardising their status
   - May encourage more non-ACS proposals in that Cycle
5. Backup proposals are unnecessary post-SM4

Cycle 17: Possible Schedule

Suppose SM4 is January 2008

- SM4 complete by late-January
- SMOV during February 2008
- HST available for observations ~March 2008 (WFC3 ~May 2008?)

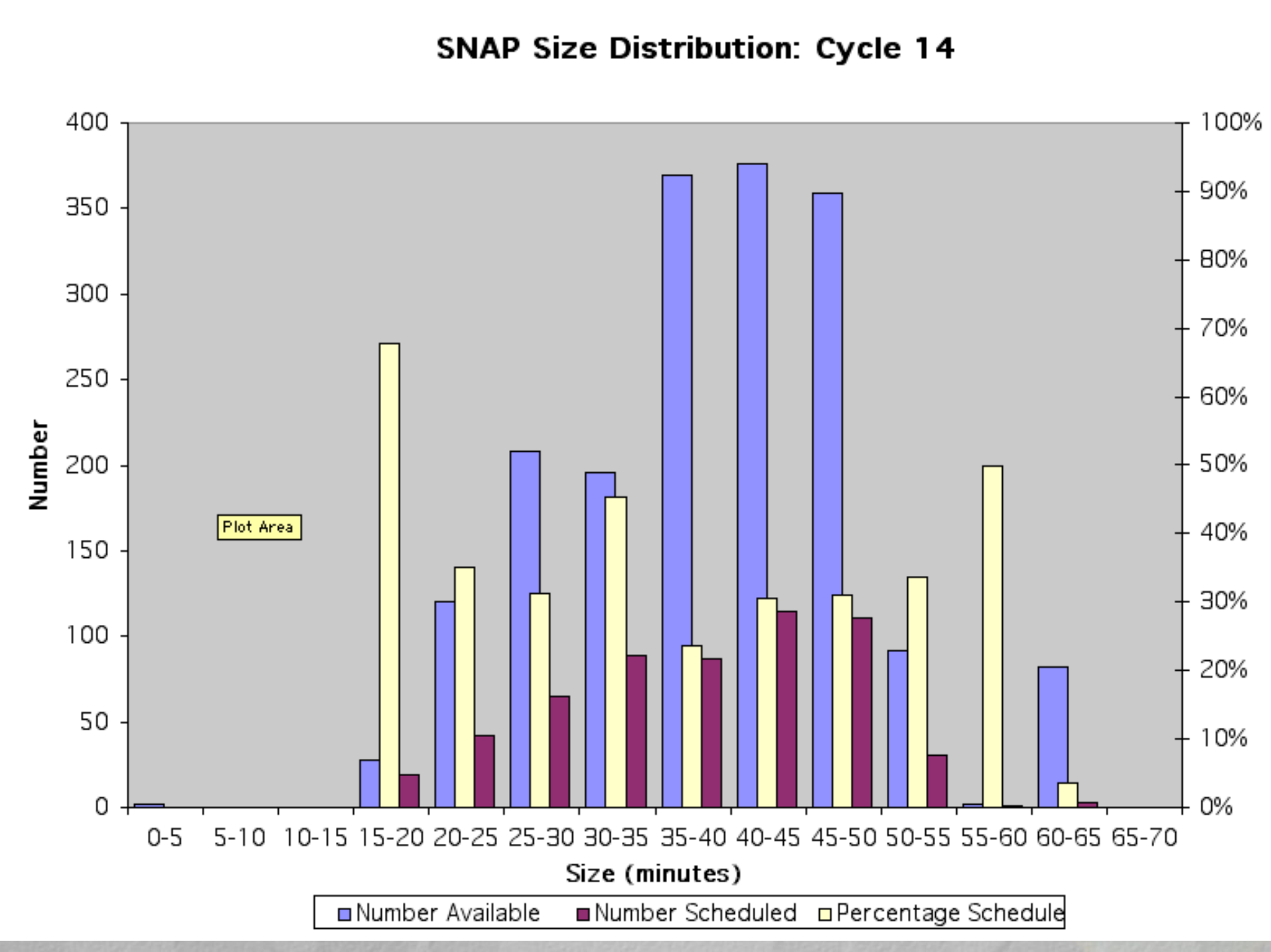
Two options for schedule - #1: advance 3 months

