`qplan` and Simulations

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Mitaka Queue Workshop
June 16, 2015

Today

- Part 1
  `qplan` inputs
  `qplan` layout and function
  `qplan` outputs

- Part 2
  Effects of different weights

- Part 3
  Simulation scenarios

Observing blocks

A	B	C	D	E	F	G	H	I
Code	tgtcfg	inscfg	telcfg	envcfg	On-src Time	Total Time	Priority	Comment
n1234_g1	n1234	g_300x5	p_opt2	dark_s0.8_am2_trans0.8	1500	1700	1	
n1234_g2	n1234	g_300x5	p_opt2	dark_s0.8_am2_trans0.8	1500	1700	1	
n1234_g3	n1234	g_300x5	p_opt2	dark_s0.8_am2_trans0.8	1500	1700	1	
n1234 i1	n1234	i_300x4	p_opt2	gray_s1_am2.5_trans0.5	1200	1360	1	
n1234 # r1	n1234	r_300x1	p_opt2	gray_s1_am2.5_trans0.5	300	340	2	
This is OB y1	n1234	Y_300x6	p_opt2	gray_s1_am2.5_trans0.5	1800	2040	3	
This is OB y2	n1234	Y_300x6	p_opt2	gray_s1_am2.5_trans0.5	1800	2040	3	
This is OB y3	n1234	Y_300x6	p_opt2	gray_s1_am2.5_trans0.5	1800	2040	3	
This is OB y4	n1234	Y_300x6	p_opt2	gray_s1_am2.5_trans0.5	1800	2040	3	
					#N/A	#N/A		
10	H9000	g_300x5	p_opt2	dark_s0.8_am2_trans0.8	1500	1700	1	
11	H9000	g_300x5	p_opt2	dark_s0.8_am2_trans0.8	1500	1700	1	
12	H9000	g_300x5	p_opt2	dark_s0.8_am2_trans0.8	1500	1700	1	
13	H9000	i_300x4	p_opt2	gray_s1_am2.5_trans0.5	1200	1360	1	
14	H9000	r_300x1	p_opt2	gray_s1_am2.5_trans0.5	300	340	2	
15	H9000	Y_300x6	p_opt2	gray_s1_am2.5_trans0.5	1800	2040	3	
16	H9000	Y_300x6	p_opt2	gray_s1_am2.5_trans0.5	1800	2040	3	
17	H9000	Y_300x6	p_opt2	gray_s1_am2.5_trans0.5	1800	2040	3	
18	H9000	Y_300x6	p_opt2	gray_s1_am2.5_trans0.5	1800	2040	3	

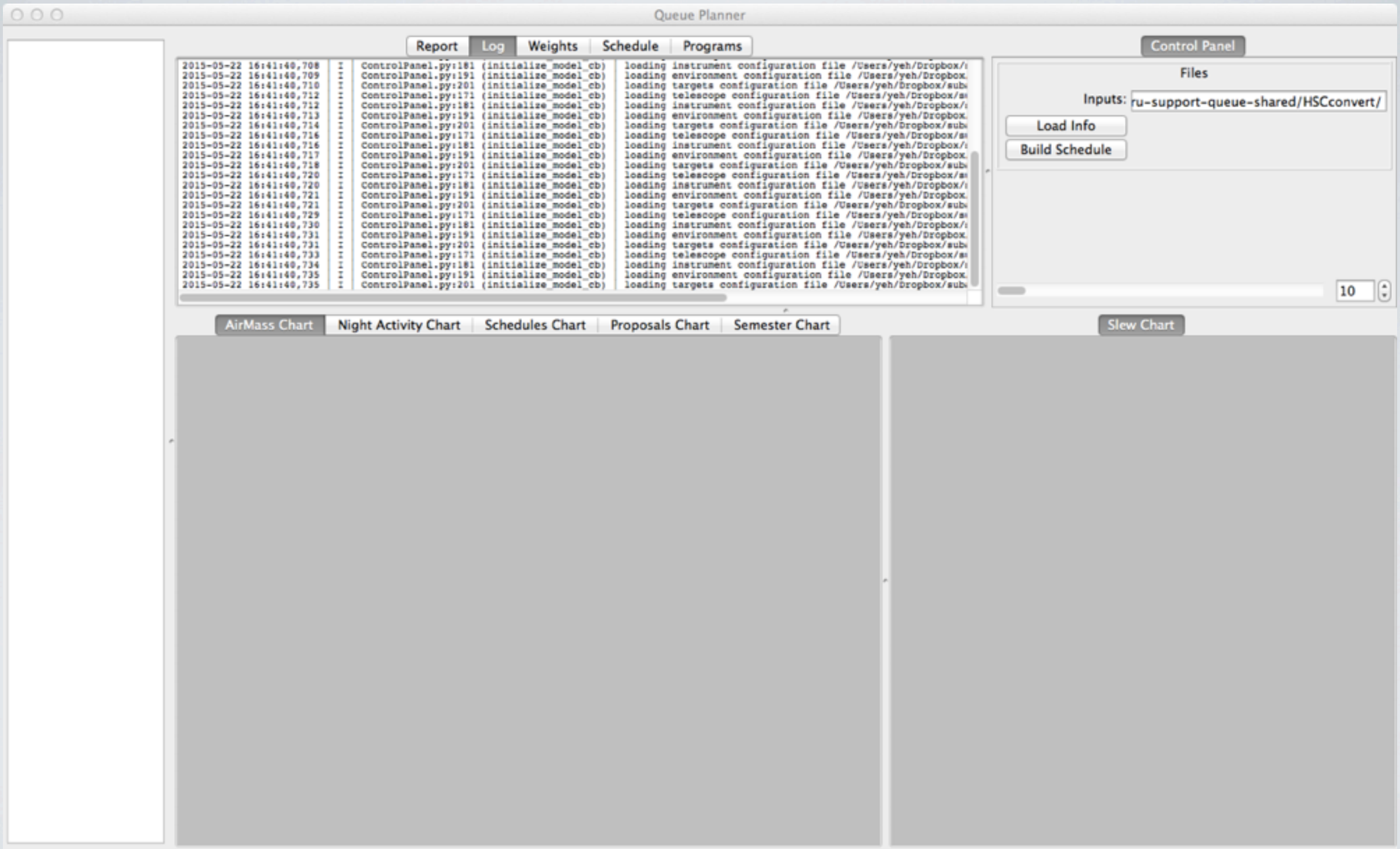
"codes" defined in
targets, envcfg, inscfg, telcfg

Customized OB codes
reported in qplan

OB priorities within one proposal
1 is highest

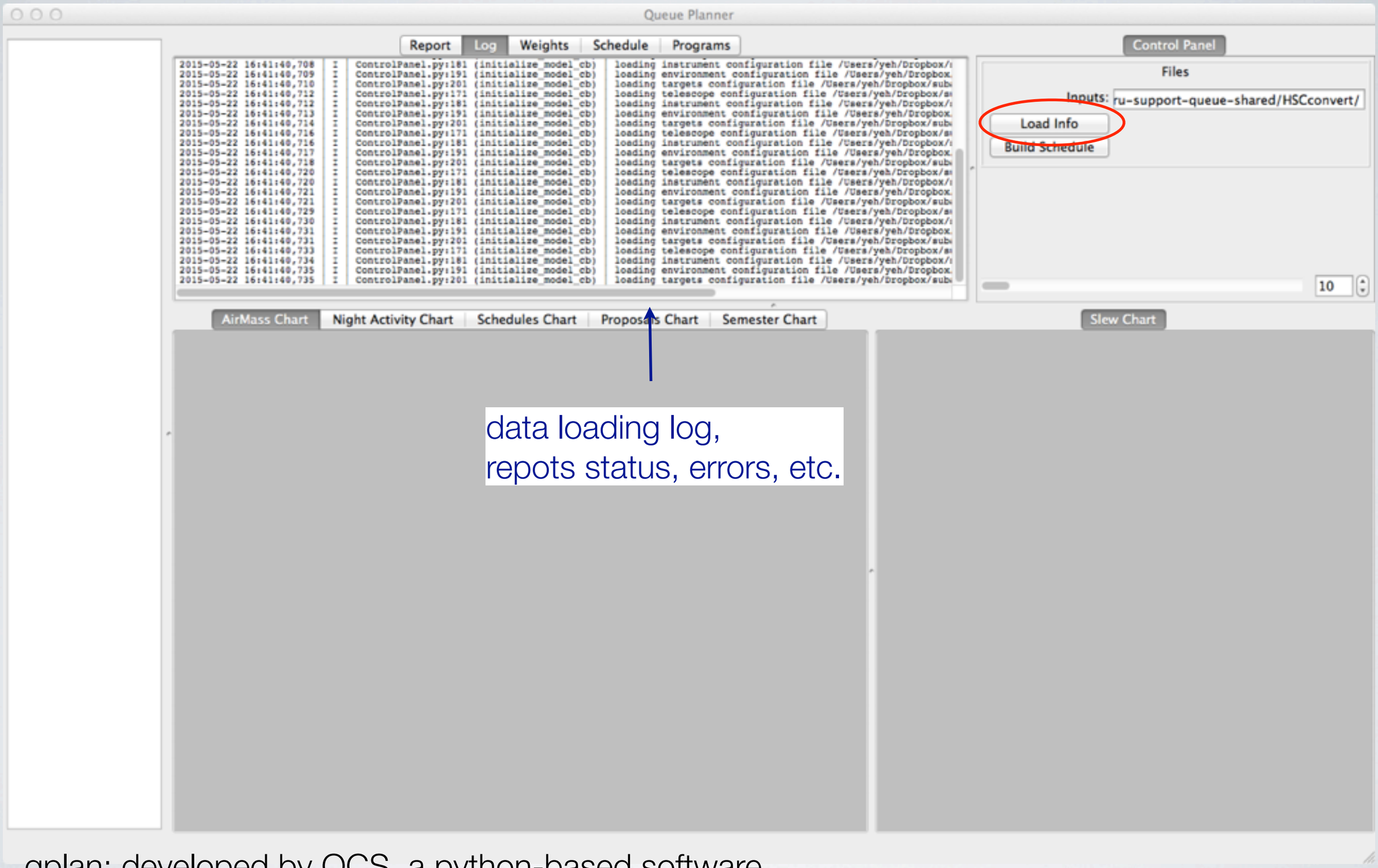
Note:
Priority 1 OBs are not always executed first

qplan input 1: load OB info



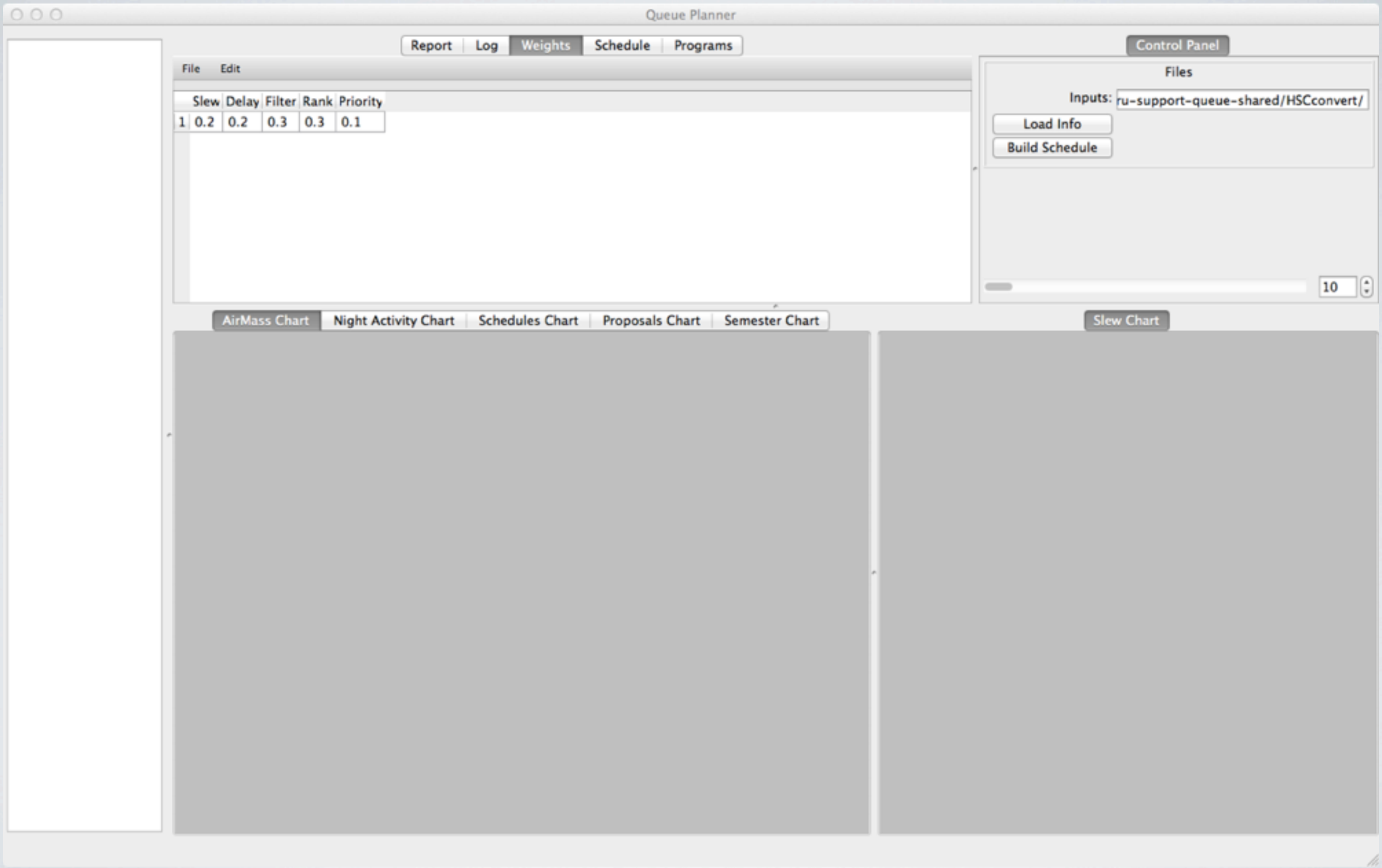
qplan: developed by OCS, a python-based software

