

Statistical results for HST Solar System proposals

Compiled for the HST Solar System Advisory Group

Introduction

In the course of the initial SSAG telecon (December 11, 2013), a number of questions came up regarding statistical issues associated with solar system proposals within the HST TAC process. I have reviewed the appropriate records to address those questions and compiled the results given below. We maintain confidentiality for individuals involved in the TAC process, both investigators and reviewers. However, the results given here are statistical in nature, so I do not believe that they are proprietary and there is no bar to sharing them with the community.

Triage

Prior to the TAC meeting, panelists submit preliminary grades for all proposals submitted to their panel for which they have no conflict of interest. The individual grades are combined and the lowest ranked proposals are marked for triage i.e. those proposals will be rejected without discussion by the panel. (Panelists have the option of raising any triaged proposal for discussion.)

Through Cycle 16, Solar System proposals were reviewed by a single panel; from Cycle 17, solar system proposals have been combined with other topics (primarily research on exoplanets and circumstellar disks) in two mirror panels. Triage is set by panel, not by topics within the panel. A question arose regarding the triage level for solar system proposals in the mixed-topic panels. Are solar system proposals triaged at a higher than average rate, leading to fewer such proposals being discussed by the panel?

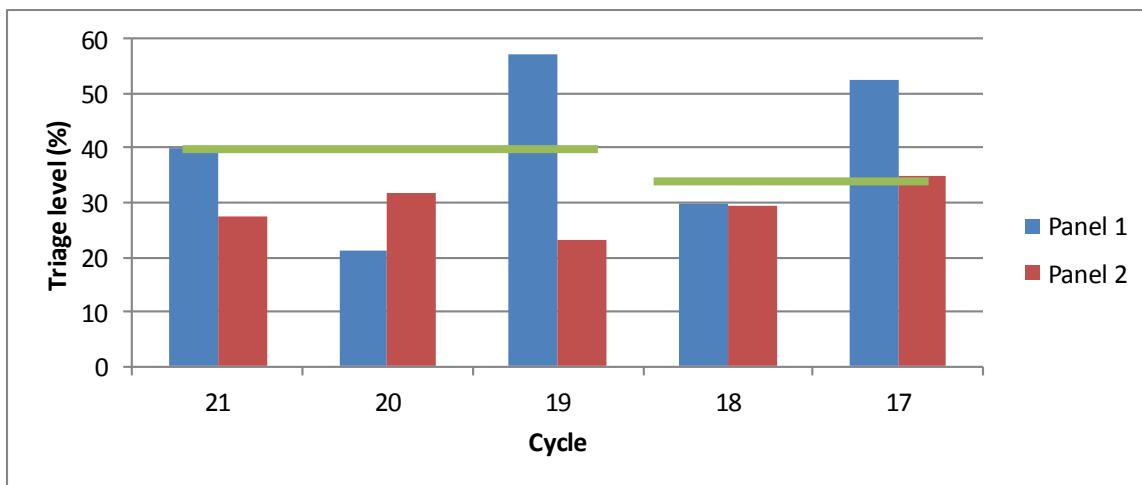


Figure 1: Triage level for Solar System proposals in Cycle 17 to 21 – the horizontal lines mark the levels set for each panel; the histograms show the fraction of solar system proposals that were marked for triage in each panel.

Figure 1 shows the data for the 10 “Planet” panels. The green horizontal lines mark the triage level set for panels in each cycle (35% in Cycles 17 and 18, 40% in Cycles 19 to 21); the

histograms show the fraction of solar system proposals that were marked for triage in each panel; histograms that extend above the triage line indicate that the panel marked a larger fraction of the solar system proposals for triage, while histograms below the line indicate that fewer solar system proposals were triaged than the average for the panel. Thus, in Cycle 19, the triage level was set at 40%, but one panel marked 57% of the solar system proposals for triage while the other marked only 22% for triage. Overall, 2 of the 10 panels marked an above-average fraction of solar system proposals for triage; two panels triaged solar system proposals at the average level; and 6 panels triaged a smaller fraction of solar system proposals than the average level.

Proposal size

Do Solar System proposers tend to request fewer orbits than most HST proposers? Do panels tend to allocate fewer orbits to Solar System proposals? What is the size distribution of Solar System proposals, submitted and approved?