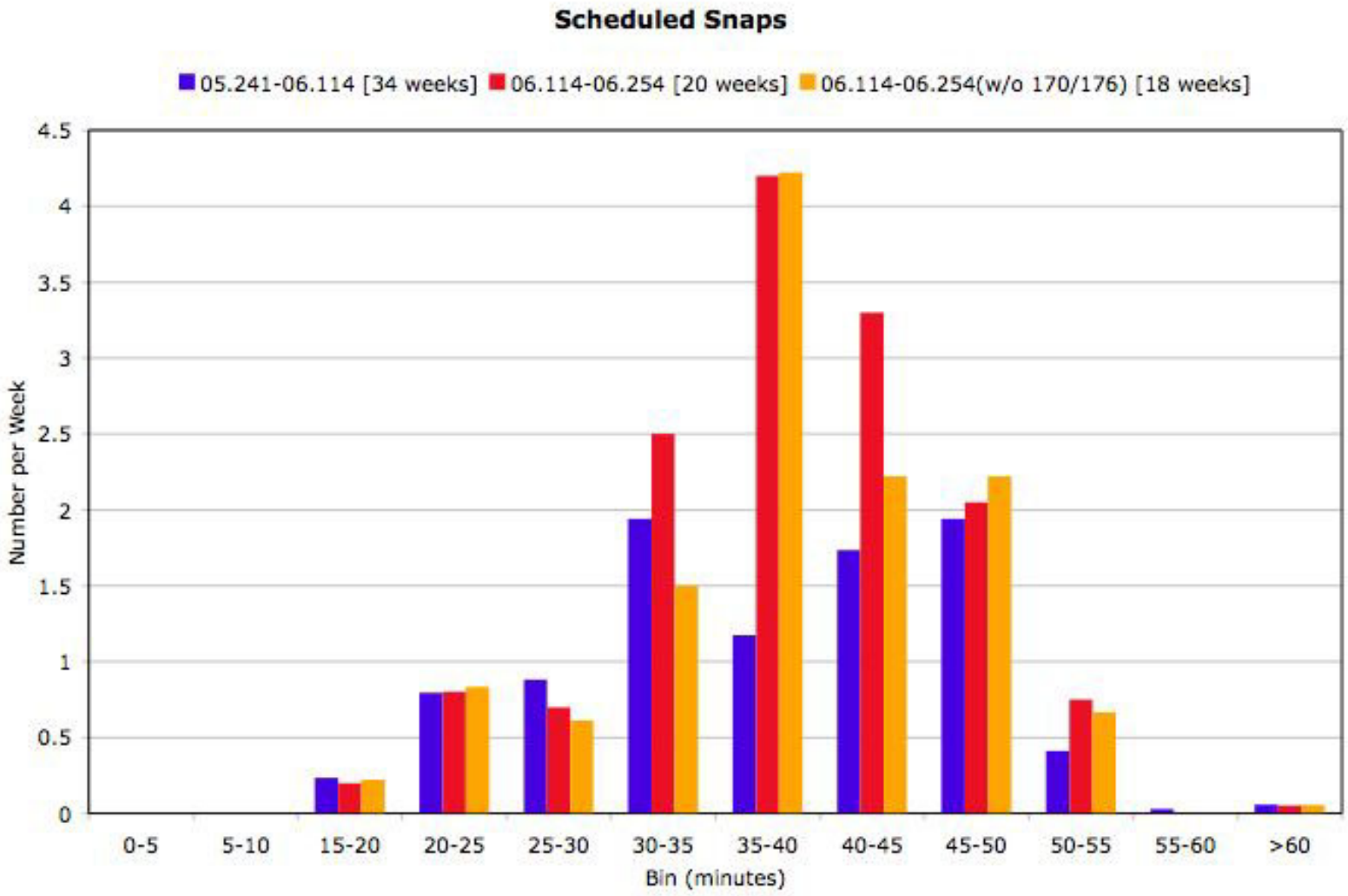
- CP17 release – 15 July 2007
- APT available – mid-August 2007
- Proposal deadline – 15 October 2007
- HST TAC meets – mid-December 2007
- Cycle 17 begins ~March 2008