qplan input 1: load OB info

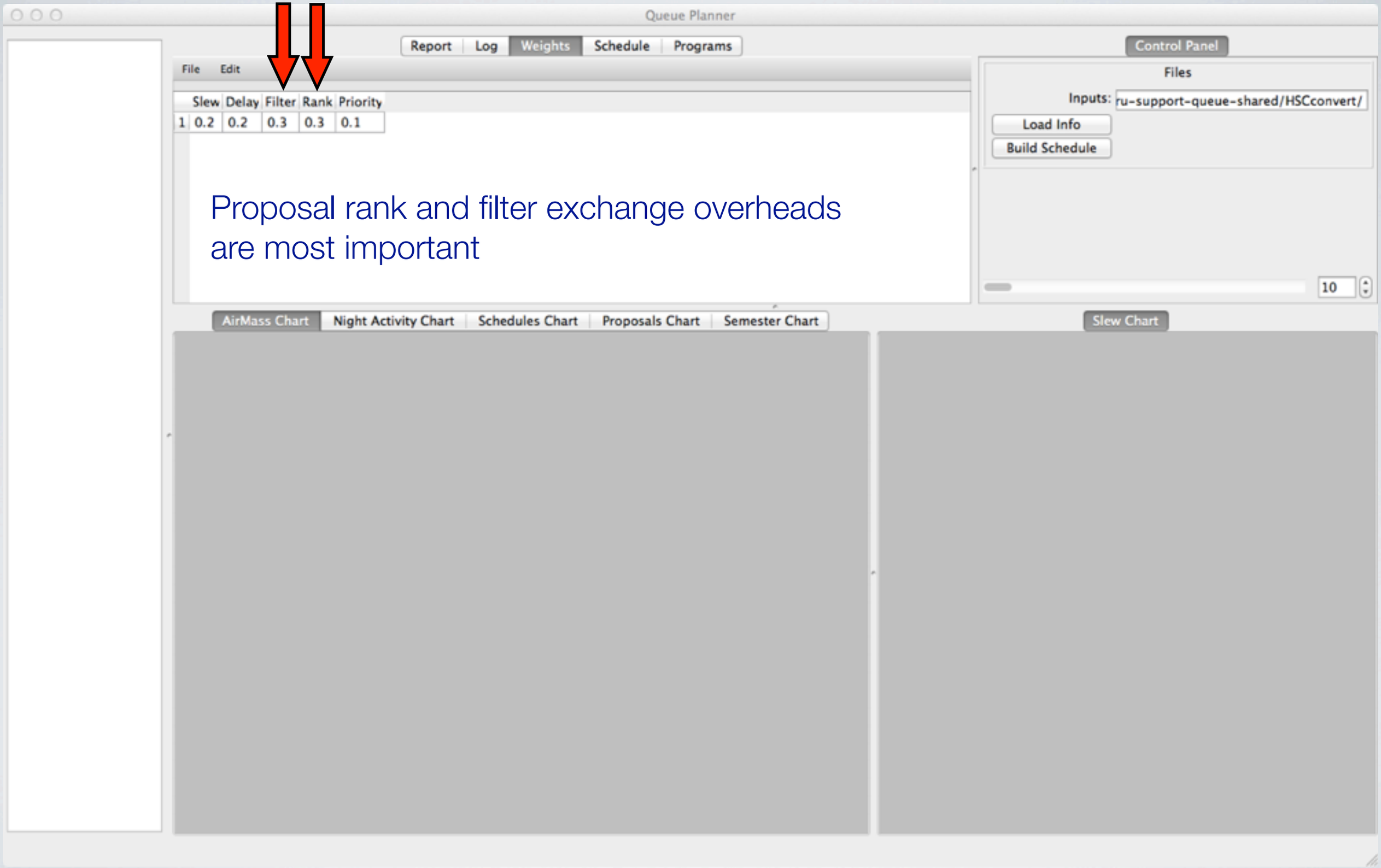


qplan: developed by OCS, a python-based software

qplan input 2: weights

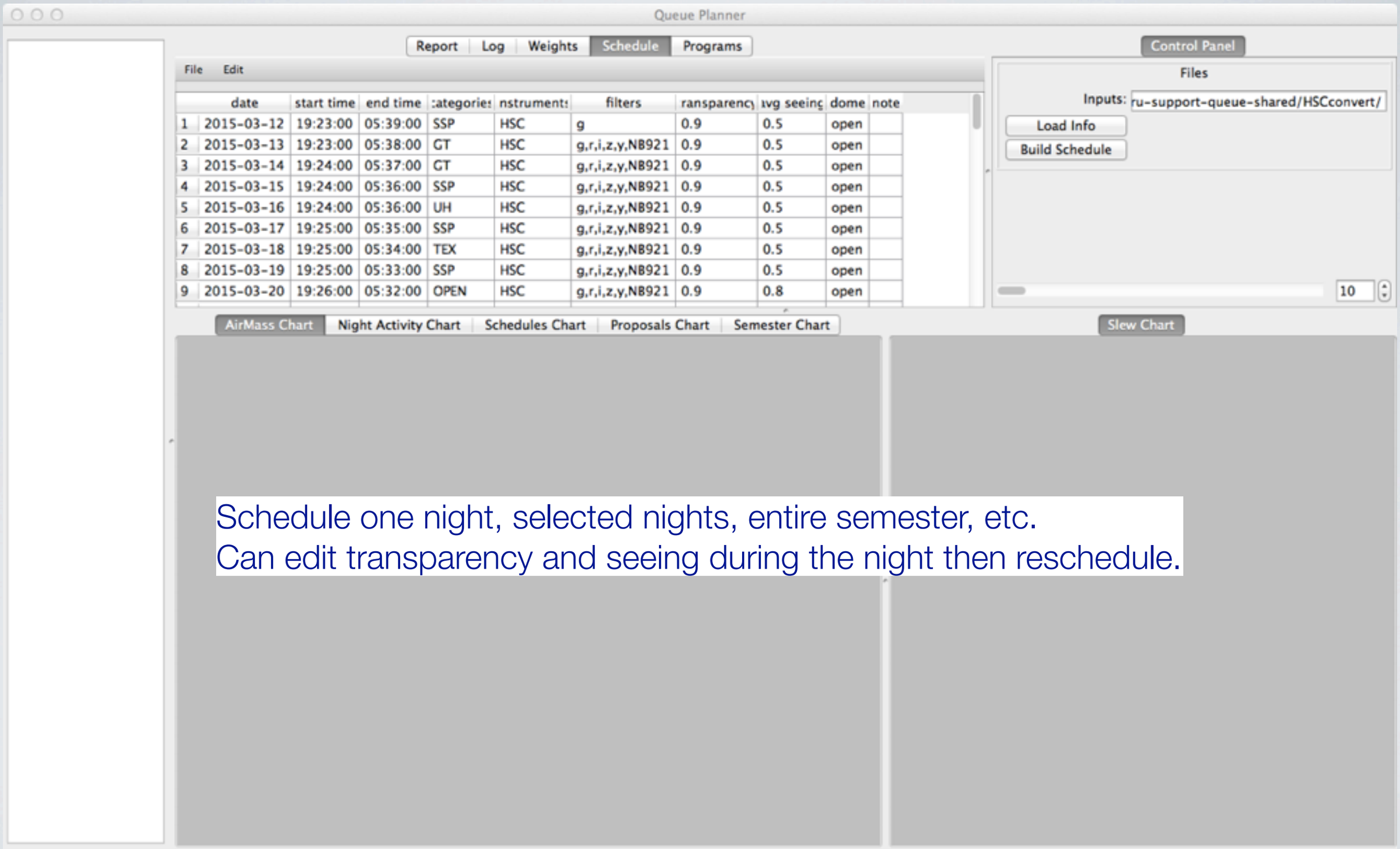


qplan input 2: weights



Proposal rank and filter exchange overheads are most important

qplan input 3: schedule



Schedule one night, selected nights, entire semester, etc.
Can edit transparency and seeing during the night then reschedule.

qplan input 3: schedule

Queue Planner

Report | Log | Weights | Schedule | Programs

File Edit

	date	start time	end time	:ategories	nstrument:	filters	ransparency	ıvg seeing	dome	note
1	2015-03-12	19:23:00	05:39:00	SSP	HSC	g	0.9	0.5	open	
2	2015-03-13	19:23:00	05:38:00	GT	HSC	g,r,i,z,y,NB921	0.9	0.5	open	
3	2015-03-14	19:24:00	05:37:00	GT	HSC	g,r,i,z,y,NB921	0.9	0.5	open	
4	2015-03-15	19:24:00	05:36:00	SSP	HSC	g,r,i,z,y,NB921	0.9	0.5	open	
5	2015-03-16	19:24:00	05:36:00	UH	HSC	g,r,i,z,y,NB921	0.9	0.5	open	
6	2015-03-17	19:25:00	05:35:00	SSP	HSC	g,r,i,z,y,NB921	0.9	0.5	open	
7	2015-03-18	19:25:00	05:34:00	TEX	HSC	g,r,i,z,y,NB921	0.9	0.5	open	
8	2015-03-19	19:25:00	05:33:00	SSP	HSC	g,r,i,z,y,NB921	0.9	0.5	open	
9	2015-03-20	19:26:00	05:32:00	OPEN	HSC	g,r,i,z,y,NB921	0.9	0.8	open	

Control Panel

Files

Inputs: ru-support-queue-shared/HSCconvert/

Load Info

Build Schedule

10

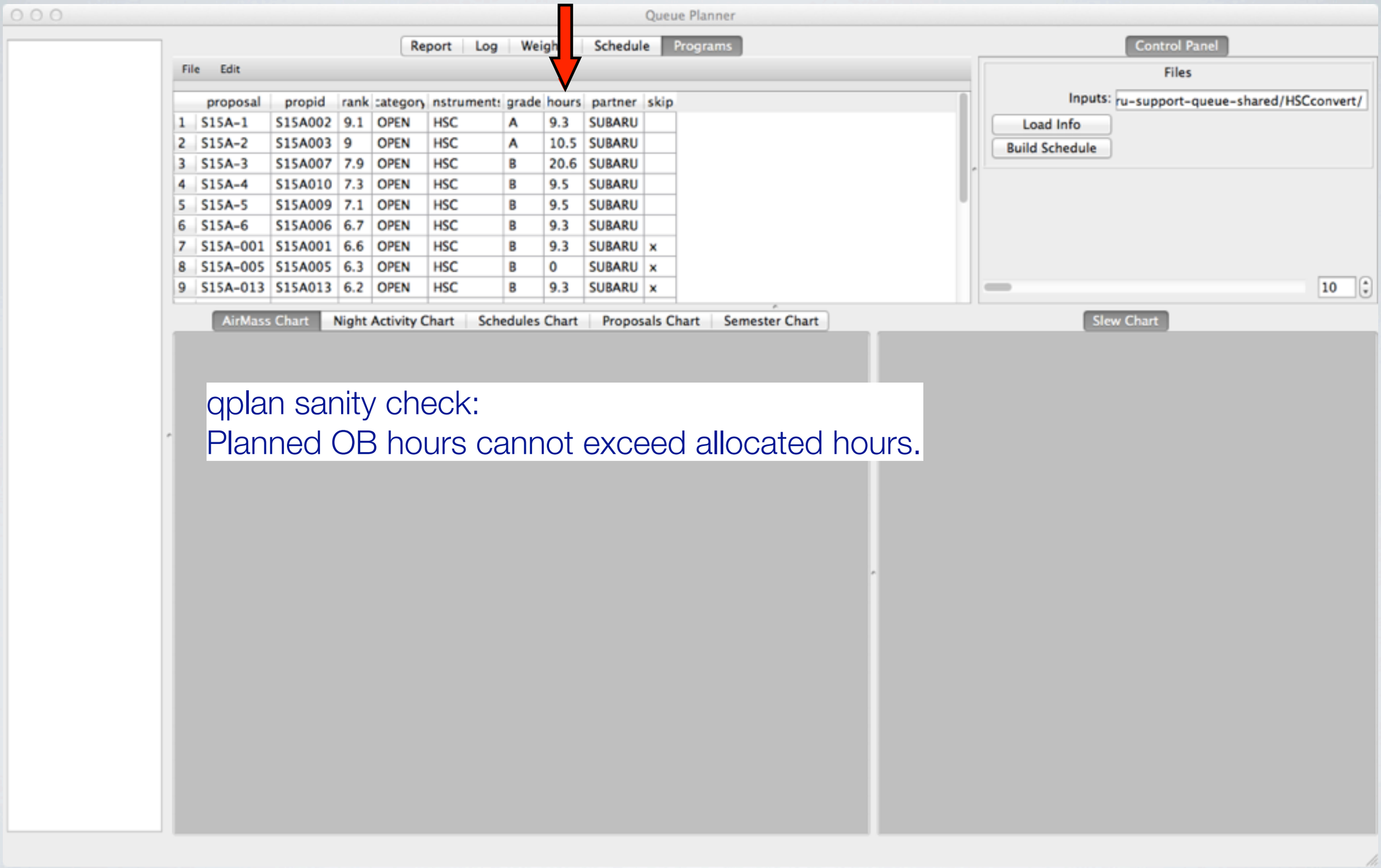
weather info

AirMass Chart | Night Activity Chart | Schedules Chart | Proposals Chart | Semester Chart

