Parallels Post-SM4

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Parallels

• Parallel observations offer a chance to increase the science productivity of HST

• Operate one or more instruments in conjunction with the prime science instrument
  • “Coordinated” Parallels
    • Parallel is part of prime science investigation proposed and approved in Phase I
    • Parallel specification is given by GO as part of Phase II proposal
      • Parallel and prime exposures/visits are specified together in same proposal
  • “Pure” Parallels
    • Parallel is proposed in Phase I as part of standalone parallel science program
    • Parallel specification / description is given by GO in Phase II
      • Parallel and (unrelated) prime visits are matched at this stage through iterative process
Maximizing Pure Parallel Science

- Existing implementation is less efficient than desired
  - Visits matched late in scheduling process (after primes are scheduled)
    - Doesn’t always work (no chance for iteration)
  - Rigid visit structure/specification limits scheduling opportunities
    - If match does not exist, parallel is not scheduled
  - Long parallel opportunities are difficult to schedule
    - Buffer dump conflicts are problematic for long parallels
  - Prioritization and completion of parallel visits are not handled optimally
    - Know completion rate only after observations execute (end of cycle)

- New implementation should improve parallel science return
Pure Parallels in Cycle 17

- Pure parallels will be treated more like prime observations than in the past
- Ranked/approved by TAC in Phase I process \((\textit{as before})\)
- Completion rate should be higher than in previous pure parallel implementation
- Default proprietary period of 12 months \((\textit{new})\)
- Parallels assigned to primes will be carried over to next cycle if specified prime does not execute in Cycle 17 \((\textit{new})\)
- PI assists in selection of best parallel pointing opportunities \((\textit{new})\)
- Matching done early (Phase II) rather than late in process \((\textit{new})\)
- Early assessment of feasibility and ability to schedule \((\textit{new})\)
Pure Parallel Process

Phase I proposals submitted as usual

Phase II primes submitted

STScI creates list of matching opportunities

Pure parallel PIs match observations to multiple opportunities using APT

STScI and PIs resolve conflicts and select final matches
Prime programs modified (orients) if necessary and allowed

Proposal prep and LRP as today
Pure Parallels - Assumptions

• Pure parallels will be attached only to COS primes with minimal readout conflict (i.e., single COS readout occurs at end of orbit or in occultation)
  • Hundreds of opportunities expected based on COS DRM
  • Examples on slides to follow
• Pure parallels may not impose dithers on COS primes
  • We will consider relaxing this option in Cycle 18
• Pure parallels may not specify absolute orient constraints
• Pure parallels may impose relative orient constraints
  • Orient constraint applied by STScI to allow field matching for parallels
  • Orient will be imposed only when it does not adversely impact COS prime science or scheduling
• Strategy adopted appears feasible with available resources
• Strategy should allow more flexibility in the future if needed
Allowed Pure Parallel Instrument Combinations

• Pure parallels may specify any of the following imagers
  • ACS/WFC
  • ACS/HRC
  • WFC3/UVIS
  • WFC3/IR

• Use of more than one imager in parallel will be allowed
  • Will not match multiple imagers against same prime unless imagers are in same parallel proposal

• Pure parallels may not specify COS, FGS, NICMOS, STIS, or ACS/SBC as the parallel instrument

• Pure parallels must be attached to COS primes (at least for Cycle 17)
Parallel Opportunities

• Prior to ACS failure, we expected that ACS+WFC3 would be used in parallel frequently.
  • ACS repair would re-enable synergy with WFC3
• COS will probably account for ~25% of prime observing time (~700-800 orbits per cycle)
  • For most COS observations, parallels could be scheduled without readout and buffer dump conflicts

• If ACS is restored, using multiple instruments in parallel at the same time (e.g., WFC3+ACS) results in more buffer conflicts
A Few More Parallel Examples

COS Prime (Exp 1)

ACS/WFC

WFC3/UVIS

ACS/HRC

WFC3/UVIS

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Examples of Possible Parallel Programs

- Searches for high-z supernovae with WFC3 grism
- Searches for $z > 7$ galaxies with WFC3 IR channel
- WFC3 deep UV fields
- Cosmic variance (ACS or WFC3)
- Cluster mosaics, weak lensing on small scales
- Magellanic cloud narrow band imaging survey
- Nearby galaxy stellar population studies
- and so on....