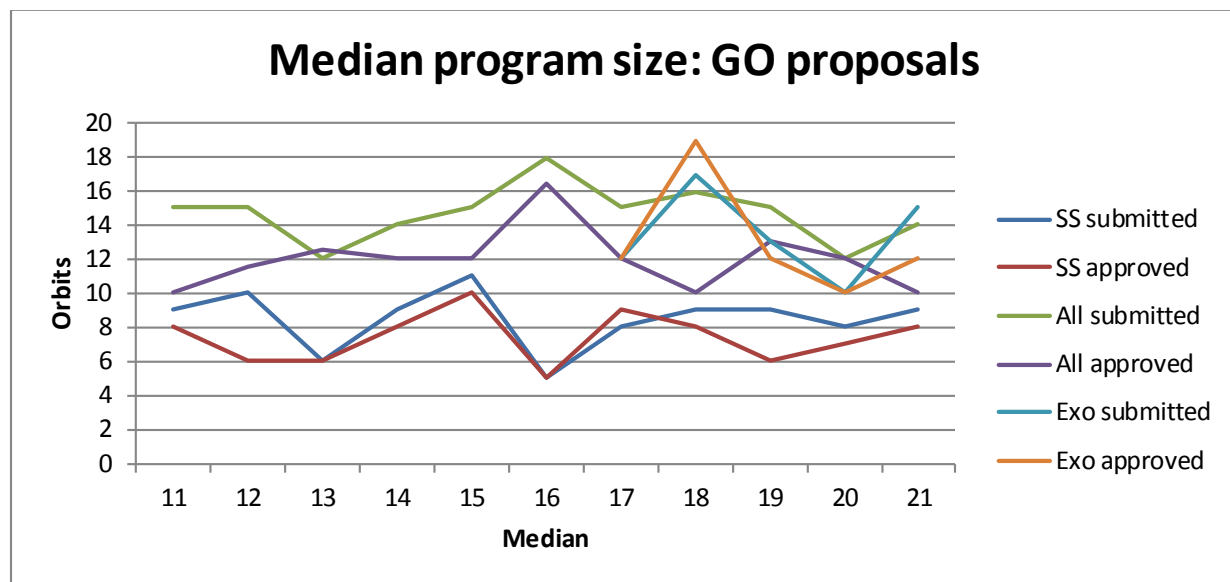


Figure 2: Median proposal size for Solar System, Exoplanet and all HST proposals - Cycles 11 through 21

A simple global metric that addresses the first two questions is the median program size for solar system proposals versus other science categories. Figure 2 shows that parameter for Cycles 11 through 21 matching Solar System proposals against the median for all proposals and against exoplanet proposals for Cycles 17 through 21 (Cycle 17 was the first with an exoplanet science category). The median size for Solar System proposals, both submitted and approved, is indeed significantly smaller than the median for all proposals; differences range from 5 to 12 orbits for submitted, and 2 to 10 orbits for approved programs. Similar differences exist between the Solar System and Exoplanet proposals – note that these proposals are