Slew Chart

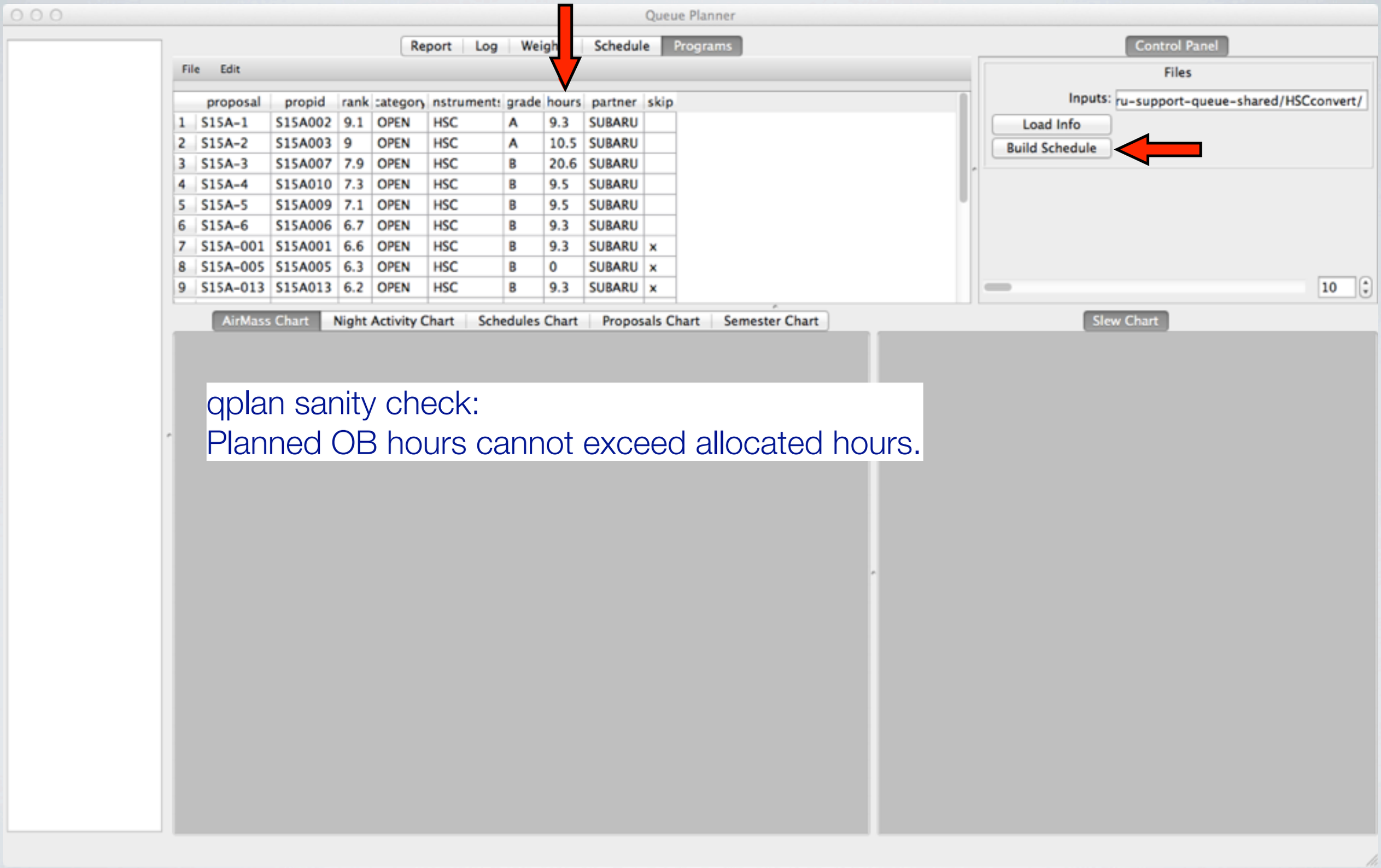
Schedule one night, selected nights, entire semester, etc.
Can edit transparency and seeing during the night then reschedule.

qplan input 4: programs



qplan sanity check:
Planned OB hours cannot exceed allocated hours.

qplan input 4: programs



qplan sanity check:
Planned OB hours cannot exceed allocated hours.

qplan output 1: schedule summary

Queue Planner

Schedule

- 2015-03-20 19:26
- 2015-03-22 19:26
- 2015-03-23 19:26
- 2015-05-13 19:49
- 2015-05-15 19:50
- 2015-05-19 19:52
- 2015-05-21 19:54
- 2015-05-23 19:55
- 2015-05-26 19:56

Scheduled nights

Report | Log | Weights | Schedule | Programs

```
  File "/Users/yeh/queuesim/plugins/AirMassChart.py", line 142, in new_schedule_cb
    self.add_schedule(schedule)

  File "/Users/yeh/queuesim/plugins/AirMassChart.py", line 134, in add_schedule
    min_len = min(*lengths)

2015-05-29 14:08:01,386 | I | Model.py:513 (schedule_all) | 86 unscheduled OBs left
2015-05-29 14:08:01,387 | I | Model.py:516 (schedule_all) | 11.74 sec to schedule all
2015-05-29 14:08:01,389 | I | Model.py:568 (schedule_all) | 61.95 % of OBs scheduled
Completed programs
S15A-1          9.10  16/16  100%
S15A-2          9.00  16/16  100%
S15A-3          7.90  20/20  100%

Uncompleted programs
S15A-4          7.30  9/10  90.00%  [7]
S15A-5          7.10  10/12  83.33%  [1, 2]
S15A-6          6.70  46/76  60.53%  [14, 15, 16, 17, 31, 32, 33, 34, 35, 36, 37, 38, 55, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 7
S15A-7          5.80  8/16  50.00%  [9, 10, 11, 12, 13, 14, 15, 16]
S15A-8          5.70  15/60  25.00%  [1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26

Total time: avail= 4996.00 sched= 3713.90 unsched= 1282.10 min
```

Control Panel

Files

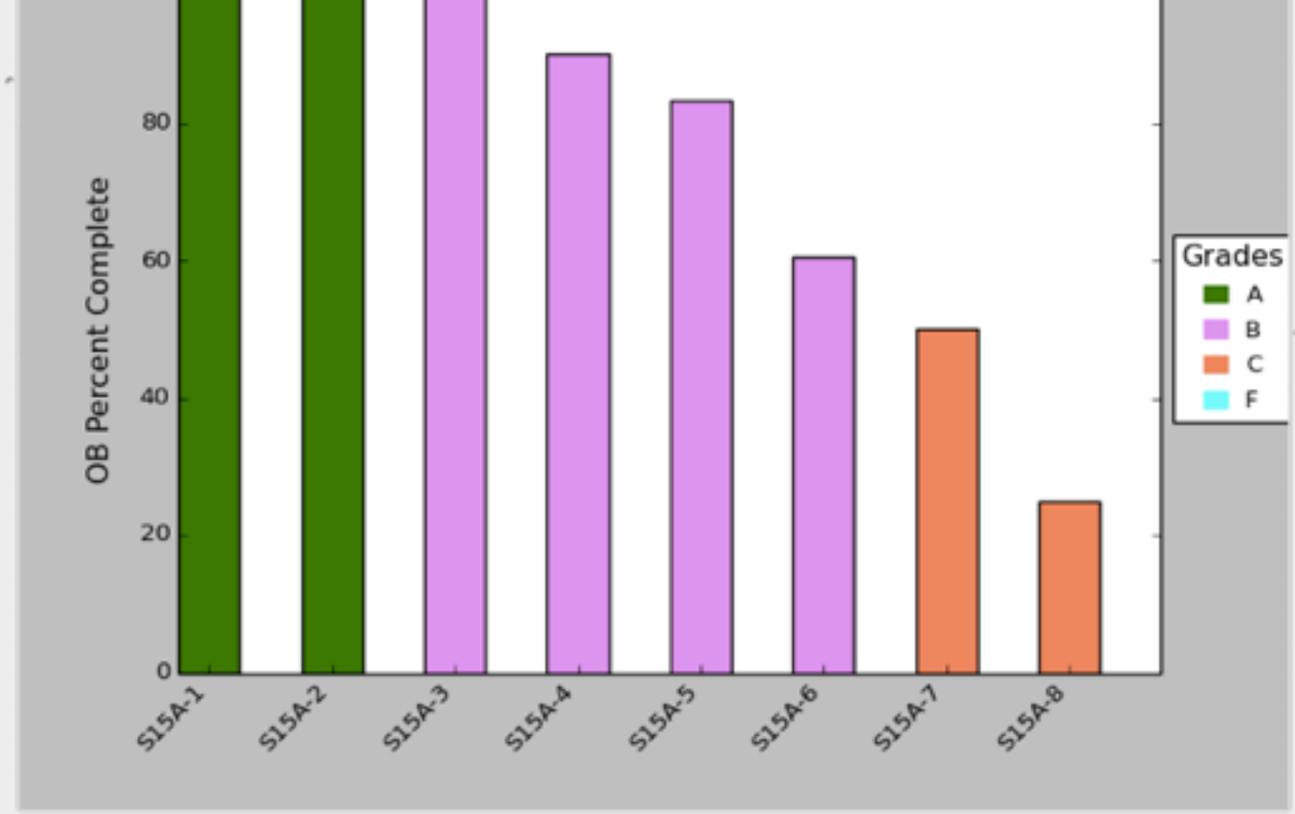
Inputs: .