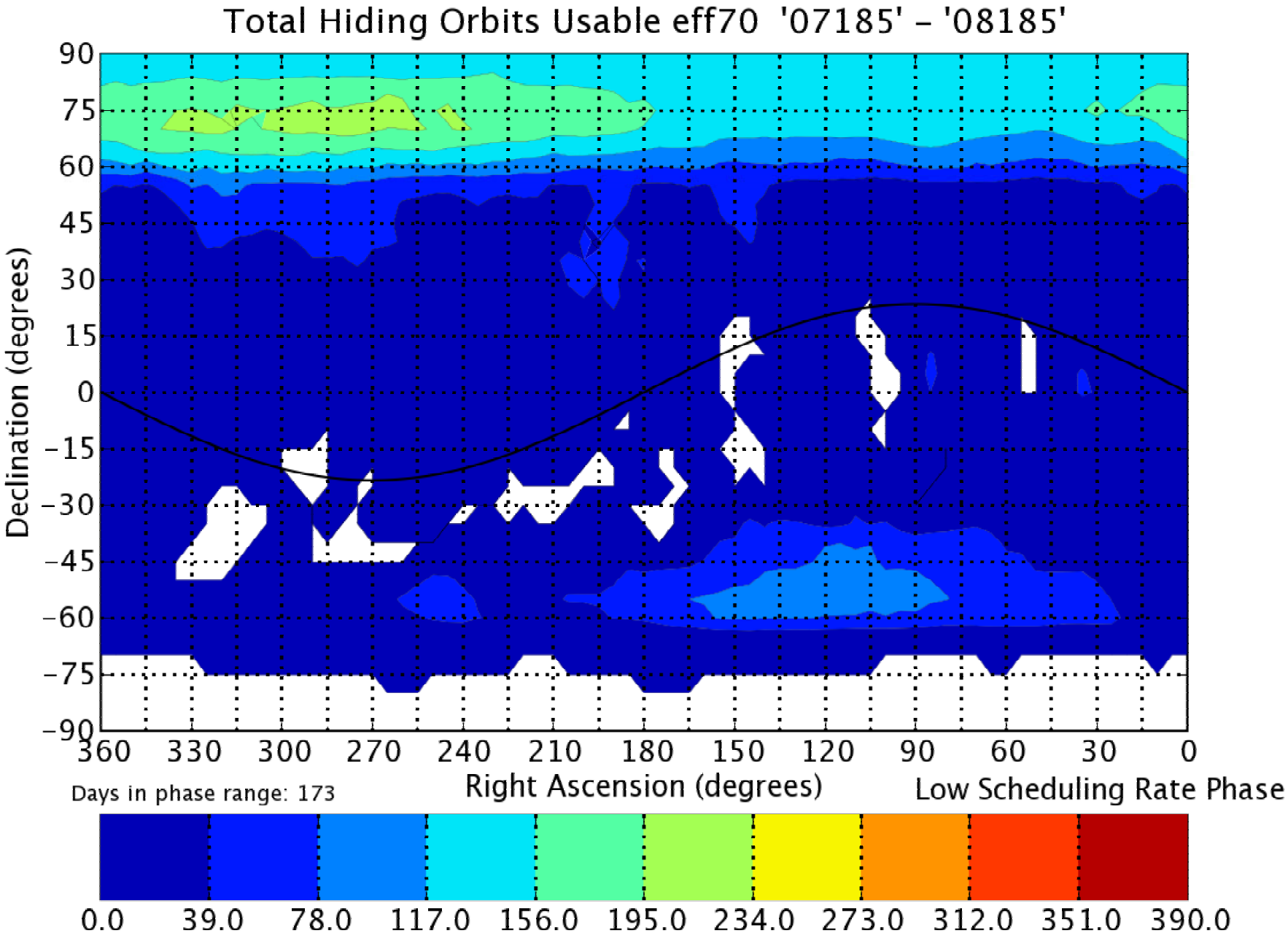
#2: Schedule remains as is

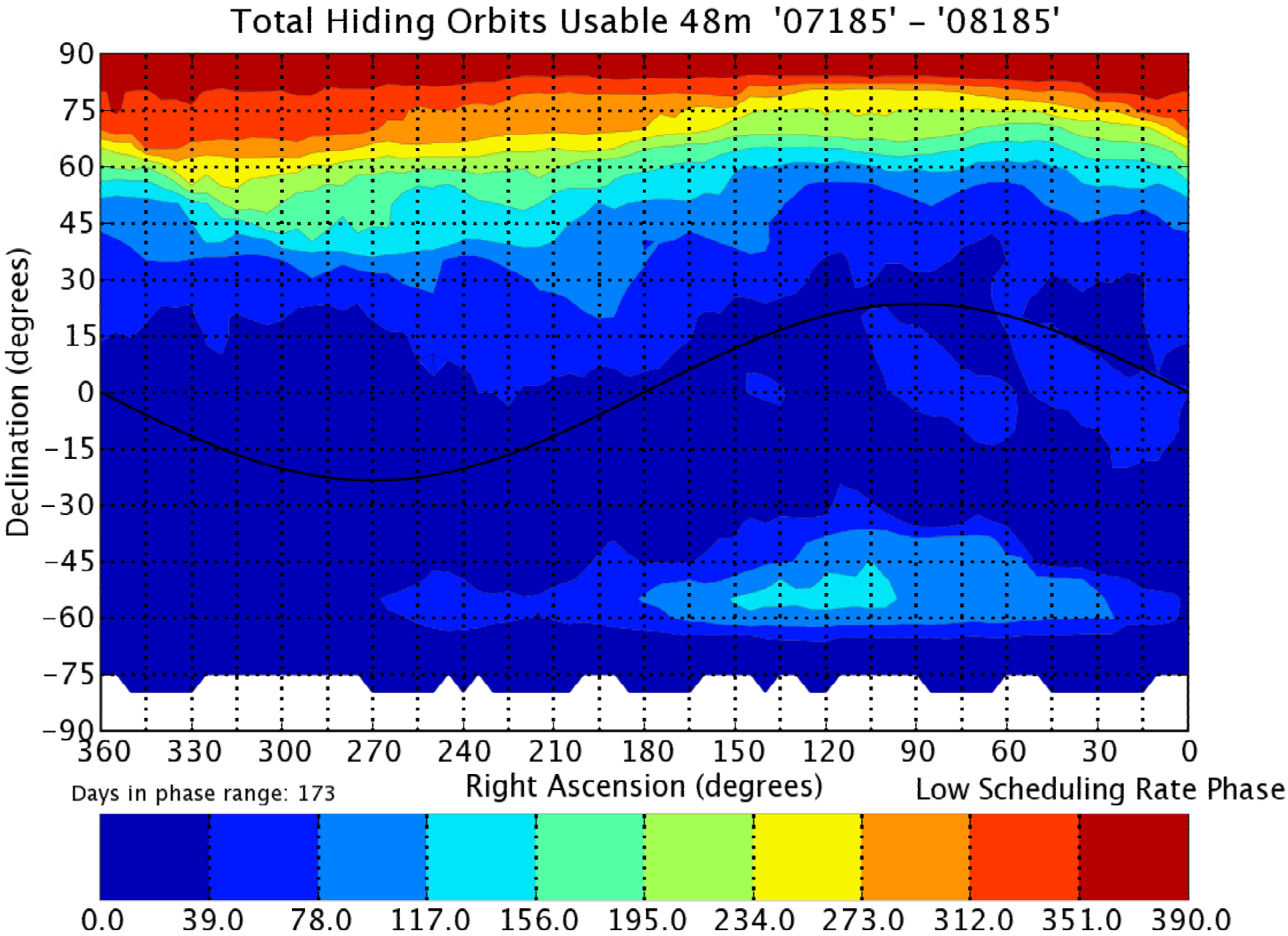
- Cycle 17 TAC knows what instruments are available
- `fill-in' any gaps with GTO time
- Require Phase II submission of Large Cycle 17 GO programs to permit rapid implementation