reviewed by the same panels. The median size for Solar System proposals, submitted and approved, has remained fairly constant over the past 12 cycles.

We have also compiled the size distribution for submitted and approved GO proposals for Cycles 11 through 21. These compilations do not include Pure Parallel programs or SNAP programs. Again, we have compared the Solar System distributions against data for all GO programs for all 12 cycles, and against data for exoplanet proposals from Cycles 17 to 21. Data for 3 cycles (12, 17 and 21) are shown below; data for all cycles are included in the Appendix. We show the numbers of submitted and approved proposals in each category, and the corresponding acceptance fraction as a function of proposal size.

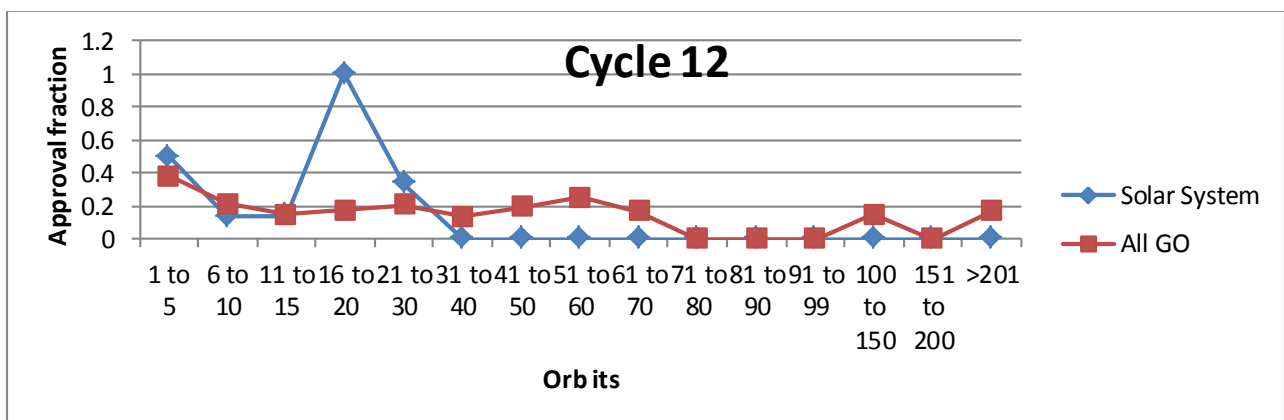
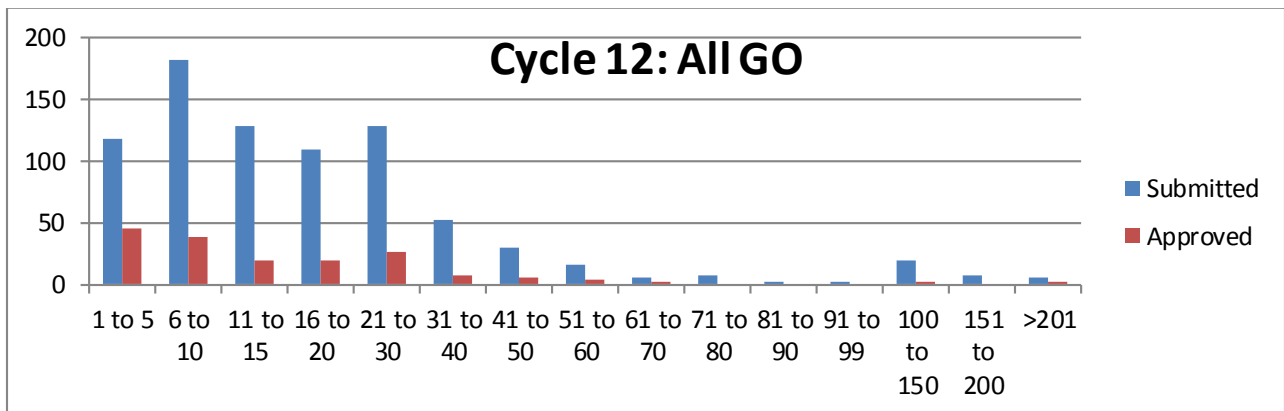
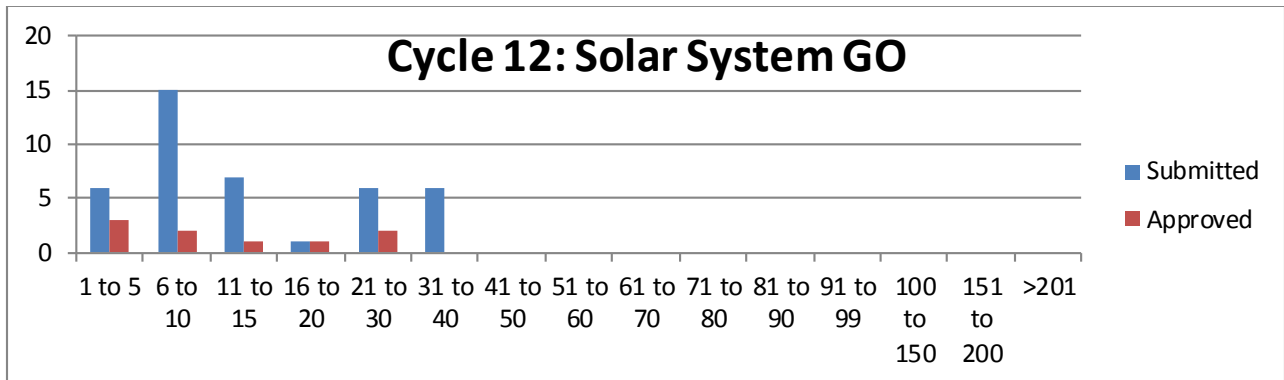


