April 30, 2013

Dear STUC Members,

The question of why we do not allow SNAPs for moving targets within the orbit of Jupiter was raised at the recent STUC meeting. The answer to this is that we would have to (nearly) constantly rework the visits for such a program to ensure that guide stars are available. The guide star visibility in these cases is less than a few weeks. Since we don't know when SNAPs will occur prior to the weekly calendar build, these visits need to be flight ready throughout the entire cycle, and hence require constant attention. After discussing this with the scheduling team here, we may be able to offer an alternative solution that would allow moving target SNAPs moving targets closer than Jupiter. We could observe these under gyro control rather than guide star lock, with the caveat that the position of the pointing might be off by as much as ~15". That may be acceptable in some cases (e.g., WFC3 imaging), so this is something to consider. Please let me know if you believe this would be worth pursuing for the Cycle 22 Call for Proposals.

To address the issue raised about the completion percentages of SNAP programs, I have attached three charts that provide more information about the number of visits and completion percentages of SNAPs for the past 10 cycles. I'll describe these charts and provide some thoughts on each for your consideration. I have also included a copy of the SNAP User Information Report referred to in the Call for Proposals.

Chart 1

Chart 1 shows the number of SNAPs allocated in Cycles 11-20. The color coding of the bars indicates the duration of the SNAP visits (<20 min, 20-30 min, 30-40 min, 40-50 min, and >50 min) in each cycle. Ten years ago we typically allocated 1500-1600 SNAPs per cycle. Today we allocate about 1000 to get a large enough pool to have some visit duration and sky coverage diversity. We are more efficient at scheduling prime observations now than we were 10 years ago. In recent cycles, the majority of SNAPs allocated have had visit durations in the 40-50 minute range. Cycle 20 has roughly equal allocations in the 30-40 min and 40-50 min bins.

The large number of SNAPs allocated in Cycle 16 was due to a large FGS campaign when only FGS1r and WFPC2 were operational prior to Servicing Mission 4. I will omit the Cycle 16 SNAP information from further consideration below.

SNAP programs are selected during the standard TAC/panel process, and these programs are ranked alongside the GO and AR programs.

Chart 2

Chart 2 shows the number of SNAPs executed in Cycles 11-20. Ten years ago we typically executed more short duration (<40 min, red and yellow bars) SNAPs than longer duration (>40 min, green and purple bars). Since Cycle 17 (the first post-SM4 cycle), we have executed roughly equal numbers of short and long duration SNAPs. Please note that the Cycle 20 numbers (and to some extent even the Cycle 19 numbers) are incomplete since we are only half way through Cycle 20. We typically execute more SNAPs at the end of the cycle than at the beginning since the prime observation pool is less diverse at the end of the cycle than at the beginning.

Chart 3

Chart 3 shows the SNAP completion percentages in Cycles 11-20. In the post-SM4 cycles (Cycle 17 and later), the completion percentage rates for the SNAP pool as a whole have been 33% (Cycle 17), 57% (Cycle 18), and 38% (Cycle 19). Cycle 20 is not yet complete. In all of these cycles, the shorter SNAPs with visit durations of 20-30 min have fared better from a completion percentage standpoint than the longer SNAPs. However, the total number of visits executed (Chart 2) is comparable. The tall red bars in Cycles 18 and 19 are due to two programs (one in each cycle) that happened to have good visibility.