Load Info

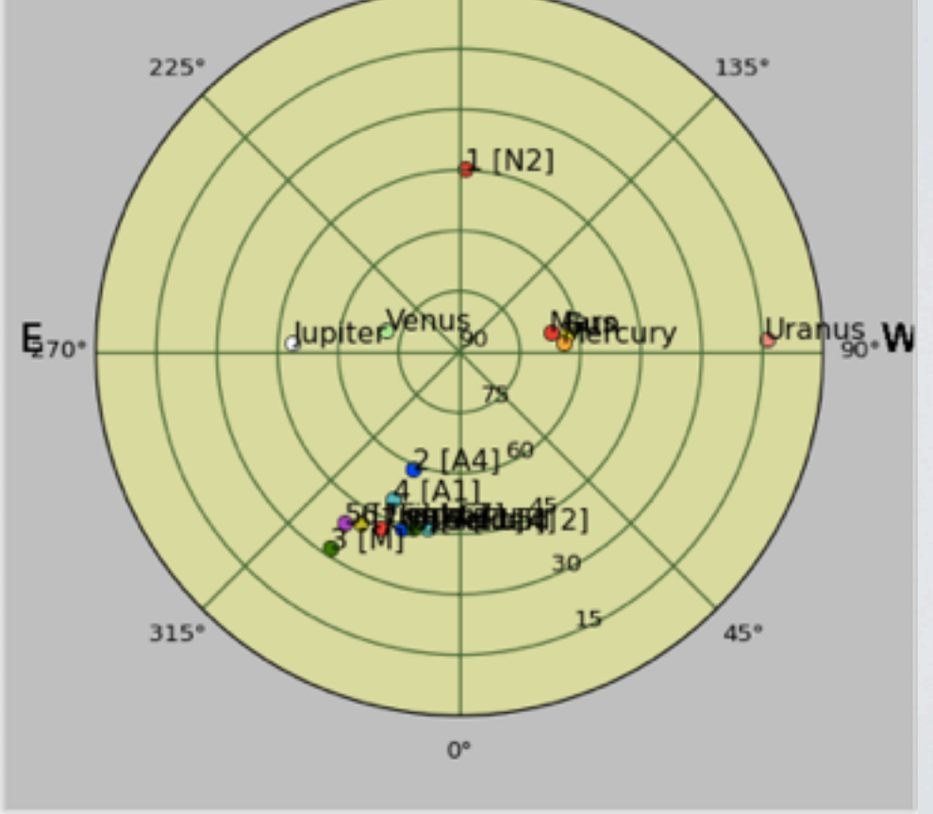
Build Schedule

10

AirMass Chart | Night Activity Chart | Schedules Chart | Proposals Chart | Semester Chart



Slew Chart



qplan output 1: schedule summary

Queue Planner

Schedule
- 2015-03-20 19:26
- 2015-03-22 19:26
- 2015-03-23 19:26
- 2015-05-13 19:49
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Uncompleted programs
S15A-4          7.30  9/10  90.00%  [7]
S15A-5          7.10  10/12  83.33%  [1, 2]
S15A-6          6.70  46/76  60.53%  [44, 45, 16, 17, 31, 32, 33, 34, 35, 36, 37, 38, 55, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 7
S15A-7          5.80  8/16  50.00%  [9, 10, 11, 12, 13, 14, 15, 16]
S15A-8          5.70  15/60  25.00%  [1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26

Total time: avail= 4996.00 sched= 3713.90 unsched= 1282.10 min
```

unexecuted OB codes

Control Panel

Files

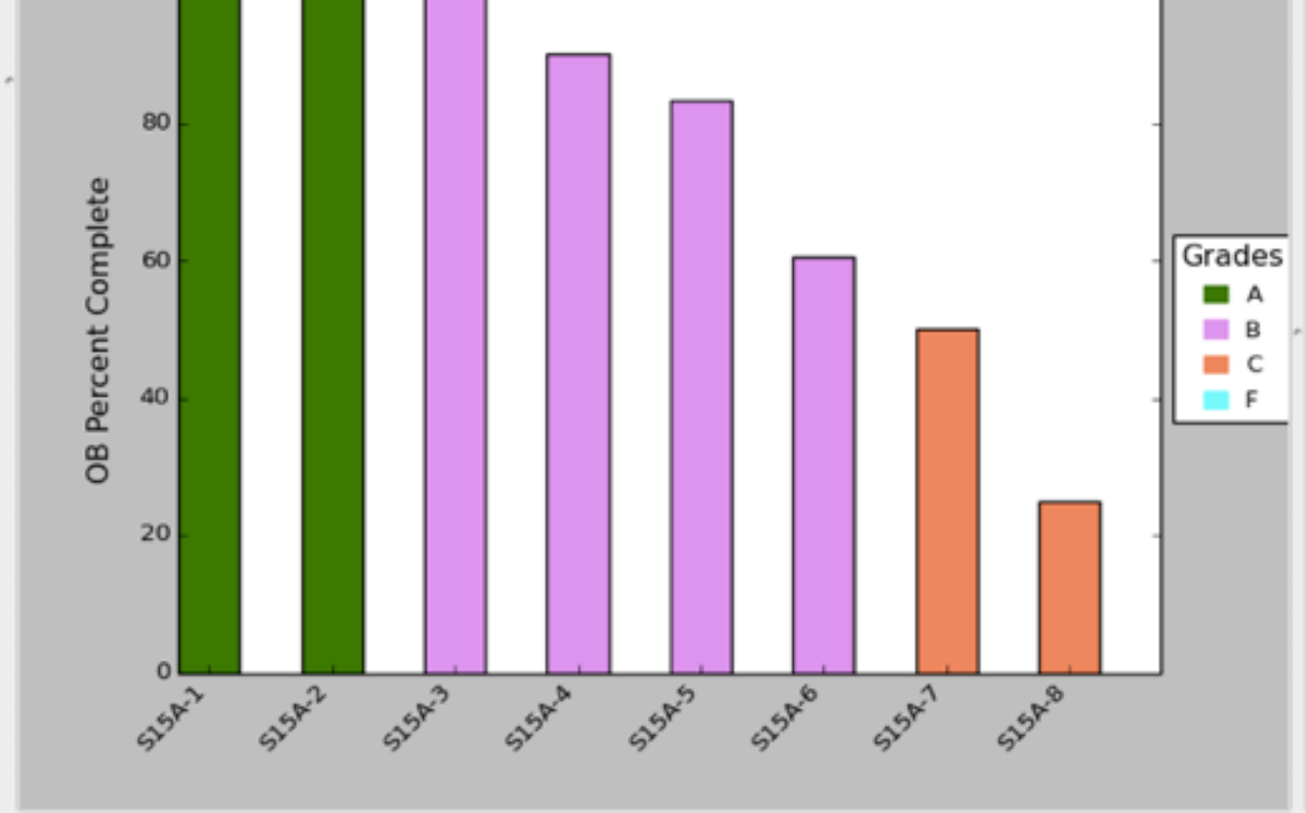
Inputs: .

Load Info

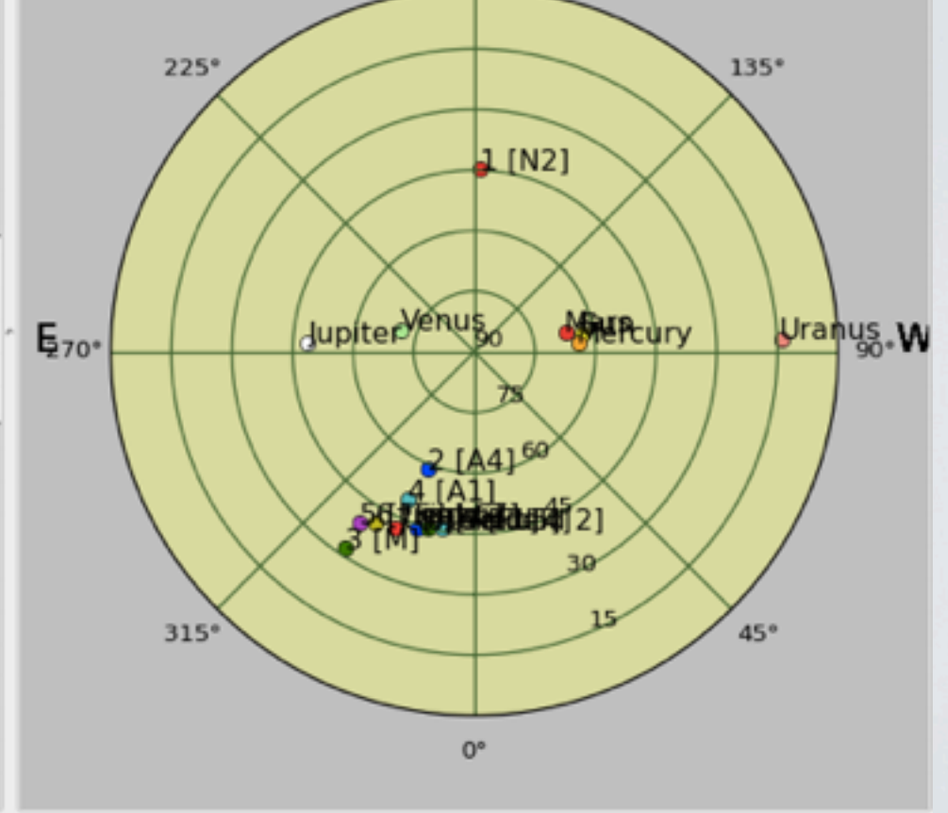
Build Schedule

10

AirMass Chart | Night Activity Chart | Schedules Chart | Proposals Chart | Semester Chart



Slew Chart



qplan output 2: nightly report

3/22 schedule

Queue Planner

Schedule

2015-03-20 19:26
2015-03-22 19:26
2015-03-23 19:26
2015-05-13 19:49
2015-05-15 19:50
2015-05-19 19:52
2015-05-21 19:54
2015-05-23 19:55
2015-05-26 19:56

Report | Log | Weights | Schedule | Programs