Figure 3: Cycle 12 data

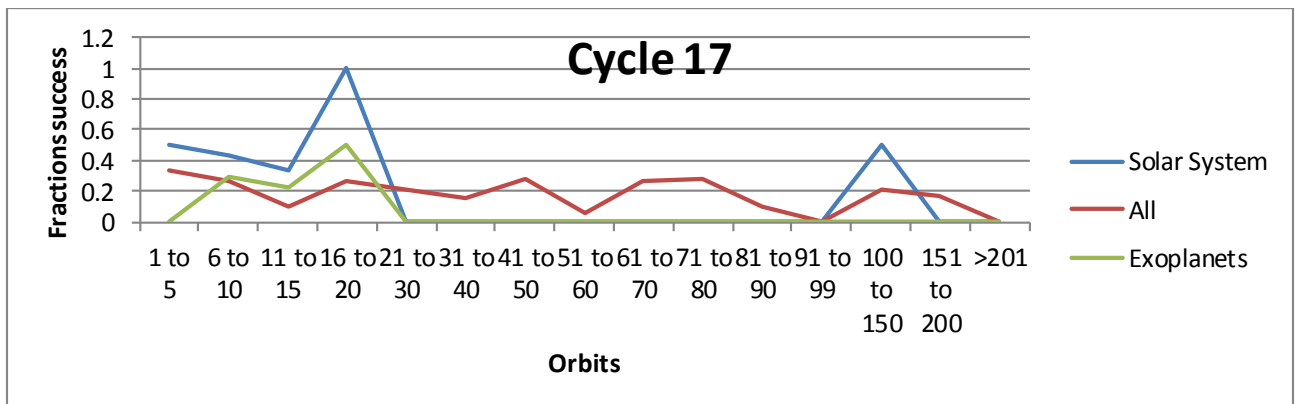
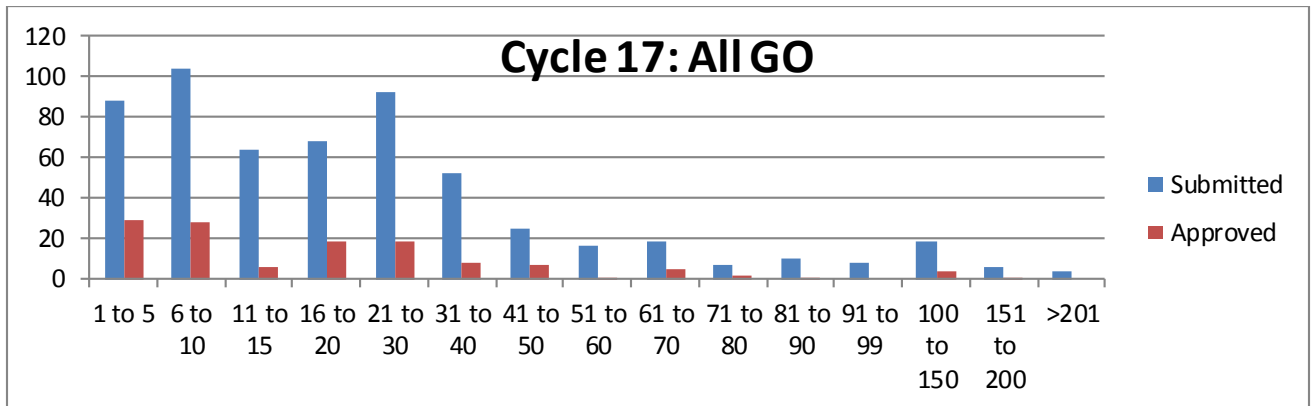
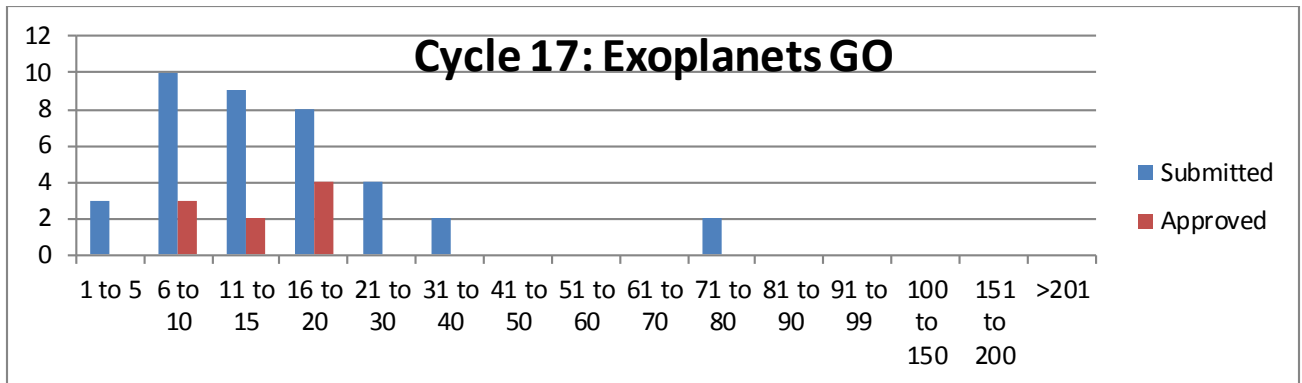
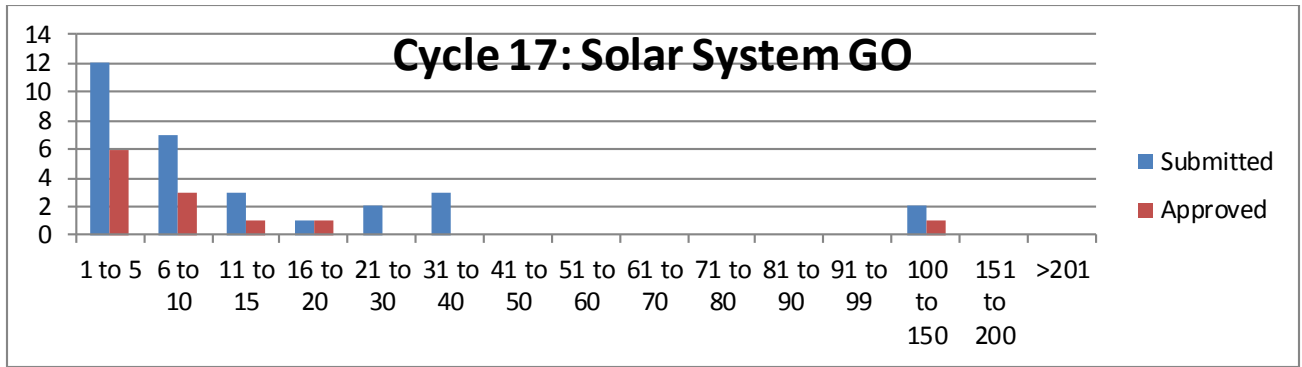