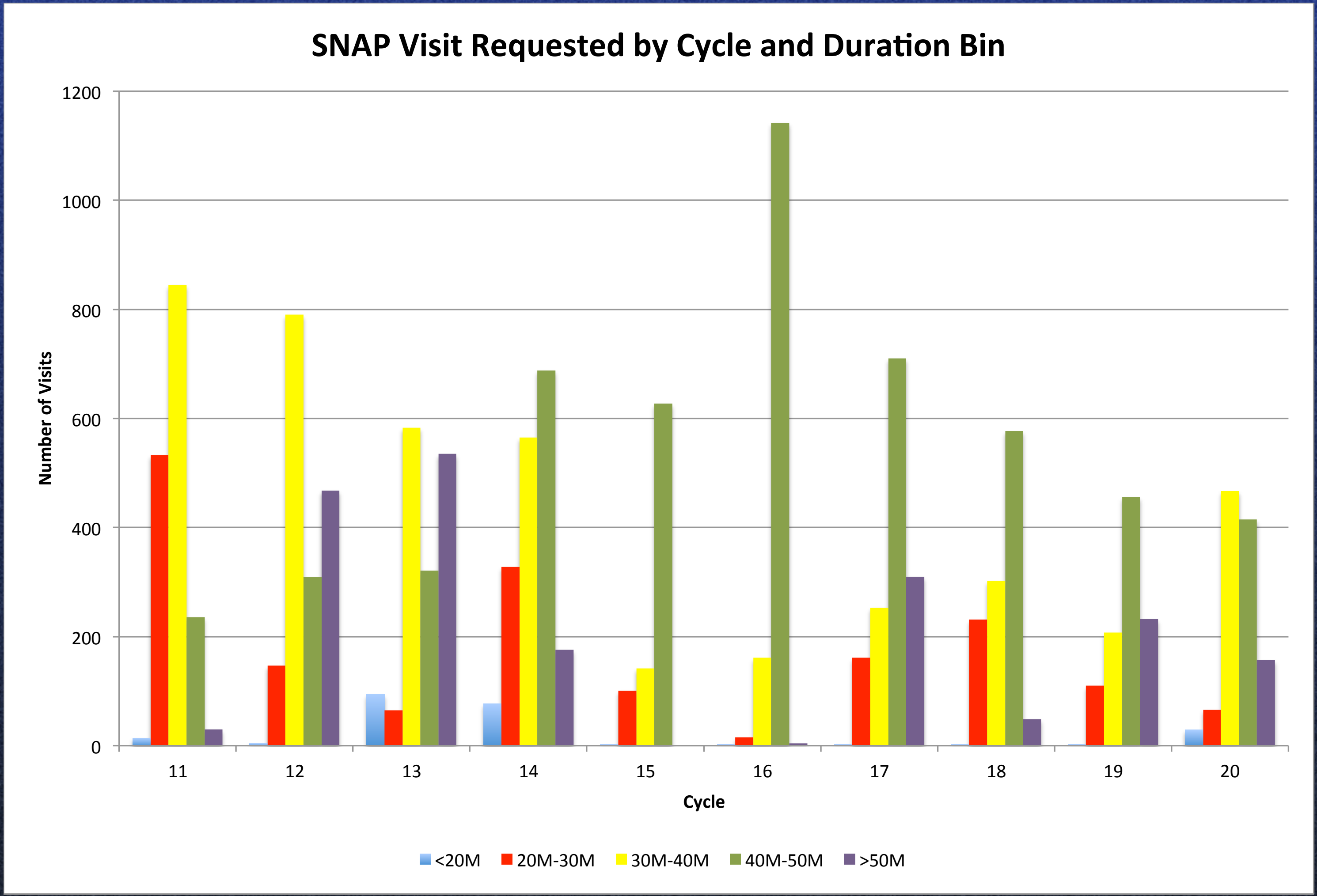
Summary

My interpretation of these charts is that our scheduling team is doing an excellent job of scheduling prime visits, as indicated by the decreasing number of SNAPs executed (needed) in recent cycles. The executed SNAPs have a roughly uniform distribution in visit duration. One could potentially try to "game the system" and submit shorter SNAP visits to take advantage of their somewhat higher completion rate, but that has limited opportunity for improving the odds of scheduling because as soon as more SNAPs in this bin are allocated, the completion percentage will decrease in response to the fixed number of SNAP visits available in the cycle. Based on this and the small number of programs driving the completion percentages in the shorter visit bins, I think the most obvious thing to do to ensure that individual SNAP programs have high completion percentages is to select programs with targets having either broad sky coverage or (in cases that can be identified) sky coverage overlapping regions where there are highly constrained prime observations that result in scheduling holes (e.g., the recent Magellanic Cloud SNAP program by Massey et al., which just happened to mesh well with another prime program's scheduling requirements). Clearly, the former of these is easier to recommend to the community than the latter since we schedule SNAPs at the time the weekly calendars are built.