```
--- NIGHT OF 2015-03-22 --- filters: g, r, i, z, y, nb921
Queue prepared at: 2015-05-29 14:07:55
Date                ObsBlk  Code            Program   Rank    Time Target     Filter   AM  Comment
2015-03-22 19:26   ob0233  ob0233           S15A-2   9.00    3.13 N2         None    1.9  Long slew for ob0018
2015-03-22 19:29   ob0234  ob0234           S15A-2   9.00   35.00 N2         i       1.9  Filter change for ob0
2015-03-22 20:04   ob0018  2                S15A-2   9.00   25.42 N2         i       1.9
2015-03-22 20:29   ob0235  ob0235           S15A-4   7.30    6.64 A4         i       1.4  Long slew for ob0053
2015-03-22 20:36   ob0053  1                S15A-4   7.30   39.08 A4         i       1.4
2015-03-22 21:15   ob0236  ob0236           S15A-2   9.00    1.78 M          i       1.9  Long slew for ob0017
2015-03-22 21:17   ob0237  ob0237           S15A-2   9.00  144.09 M          i       1.9  Delay for ob0017 visi
2015-03-22 23:41   ob0017  1                S15A-2   9.00   25.42 M          i       1.9
2015-03-23 00:06   ob0054  2                S15A-4   7.30   39.08 A1         i       1.4
2015-03-23 00:45   ob0238  ob0238           S15A-1   9.10    1.58 Field 6    i       1.6  Long slew for ob0006
2015-03-23 00:47   ob0239  ob0239           S15A-1   9.10  128.41 Field 6    i       1.6  Delay for ob0006 visi
2015-03-23 02:55   ob0006  6                S15A-1   9.10   18.50 Field 6    i       1.6
2015-03-23 03:14   ob0007  7                S15A-1   9.10   18.50 Field 7    i       1.6
2015-03-23 03:32   ob0001  1                S15A-1   9.10   18.50 Field 1    i       1.6
2015-03-23 03:51   ob0005  5                S15A-1   9.10   18.50 Field 5    i       1.6
2015-03-23 04:09   ob0004  4                S15A-1   9.10   18.50 Field 4    i       1.6
```

Control Panel

Files

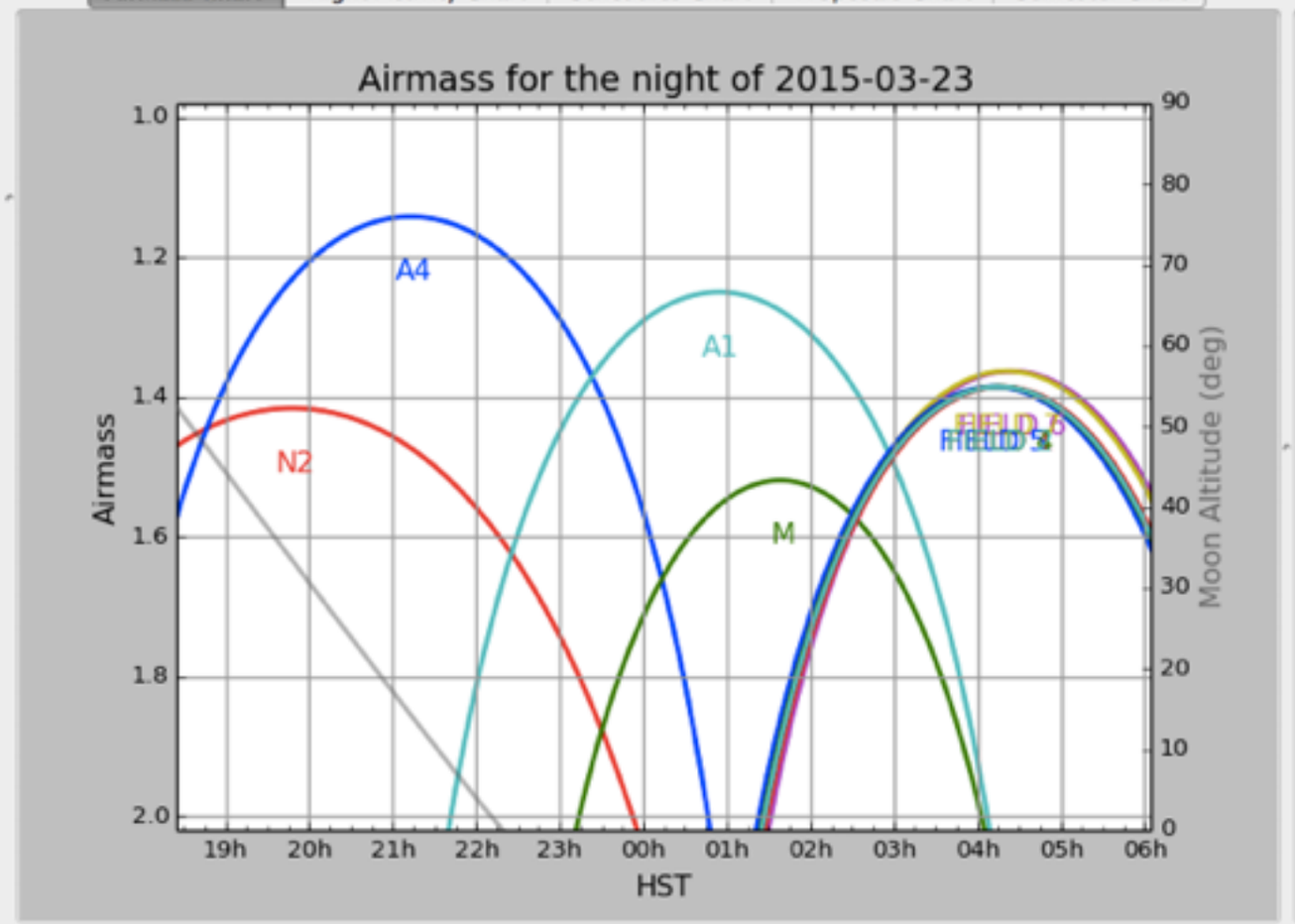
Inputs: .

Load Info

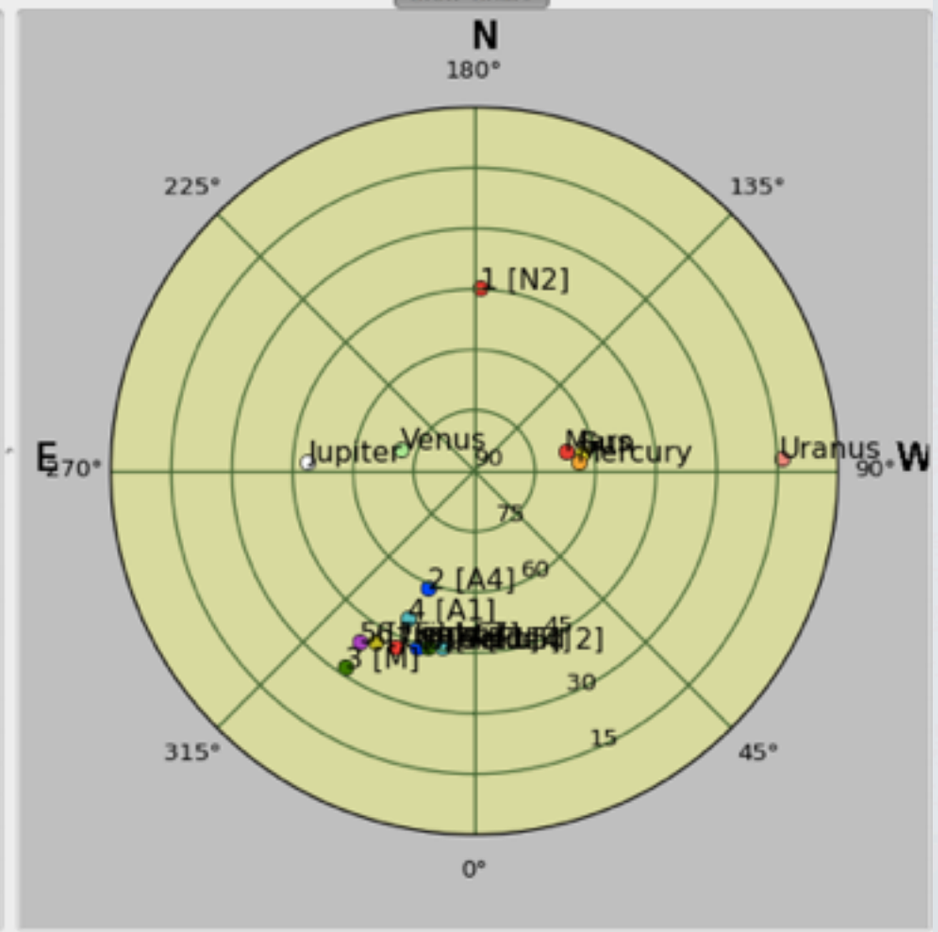
Build Schedule

10

AirMass Chart | Night Activity Chart | Schedules Chart | Proposals Chart | Semester Chart



Slew Chart



qplan output 2: nightly report

3/22 schedule

Queue Planner

Schedule
2015-03-20 19:26
2015-03-22 19:26
2015-03-23 19:26
2015-05-13 19:49
2015-05-15 19:50
2015-05-19 19:52
2015-05-21 19:54
2015-05-23 19:55
2015-05-26 19:56

Report | Log | Weights | Schedule | Programs

```
--- NIGHT OF 2015-03-22 --- filters: g, r, i, z, y, nb921
Queue prepared at: 2015-05-29 14:07:55
Date                ObsBlk  Code            Program   Rank    Time Target     Filter   AM  Comment
2015-03-22 19:26   ob0233  ob0233           S15A-2    9.00    3.13 N2         None    1.9  Long slew for ob0018
2015-03-22 19:29   ob0234  ob0234           S15A-2    9.00   35.00 N2         i       1.9  Filter change for ob0
2015-03-22 20:04   ob0018  2                S15A-2    9.00   25.42 N2         i       1.9
2015-03-22 20:29   ob0235  ob0235           S15A-4    7.30    6.64 A4         i       1.4  Long slew for ob0053
2015-03-22 20:36   ob0053  1                S15A-4    7.30   39.08 A4         i       1.4
2015-03-22 21:15   ob0236  ob0236           S15A-2    9.00    1.78 M          i       1.9  Long slew for ob0017
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2015-03-23 03:14   ob0007  7                S15A-1    9.10   18.50 Field 7    i       1.6
2015-03-23 03:32   ob0001  1                S15A-1    9.10   18.50 Field 1    i       1.6
2015-03-23 03:51   ob0005  5                S15A-1    9.10   18.50 Field 5    i       1.6
2015-03-23 04:09   ob0004  4                S15A-1    9.10   18.50 Field 4    i       1.6
```

Control Panel

Files

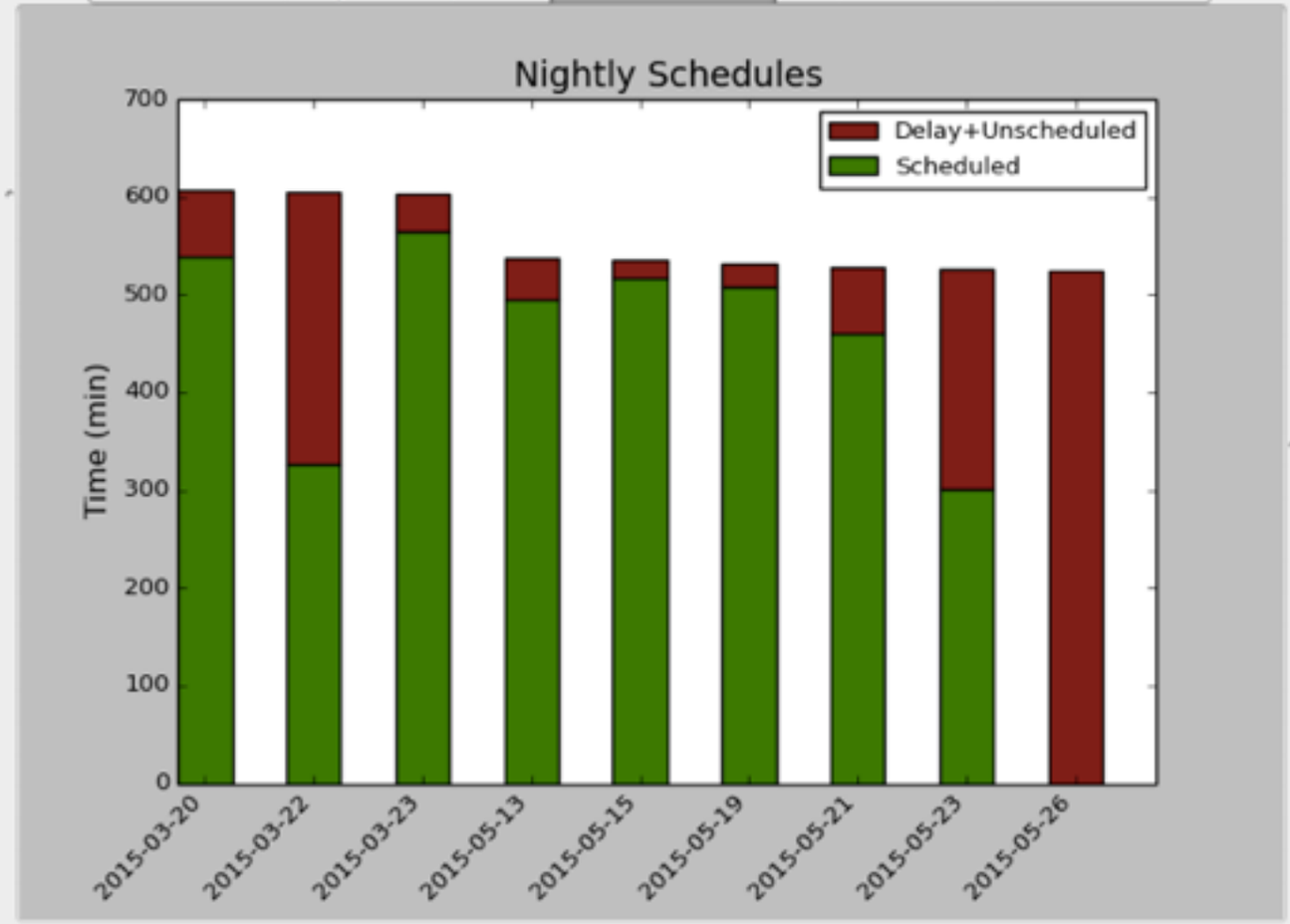
Inputs: .

Load Info

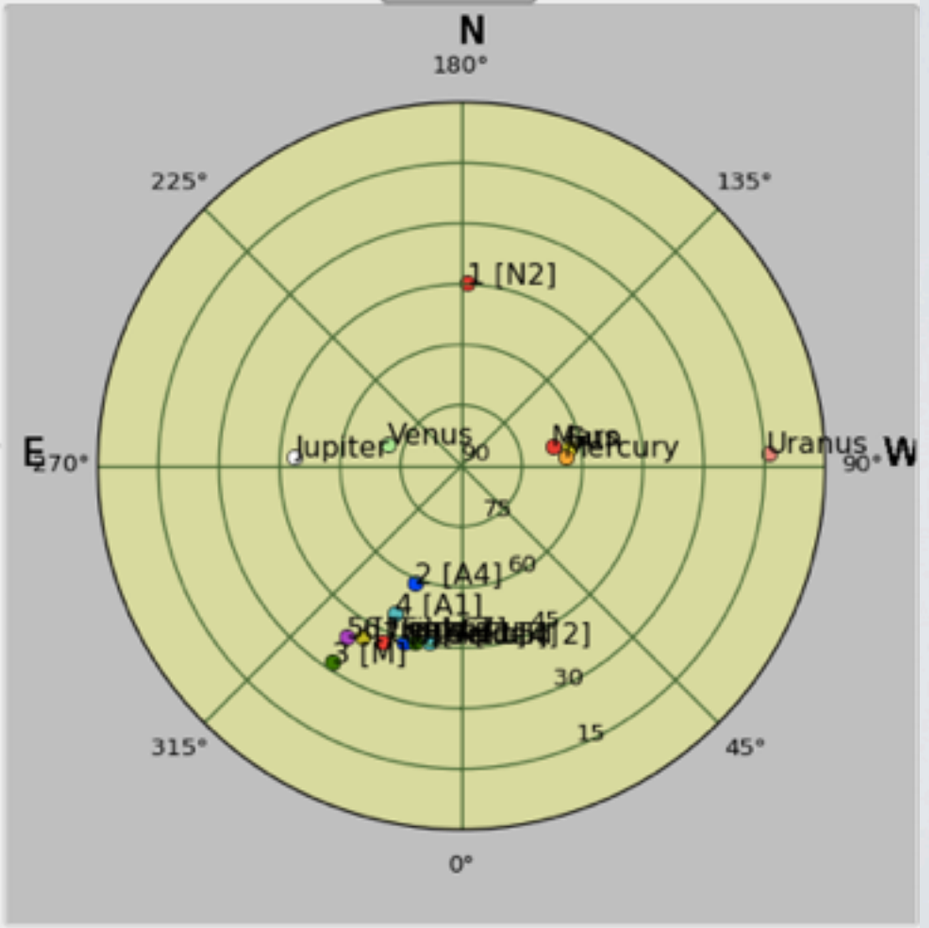
Build Schedule

10

AirMass Chart | Night Activity Chart | Schedules Chart | Proposals Chart | Semester Chart



Slew Chart



qplan output 3: nightly activity

Queue Planner

Schedule

2015-03-20 19:26
2015-03-22 19:26
2015-03-23 19:26
2015-05-13 19:49
2015-05-15 19:50
2015-05-19 19:52
2015-05-21 19:54
2015-05-23 19:55
2015-05-26 19:56

Report | Log | Weights | Schedule | Programs