Figure 4: Cycle 17 data

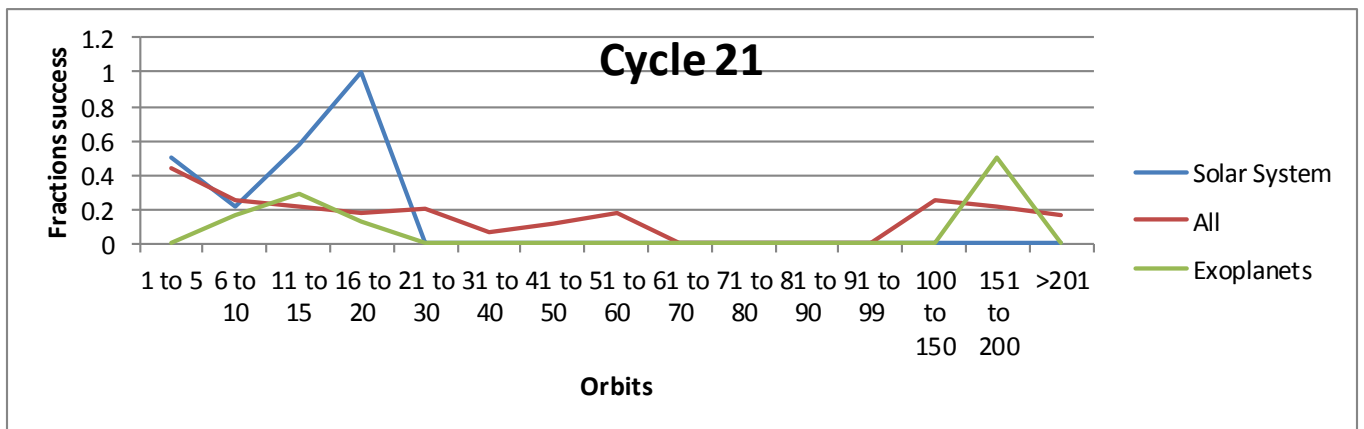
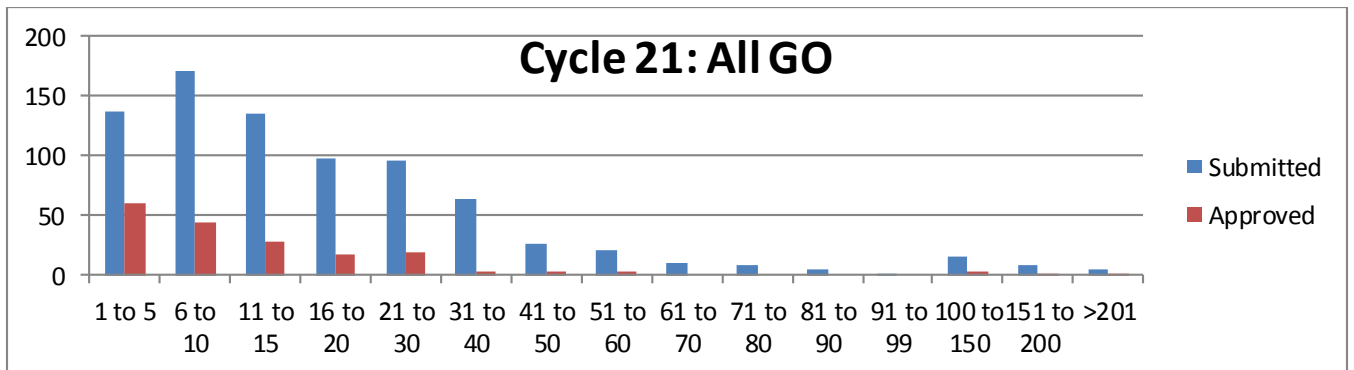
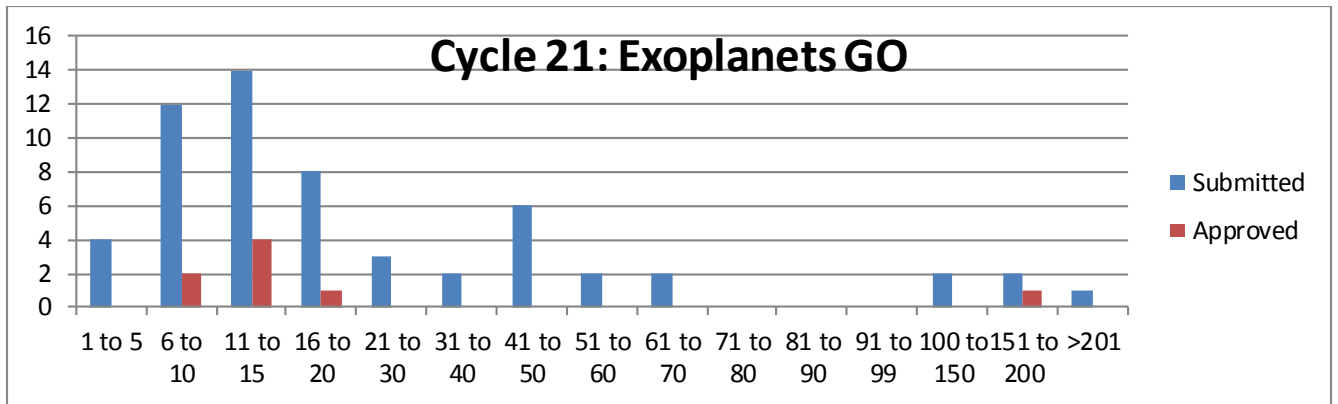
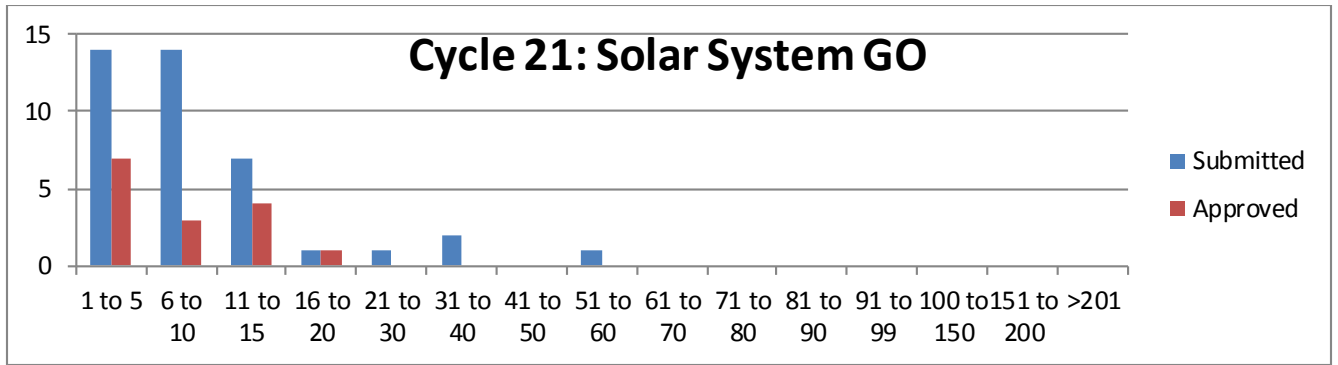