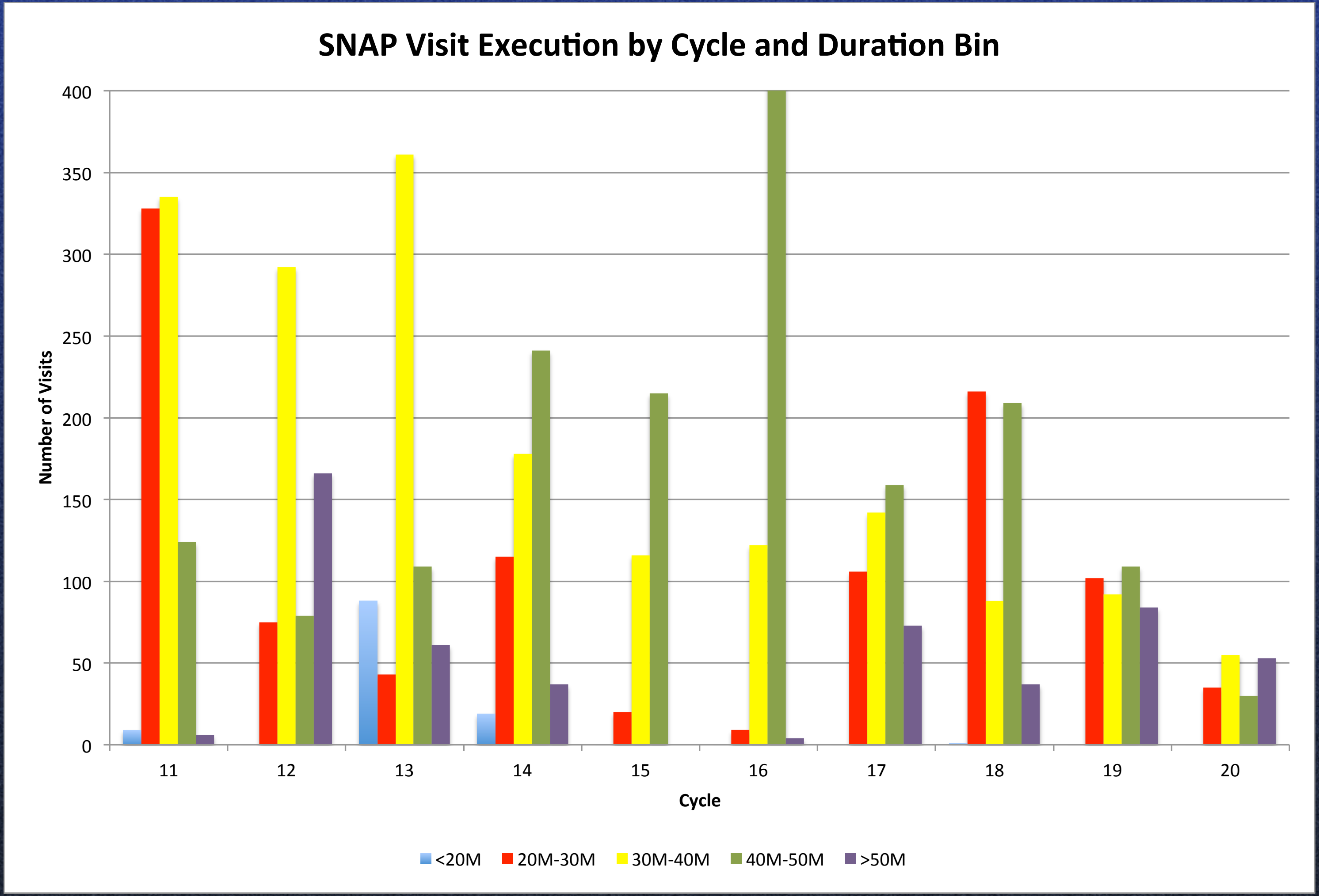
I should also note that, contrary to my comment at the meeting that there is no prioritization of SNAPs other than that current cycle SNAPs get priority over SNAPs from the previous cycle, the scheduling system does in fact decrease the priority of individual SNAP programs once their completion rate hits 50%. The SNAPs in these high completion rate programs are still available for scheduling, but SNAPs from programs with lower completion rates are given preference if they are available to fill the SNAP slot.

I hope you find this information useful.
Ken Sembach

SNAPs Allocated



SNAPs Executed



SNAP Completion Percentage