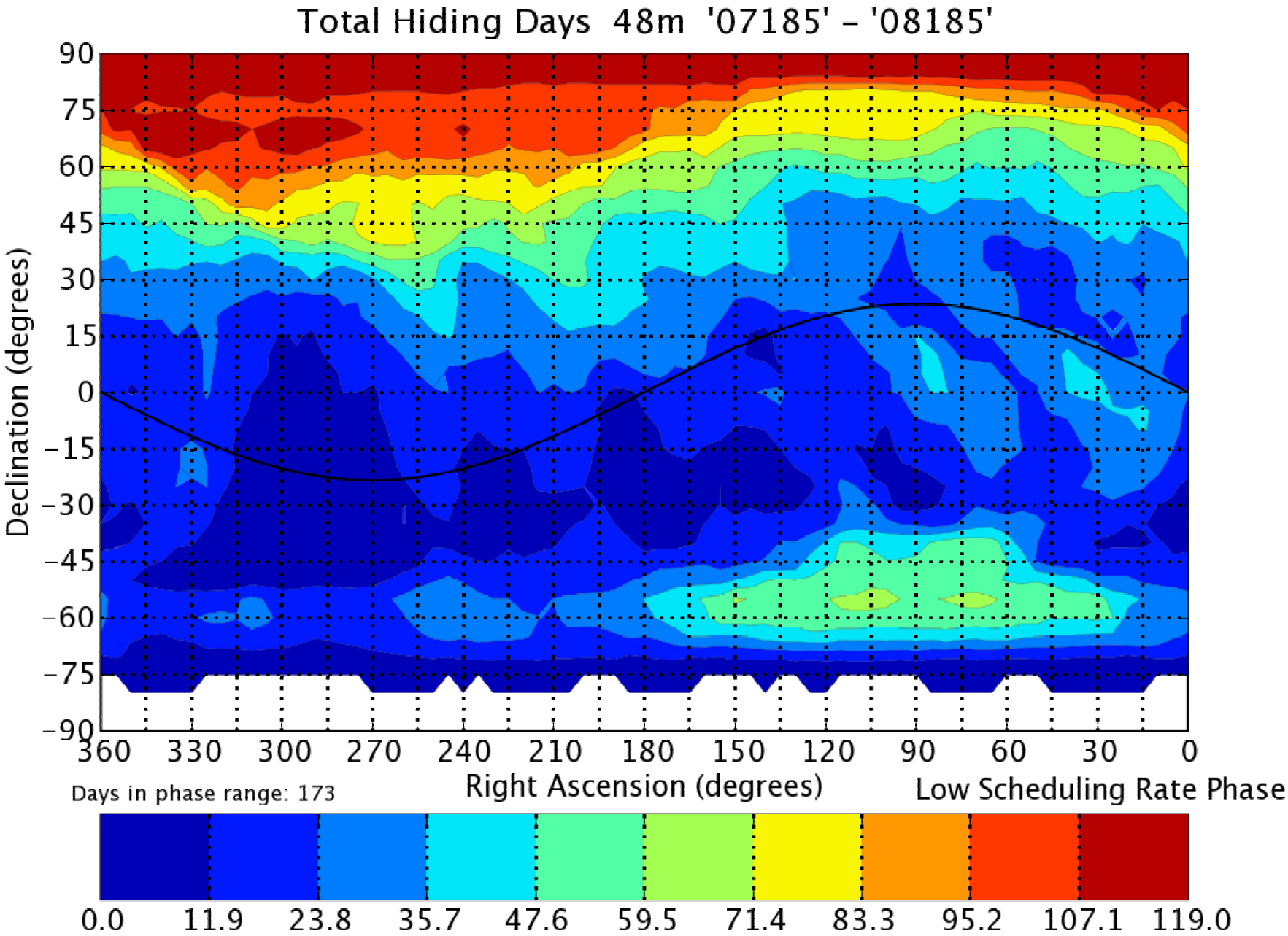
Additional slides


SNAP Size Distribution: Cycle 14
Number
Size (minutes)
Plot Area
0-5
5-10
10-15
15-20
20-25
25-30
30-35
35-40
40-45
45-50
50-55
55-60
60-65
65-70
0
50
100
150
200
250
300
350
400
0%
10%
20%
30%
40%
50%
60%
70%
80%
90%
100%
Number Available
Number Scheduled
Percentage Schedule


Scheduled Snaps
05.241-06.114 [34 weeks]
06.114-06.254 [20 weeks]
06.114-06.254(w/o 170/176) [18 weeks]
Number per Week
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
0-5
5-10
15-20
20-25
25-30
30-35
35-40
40-45
45-50
50-55
55-60
>60
Bin (minutes)


Total Hiding Orbits Usable eff70 '07185' - '08185'
Declination (degrees)
90
75
60
45
30
15
0
-15
-30
-45
-60
-75
-90
360 330 300 270 240 210 180 150 120 90 60 30 0
Right Ascension (degrees)
Days in phase range: 173
Low Scheduling Rate Phase
0.0 39.0 78.0 117.0 156.0 195.0 234.0 273.0 312.0 351.0 390.0


Total Hiding Orbits Usable 48m '07185' – '08185'
Declination (degrees)
90
75
60
45
30
15
0
-15
-30
-45
-60
-75
-90
360 330 300 270 240 210 180 150 120 90 60 30 0
Right Ascension (degrees)
Days in phase range: 173
Low Scheduling Rate Phase
0.0 39.0 78.0 117.0 156.0 195.0 234.0 273.0 312.0 351.0 390.0


Total Hiding Days 48m '07185' - '08185'
Declination (degrees)
90
75
60
45
30
15
0
-15
-30
-45
-60
-75
-90
360 330 300 270 240 210 180 150 120 90 60 30 0
Right Ascension (degrees)
Days in phase range: 173
Low Scheduling Rate Phase
0.0 11.9 23.8 35.7 47.6 59.5 71.4 83.3 95.2 107.1 119.0