Figure 5: Cycle 21 data

We have also compiled composite statistics for Cycles 11 through 16 and 17 through 21.

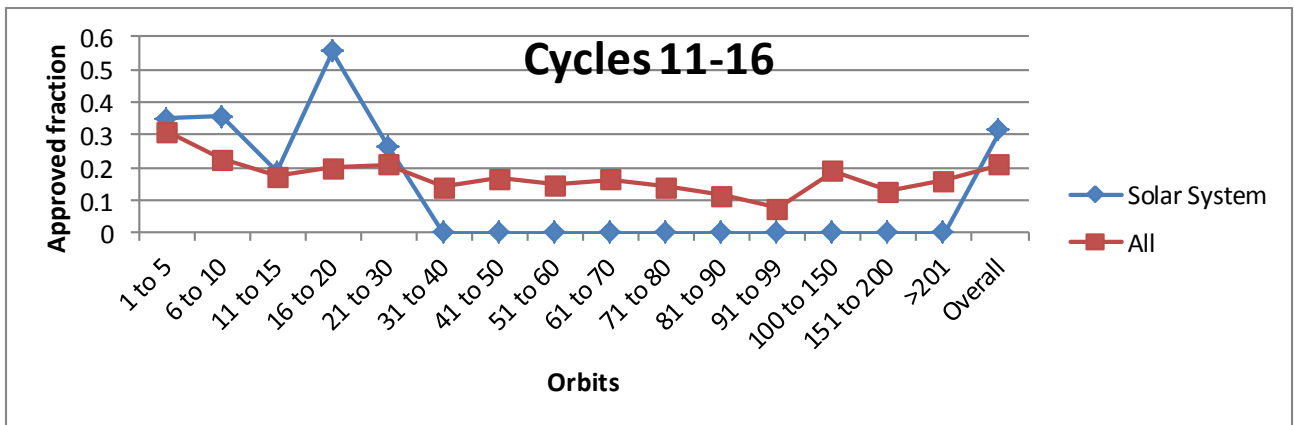
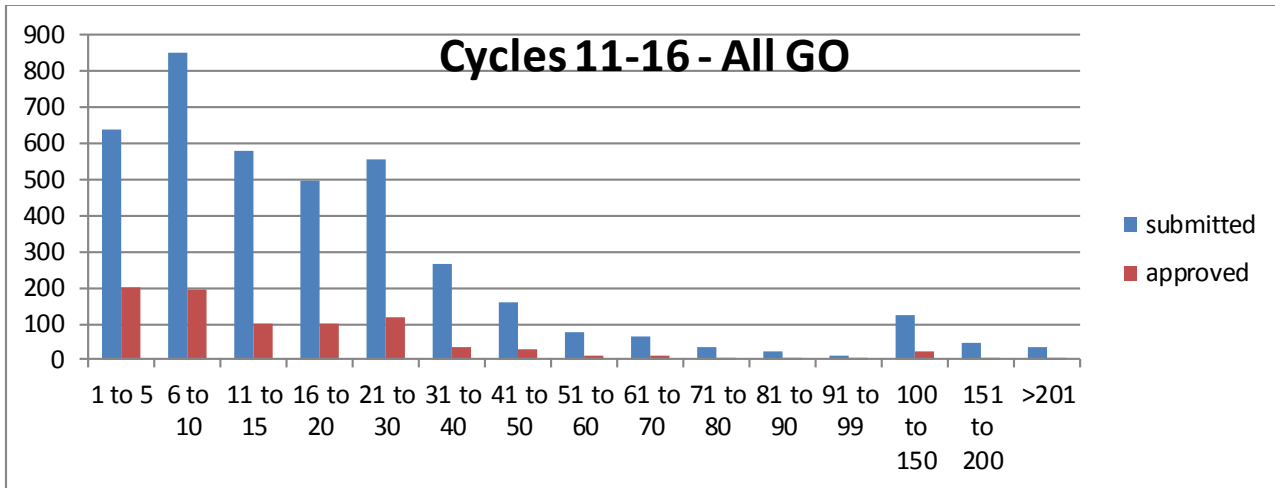
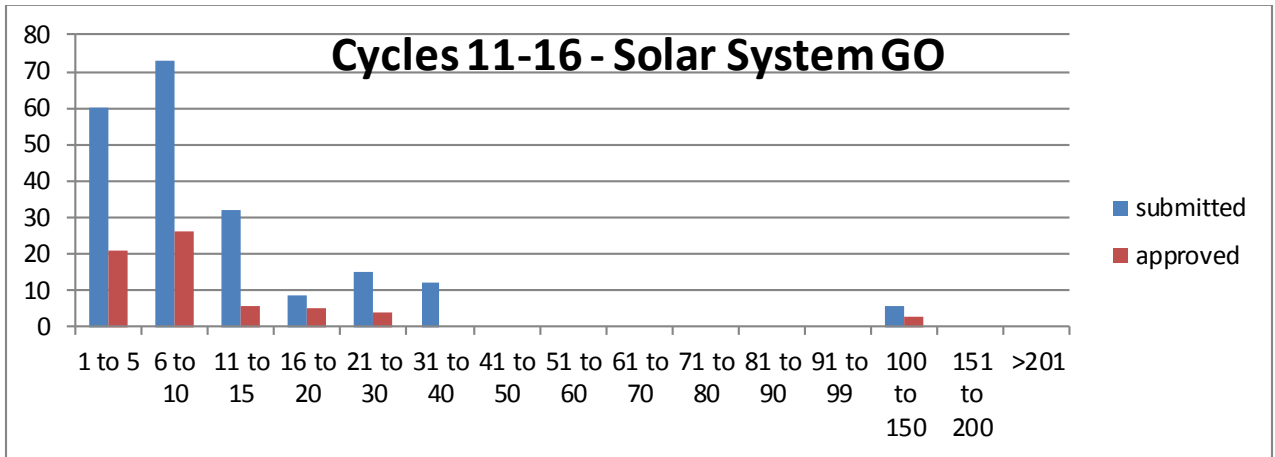