```
--- NIGHT OF 2015-03-22 --- filters: g, r, i, z, y, nb921
Queue prepared at: 2015-05-29 14:07:55
Date                ObsBlk  Code            Program   Rank    Time Target     Filter   AM  Comment
2015-03-22 19:26   ob0233  ob0233           S15A-2    9.00    3.13 N2         None    1.9  Long slew for ob0018
2015-03-22 19:29   ob0234  ob0234           S15A-2    9.00   35.00 N2         i       1.9  Filter change for ob0
2015-03-22 20:04   ob0018  2                S15A-2    9.00   25.42 N2         i       1.9
2015-03-22 20:29   ob0235  ob0235           S15A-4    7.30    6.64 A4         i       1.4  Long slew for ob0053
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2015-03-22 21:15   ob0236  ob0236           S15A-2    9.00    1.78 M          i       1.9  Long slew for ob0017
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2015-03-23 00:06   ob0054  2                S15A-4    7.30   39.08 A1         i       1.4
2015-03-23 00:45   ob0238  ob0238           S15A-1    9.10    1.58 Field 6    i       1.6  Long slew for ob0006
2015-03-23 00:47   ob0239  ob0239           S15A-1    9.10  128.41 Field 6    i       1.6  Delay for ob0006 visi
2015-03-23 02:55   ob0006  6                S15A-1    9.10   18.50 Field 6    i       1.6
2015-03-23 03:14   ob0007  7                S15A-1    9.10   18.50 Field 7    i       1.6
2015-03-23 03:32   ob0001  1                S15A-1    9.10   18.50 Field 1    i       1.6
2015-03-23 03:51   ob0005  5                S15A-1    9.10   18.50 Field 5    i       1.6
2015-03-23 04:09   ob0004  4                S15A-1    9.10   18.50 Field 4    i       1.6
```

Control Panel

Files

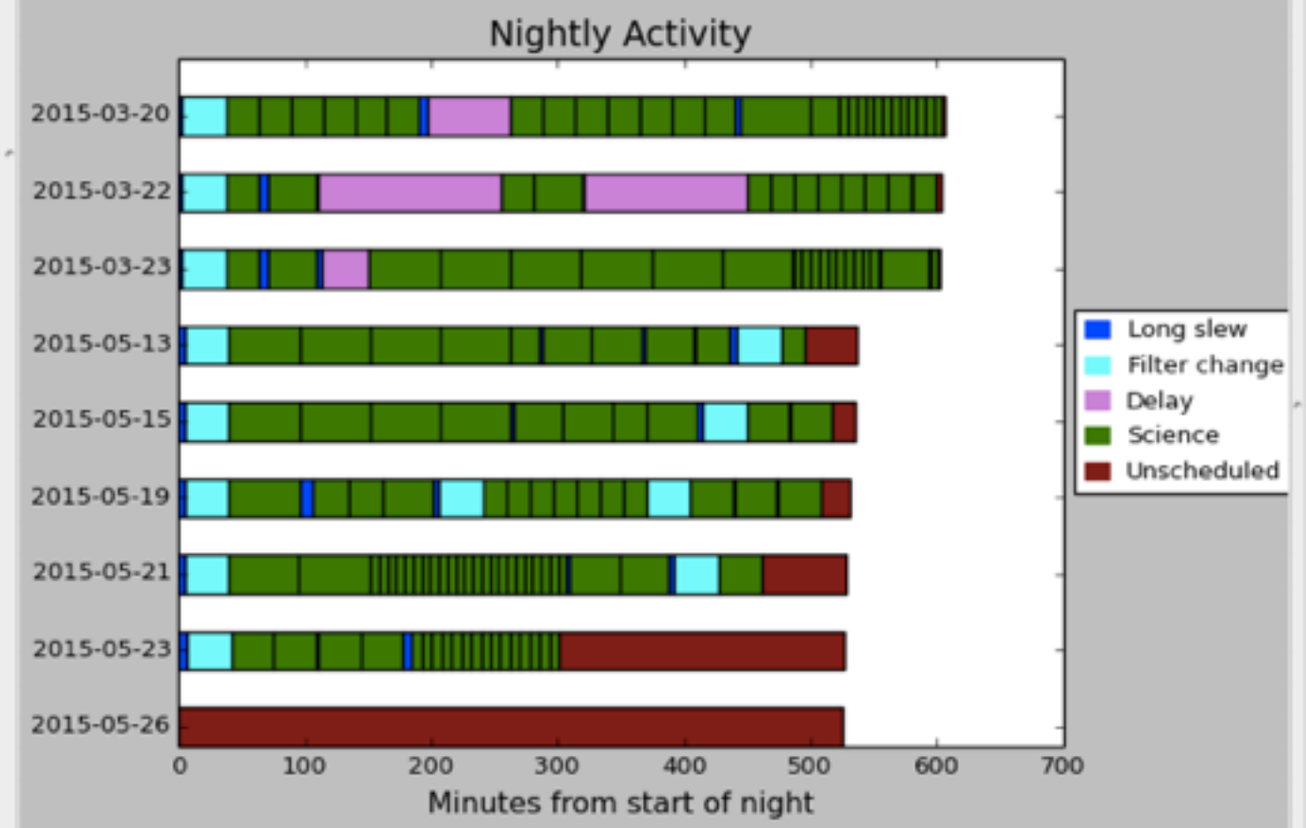
Inputs: .

Load Info

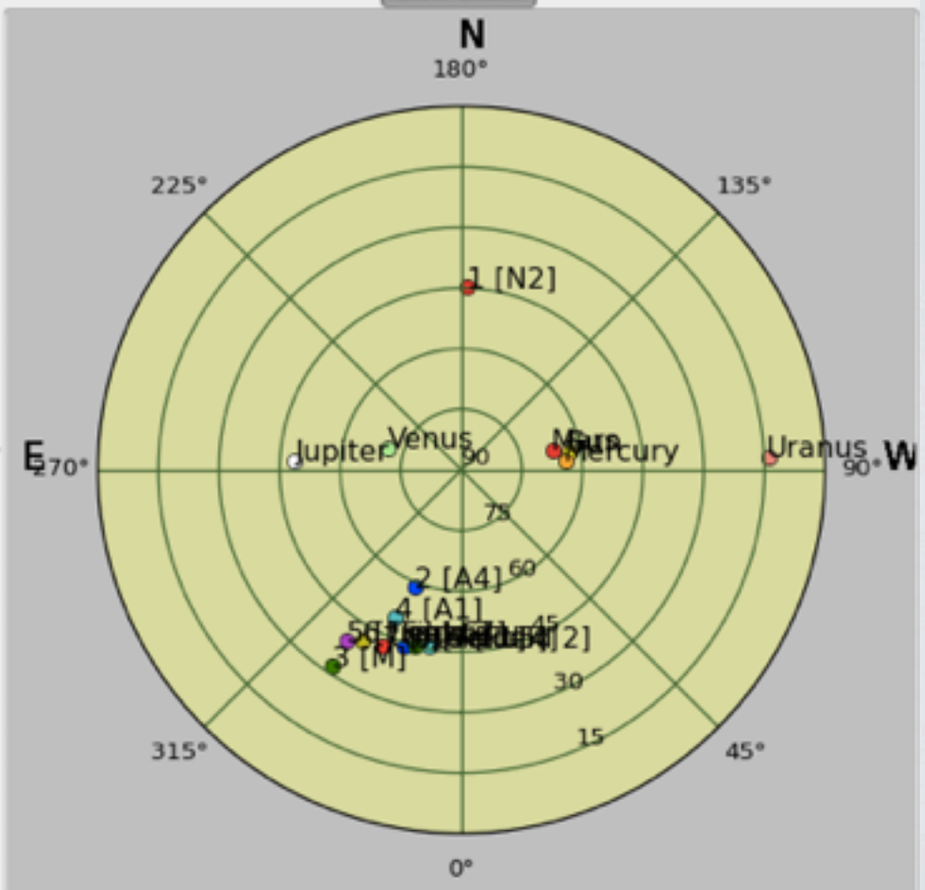
Build Schedule

10

AirMass Chart | Night Activity Chart | Schedules Chart | Proposals Chart | Semester Chart



Slew Chart



qplan output 4: semester chart

Queue Planner

Schedule

2015-03-20 19:26
2015-03-22 19:26
2015-03-23 19:26
2015-05-13 19:49
2015-05-15 19:50
2015-05-19 19:52
2015-05-21 19:54
2015-05-23 19:55
2015-05-26 19:56

Report | Log | Weights | Schedule | Programs

