Cover Notes - Modes and Metrics

Science and Evolution of Gemini, 2018

This presentation was largely graphics, so here are some narrative notes which I hope give context and reflect what was said in the meeting. - AJA

Section - Modes

Slide 4

On the left: ways for applying for time. On the right: routes for involvement in the observing process. Top to bottom: increasing frequency of proposal opportunity.

Section - Completion rates

Slide 6

Recent semesters. Points made in the discussion were that oversubscription varies with partner, with site, with semester, sometimes by factors of two or more, and we rarely find that we predicted any particular change. Note: bars are oversubscription of time available in the regular queue, which dominates total time, and amounts to 80% of total time as we hold off on 20% because we know we will lose at least that much to unusable weather. Lower dots are relative to all time, and upper dots are relative to the time available in bands 1 and 2 only (which most PIs are applying for). Note also that these bars are by partner, and therefore the two largest partners (US and Canada) are under-represented in terms of hours.

Slide 7

Allocations of time in the regular queue, per band, over time since the start of multi-instrument queue in 2005. In both north and south, the trend to smaller allocations is strongest in Band 1. No conclusions were drawn here; the purpose was informational.

Slide 8

Against a plot of the average completion rate of programs in Band 1 at Gemini North, changes that we have made in science operations since 2005. Specifically noted the fact that very early high average completion resulted from the small percentage of time in Band 1, which was unpopular and resulted in trading time from band 3 into band 1 (2007) and further reduction in

band 3 (2011) as a result of feedback that PIs didn't want to prepare observations that didn't get executed.

Slide 9

Comparison from 2014 of the ESO VLT program completions in their Bands A, B and C against Gemini Bands 1, 2 and 3 over approximately the same timescale. The significant point I raised to take away from this was that PIs whose programs are in Bands 2 and 3 at Gemini stand a significantly greater chance of getting data than those in Bands B and C at ESO VLT; we should redo this analysis with more up to date numbers.

Slide 10

Having said all that, this demonstrates why average program completion (at least at Gemini) is a bad statistic. These two histograms show completion in the regular queue (not including ToOs, over which we don't have control, or block-scheduled modes, over which the weather dominates in some semesters). In an average semester, shown first, the majority of programs end up in the "100% complete" bin. In a bad semester (we're showing one of the worst in recent history), a lot are not started, and band 3s outnumber Band 1s in the 100% complete bin. We also noted that we are most recently focusing on programs in the center of these histograms, for reasons brought up later.

Slide 11

More recently we have concentrated on the number of programs at 80% completion (again, reasons stated later). These charts show, for Gemini North, (bars) fraction of programs at 80%; (dots) fraction of programs at 100% complete (implication - if you get to 80%, you stand a good chance of getting to 100%), and (grey line) the ratio of time offered to time delivered (lower points on the latter correspond to severe weather loss or major instrument/telescope failures). Band 1 (in this slide) shows relatively little response to major changes in the delivered/offered ratio. Band 2 completion (top right) shows significant following of that ratio. Band 1 is therefore protected preferentially, which is one goal of the queue system. Band 3 (right center) shows a lower fraction reaching 80% than Band 1 and 2, as expected, but an indication of an increasing trend, probably relating to the shrinking size of Band 3 over time (see Slide 8). Bottom right shows the same statistic for programs in 1 scheduled in blocks (in the north, this corresponds to visiting instruments and laser AO). The results are more sporadic, with larger variability as block scheduled modes are more vulnerable to a bad week of weather for example.

Slide 12

Similar to Slide 11, but for Gemini South. Significant recent losses correspond to two appalling semesters of bad weather, and significant instrumentation problems with GeMS laser in particular. The latest complete semester at the time of the conference, 2017B, continued a

resurgence of completion rates in Band 1 (and partly Band 2) at Gemini South. Block-scheduled programs, which at Gemini South include GeMS/GSAOI, GPI and visiting instruments, have been very challenging as many band 1 programs are in the block-scheduled modes and those two instruments in particular require at least average, and some better than average, observing conditions.

Section - publications

Slides 14-20 concerned publications and what we can glean from the available statistics.

Slide 14

Gemini annual publication count, which may have peaked at approximately two papers per week per telescope. Gemini South and North are approximately equal in publication count. Papers relying on data from both telescopes account for 5-10% of all papers. “Other” (green) are publications resulting from commissioning, system verification etc.

Slide 15

Shows that it takes typically two years to get a publication out of a gemini science program.

Slide 16

Shows the number of hours of observations in Band 1, 2, 3 and 4 (poor weather) to get at least one publication out. Discretionary programs require the smallest amount of observing time to produce a publication.

Slide 17

Data (left): for science programs reaching >80% completion, the number of programs (abscissa) and published programs (ordinate). Visual instruments (GMOS north and GMOS south) are the two points at the upper right, and infrared instruments, for which the equivalent capabilities are segregated between different cryostats, are in the lower left. There is no evidence for major differences in productivity per instrument. The slope of the line is a little less than 50%, showing that we have some headroom to expand into - hence the Science User Support Department. The smaller plot (on the right) is the paper count per published program; the slope of this line is approximately 2.0, in other words if data from a program appear in one publication it is likely that they will appear in two.

Slide 18

Publication totals per instrument, to 2015 (staying at or beyond the peak of the delay curve). Main point raised in the meeting was that publications employing more than one instrument sit between the visual (GMOS) and infrared instruments.

Slide 19

Fraction of programs whose data appear in a publication, as a function of completion rate. This shows (robustly, though the data are a few years old) that the chances of publication peak at a completion rate of 80%. This informs us that we should put effort into avoiding programs ending the semester in the boxed region. This has resulted in increased dialog with the NGOs at strategic points in each Semester.

Slide 20

Shows the recent ramp up in LLP and FT publications, with DD as context. We expect both to increase further; it will be interesting to see if LLPs have greater impact and FTs have greater immediacy.

Section - Impact

Slide 22

Data are average impact, per paper, of programs using a single instrument (60% of the sample). Points of interest are that the largest current impact is from a visiting, and very inexpensive, instrument (DSSI), and that the second highest point in the histogram is NICI. Both of these instruments operate in relatively “niche” science areas.

Slide 23

Highlighting the fact that the impact of target of opportunity programs and DD programs are both high; and that the impact of other regular queue programs increase from Band 3 through Band 1 (as one would hope). These data are averaged over all papers meeting the criteria.

Slide 24

Demonstrating that the impact of larger queue programs is larger. Numbers within the bars are the number of science programs reflected.

Slide 25

Another demonstration that the TACs generally know what they are doing: the impact per publication (for papers resulting from one program, for simplicity). Band 1 programs increase through the higher impact bins. The point on the right is a single band 3 program which happened to confirm the redshift of the first z>7 quasar. By the time that program was awarded time, it had been seen by the TAC multiple times and “TAC fatigue” had set in. If we allow papers resulting from more than one program, impact extends up to 66 (a supernova cosmology paper). These data are updated approximately annually.