Figure 6: Composite statistics - Cycles 11 to 16

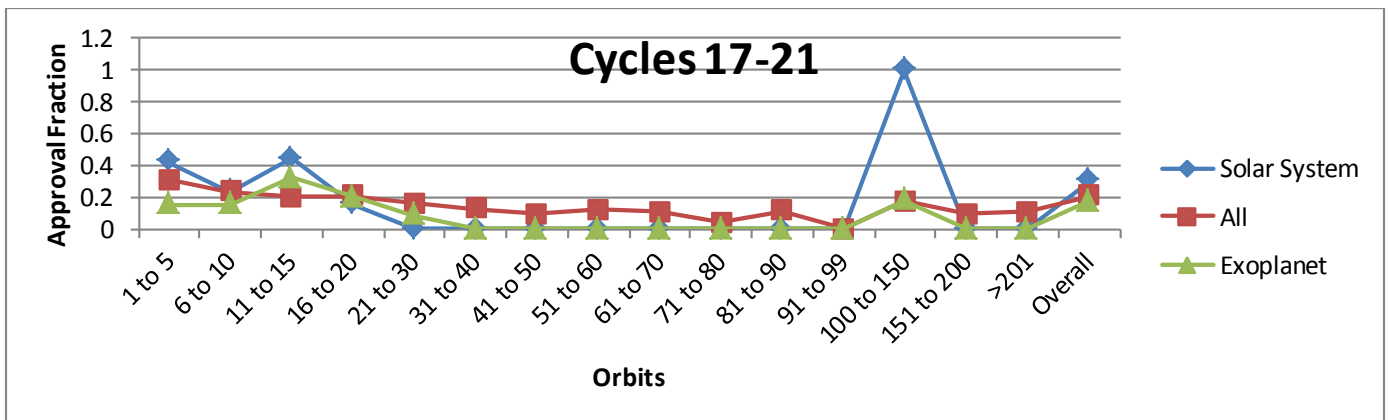
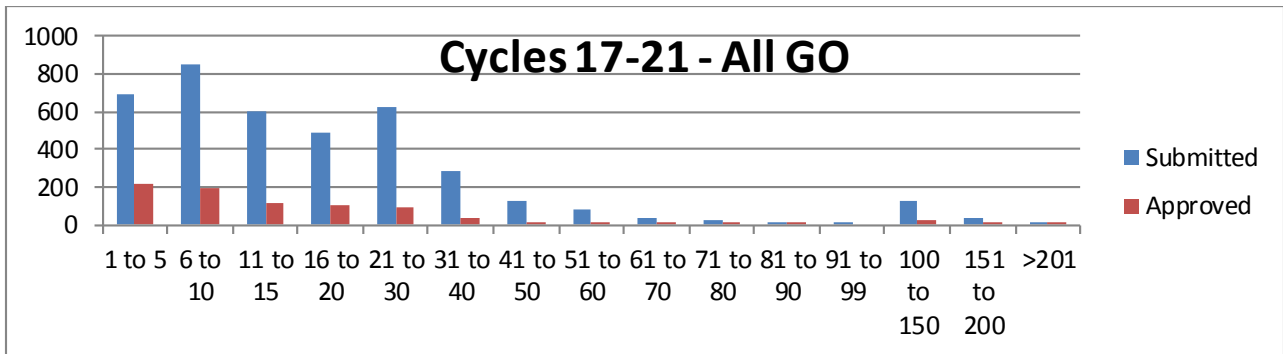
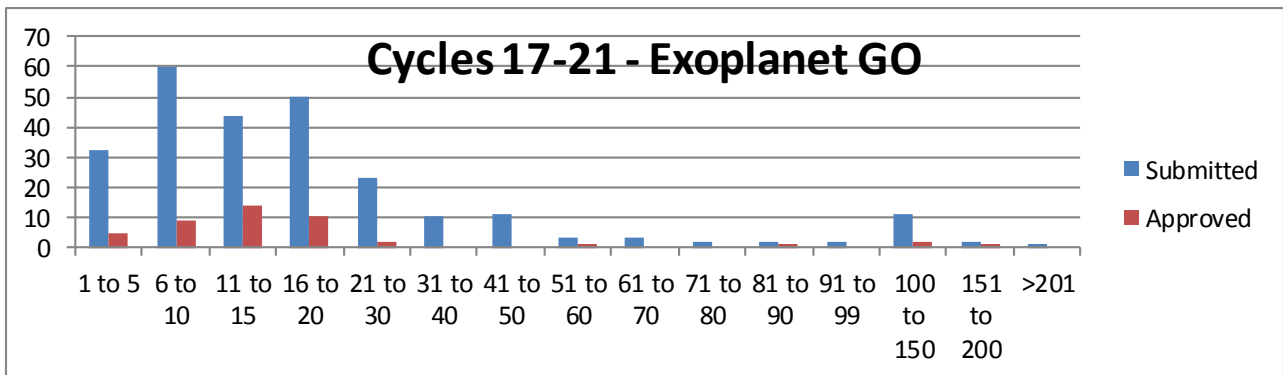
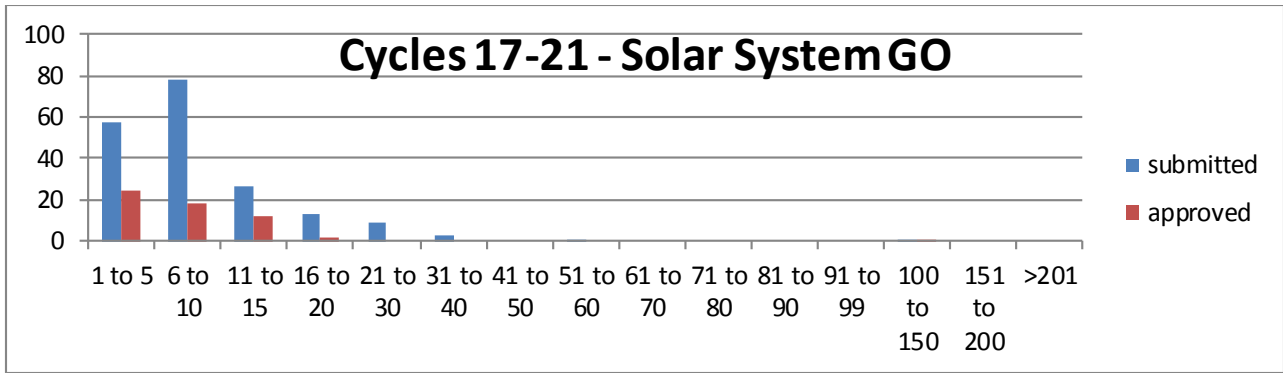