```
--- NIGHT OF 2015-03-22 --- filters: g, r, i, z, y, nb921
Queue prepared at: 2015-05-29 14:07:55
Date                ObsBlk  Code            Program   Rank    Time Target     Filter   AM  Comment
2015-03-22 19:26   ob0233  ob0233           S15A-2    9.00    3.13 N2         None     1.9  Long slew for ob0018
2015-03-22 19:29   ob0234  ob0234           S15A-2    9.00   35.00 N2         i        1.9  Filter change for ob0
2015-03-22 20:04   ob0018  2                S15A-2    9.00   25.42 N2         i        1.9
2015-03-22 20:29   ob0235  ob0235           S15A-4    7.30    6.64 A4         i        1.4  Long slew for ob0053
2015-03-22 20:36   ob0053  1                S15A-4    7.30   39.08 A4         i        1.4
2015-03-22 21:15   ob0236  ob0236           S15A-2    9.00    1.78 M          i        1.9  Long slew for ob0017
2015-03-22 21:17   ob0237  ob0237           S15A-2    9.00  144.09 M          i        1.9  Delay for ob0017 visi
2015-03-22 23:41   ob0017  1                S15A-2    9.00   25.42 M          i        1.9
2015-03-23 00:06   ob0054  2                S15A-4    7.30   39.08 A1         i        1.4
2015-03-23 00:45   ob0238  ob0238           S15A-1    9.10    1.58 Field 6    i        1.6  Long slew for ob0006
2015-03-23 00:47   ob0239  ob0239           S15A-1    9.10  128.41 Field 6    i        1.6  Delay for ob0006 visi
2015-03-23 02:55   ob0006  6                S15A-1    9.10   18.50 Field 6    i        1.6
2015-03-23 03:14   ob0007  7                S15A-1    9.10   18.50 Field 7    i        1.6
2015-03-23 03:32   ob0001  1                S15A-1    9.10   18.50 Field 1    i        1.6
2015-03-23 03:51   ob0005  5                S15A-1    9.10   18.50 Field 5    i        1.6
2015-03-23 04:09   ob0004  4                S15A-1    9.10   18.50 Field 4    i        1.6
```

Control Panel

Files

Inputs: .

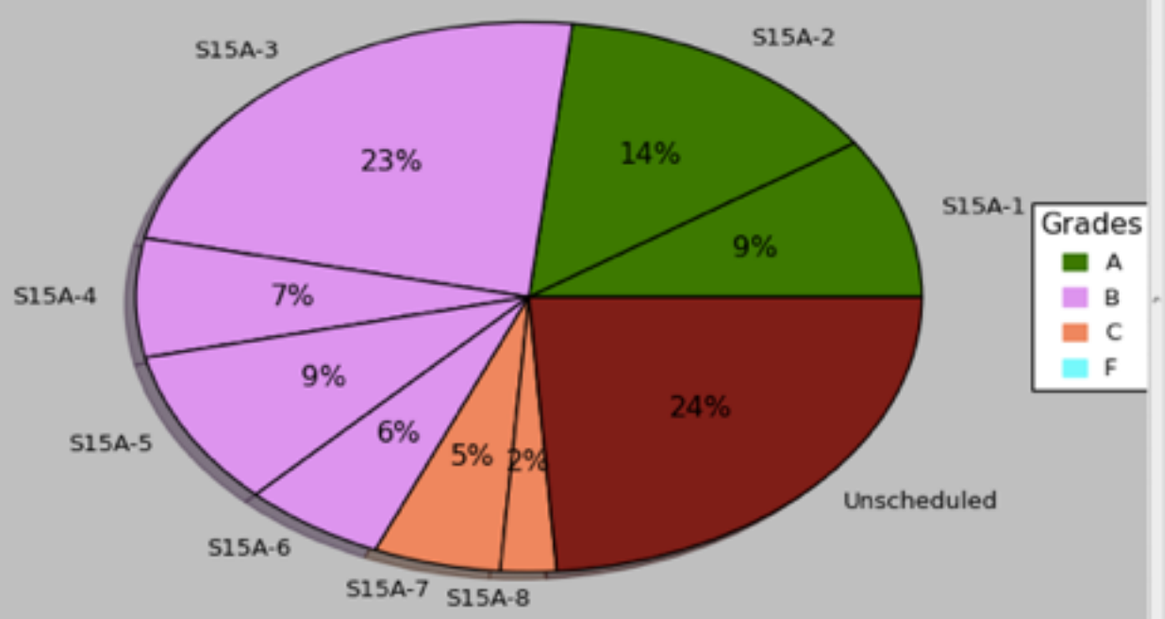
Load Info

Build Schedule