Figure 7: Composite data - Cycles 17 to 21

There are several broad statements that one can make from these data:

- The overall acceptance fraction for Solar System proposals is higher than the average for all GO proposals, but the proposals generally request less than 15 orbits.
- Relatively few Solar System proposals requesting more than 20 orbits were submitted for review by the panels: 27 in the range 21-40 orbits were submitted through Cycles 11 to 16 but only 4 were accepted; 13 were submitted in Cycles 17 to 21 and none were recommended for approval.
- Large or Treasury GO proposals for Solar System science are also rare, but they have a reasonable success rate, with 4 of 7 recommended for approval.
- The mode of the size distribution for all submitted GO programs falls in the second smallest bin (6 to 10 orbits); the mode for the Solar System proposals lies in the same bin in early cycles, but appears in smallest bin in some more recent cycles (Cycles 16, 17 and 21; see Appendix); the mode for exoplanet proposals falls in either the 6-10 orbit or 11-15 orbit bin.
- Exoplanet proposals have a lower success rate than Solar System proposals, but garner similar total orbit allocations since the individual exoplanet proposals tend to be larger.

It may be relevant to note that the Solar System panel in Cycles 11 through 16 received a typical allocation of ~80 orbits. Statistical analysis shows that it is extremely difficult for a panel to allocate more than 25-30% of their resources (i.e. orbits) to a single proposal; this is why we introduced separate categories for Large programs and, more recently, medium proposals (see pdf slides on proposal size for more details). In the case of the Solar System panel, that *de facto* limit corresponds to ~20 orbits. Proposers gain an intuitive feel for what works, and tend to modify their proposals accordingly. The combined Planet panels each receive allocations of 120-130 orbits, offering the potential for somewhat larger individual proposals, but the Solar System community may still be conditioned to submit smaller-scale proposals.

Appendix

Proposal size distributions for Cycles 11 to 20; we have not repeated the data shown in Figures 3 to 5 for Cycles 12, 17 and 21, respectively.