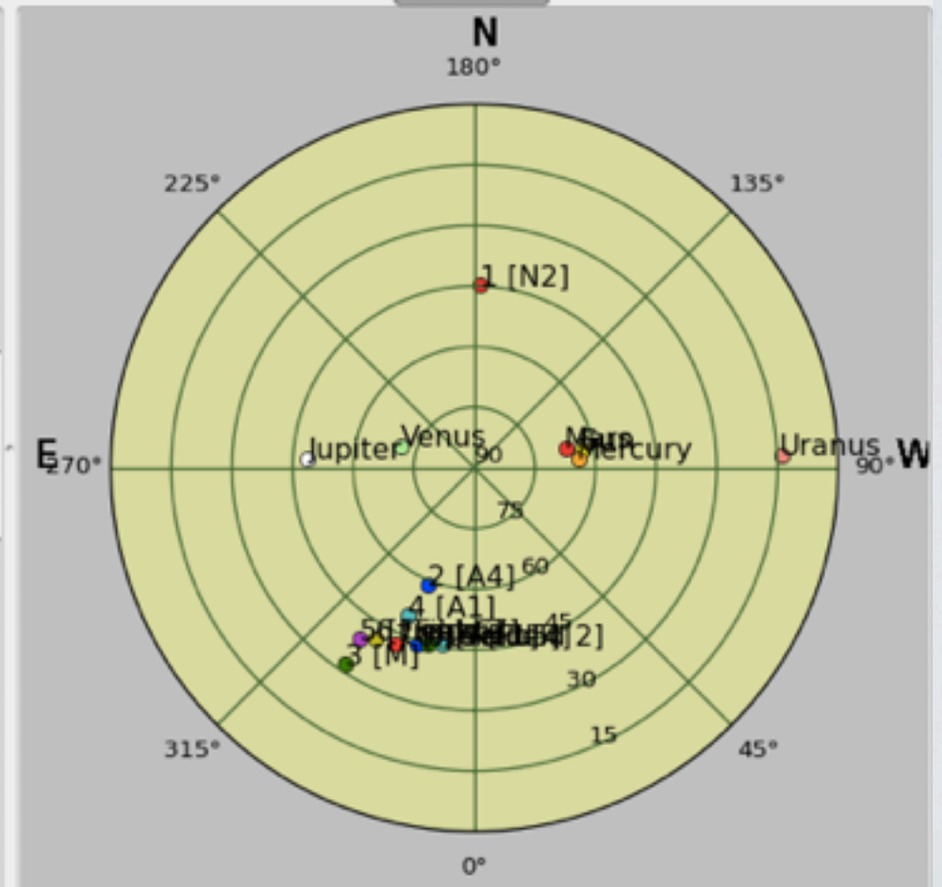
10

AirMass Chart | Night Activity Chart | Schedules Chart | Proposals Chart | Semester Chart

Total for Semester S15A = 83 Hours



Slew Chart



Questions?

Weights in `qplan`

- Slew, Delay, Filter, Rank, Priority
- The higher the number, the more important such weight is considered in the scheduling algorithm
- The higher the number, the more severe the “penalty” is, i.e. makes OBs “heavier”, less likely to be scheduled in `qplan`
- *Except “Rank”*; higher ref. score means better proposal; qplan considers the inverse value of ref. score to make high-rank OBs “lighter”, more likely to be scheduled

Weights: Slew

Queue Planner

Schedule
2015-03-20 19:26
2015-03-22 19:26
2015-03-23 19:26
2015-05-13 19:49
2015-05-15 19:50
2015-05-19 19:52
2015-05-21 19:54
2015-05-23 19:55
2015-05-26 19:56

Report | Log | Weights | Schedule | Programs

File Edit

	Slew	Delay	Filter	Rank	Priority
1	1.0	0.0	0.0	0.0	0.0

Control Panel

Files

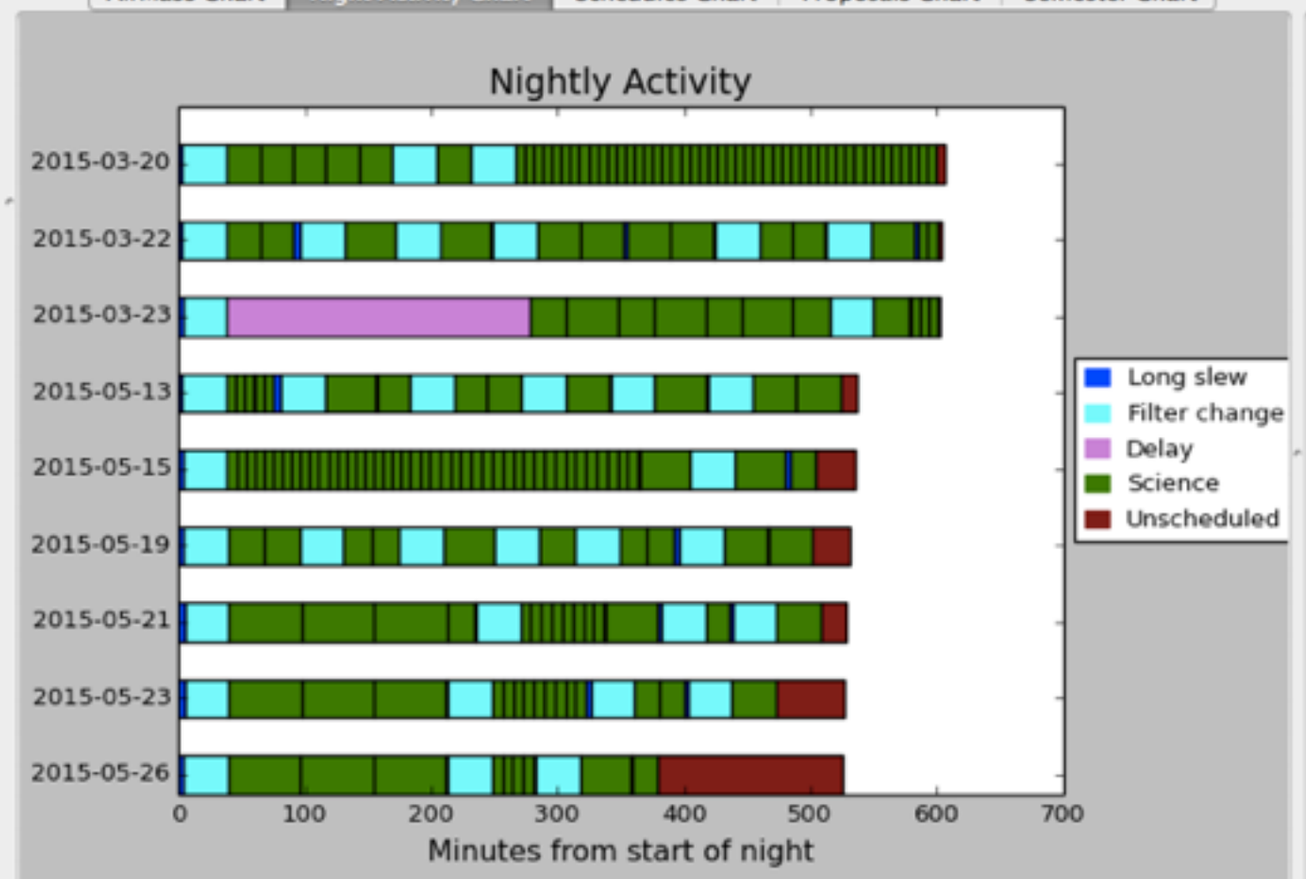
Inputs: ru-support-queue-shared/HSCconvert/

Load Info

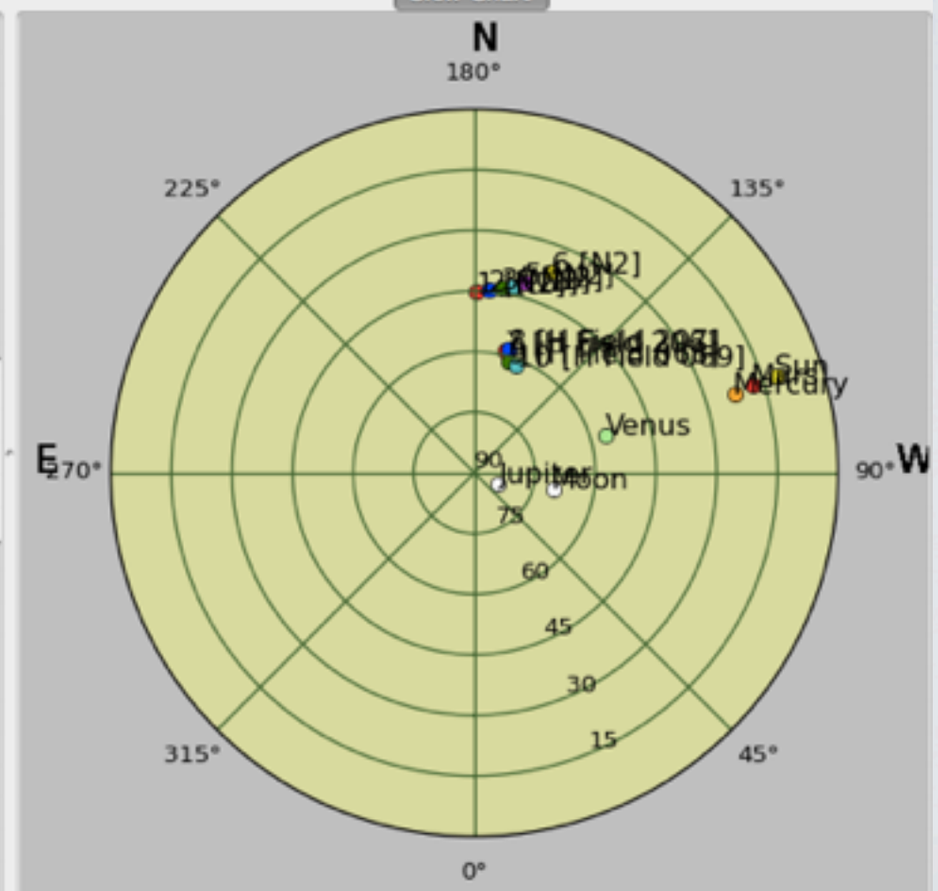
Build Schedule

10

AirMass Chart | Night Activity Chart | Schedules Chart | Proposals Chart | Semester Chart

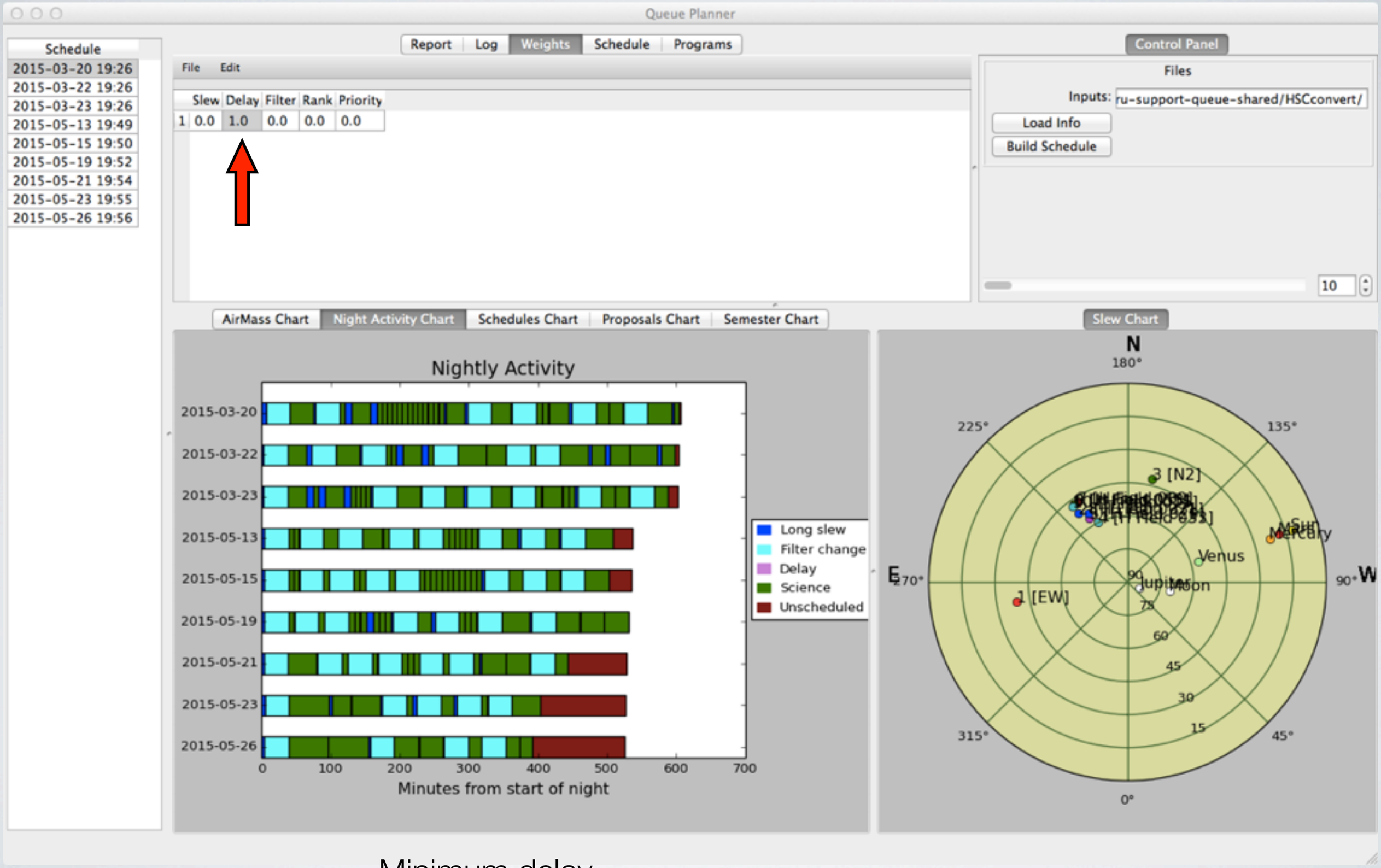


Slew Chart



Minimum long slews

Weights: Delay



Minimum delay

Weights: Filter

Queue Planner

Schedule
2015-03-20 19:26
2015-03-22 19:26
2015-03-23 19:26
2015-05-13 19:49
2015-05-15 19:50
2015-05-19 19:52
2015-05-21 19:54
2015-05-23 19:55
2015-05-26 19:56

Report | Log | Weights | Schedule | Programs

File Edit

	Slew	Delay	Filter	Rank	Priority
1	0.0	0.0	1.0	0.0	0.0

Control Panel

Files

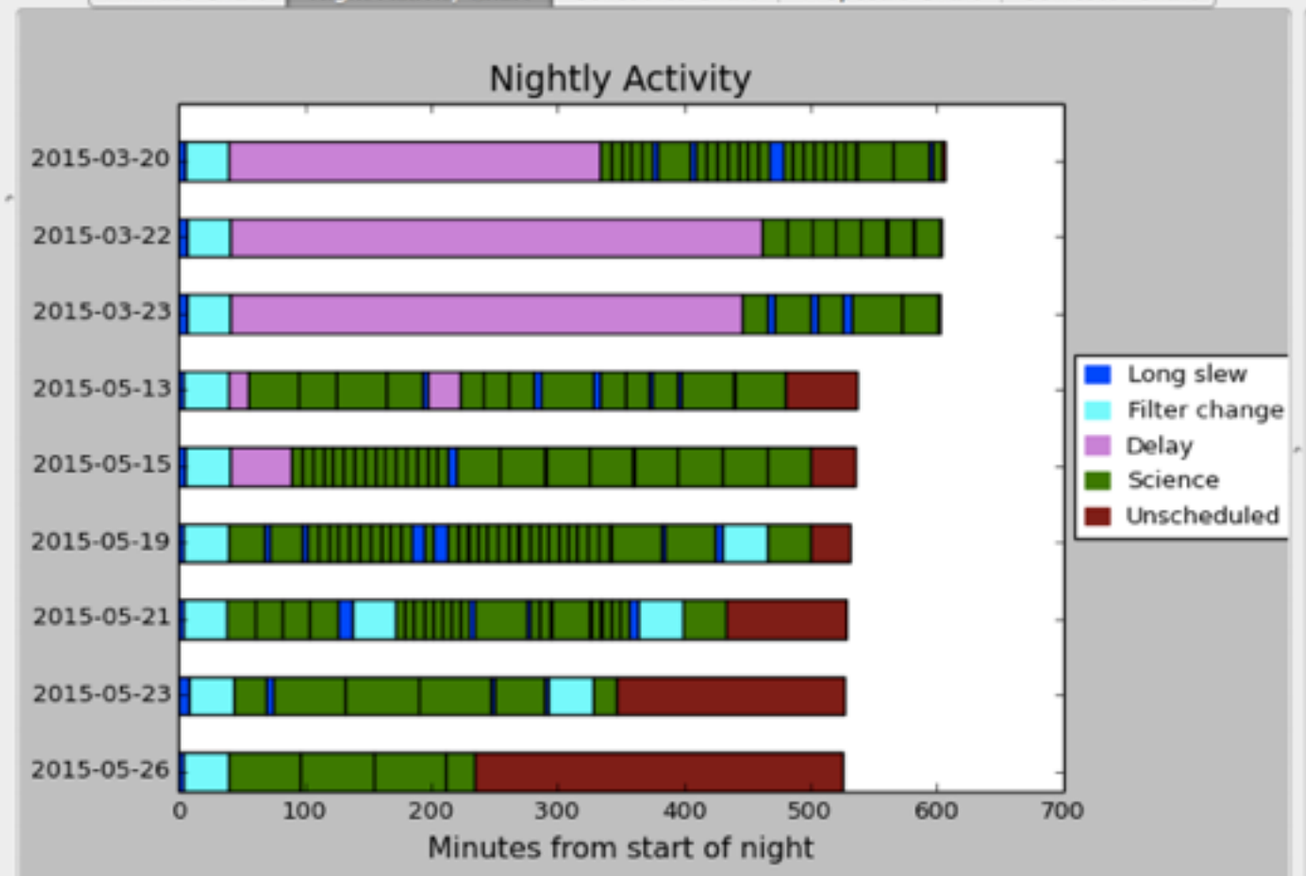
Inputs: ru-support-queue-shared/HSCconvert/

Load Info

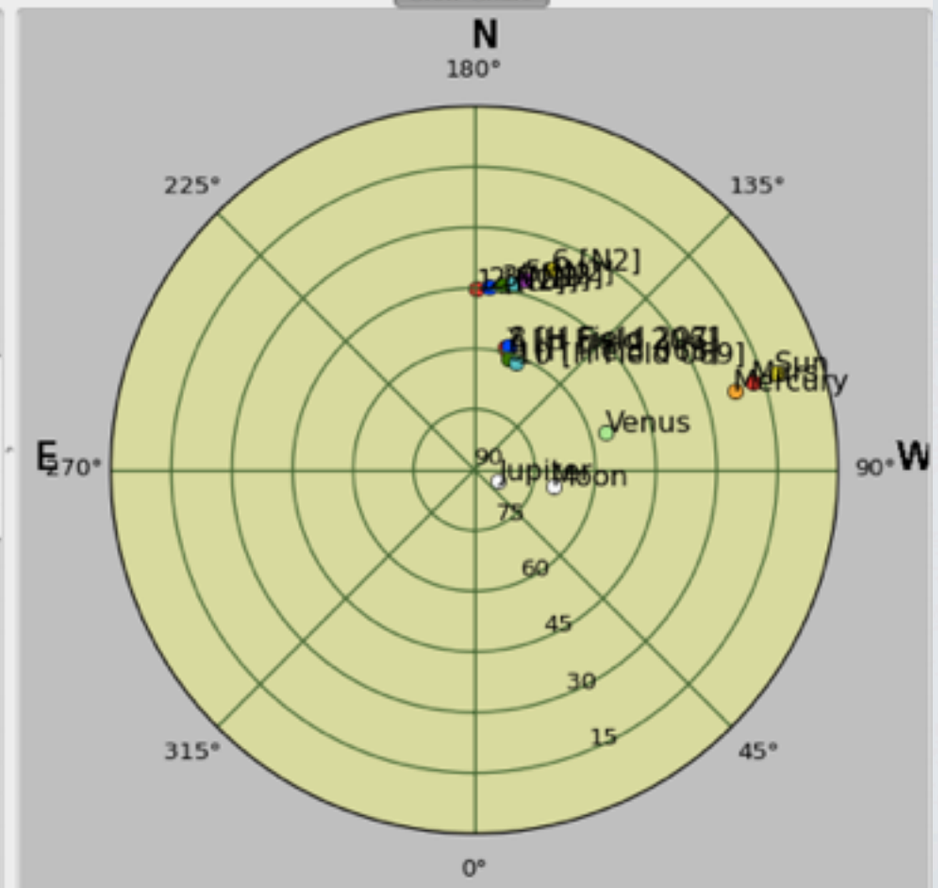
Build Schedule

10

AirMass Chart | Night Activity Chart | Schedules Chart | Proposals Chart | Semester Chart

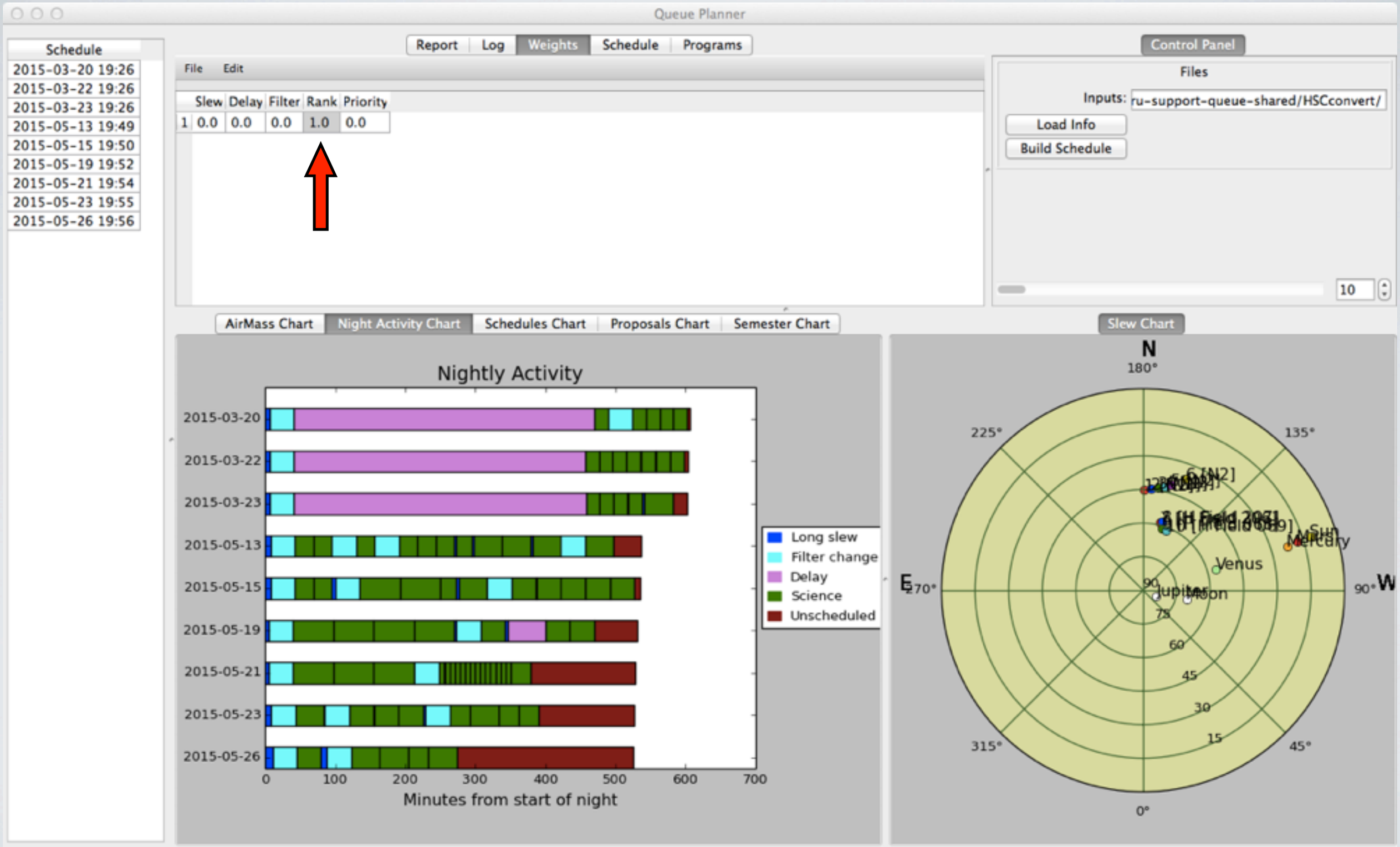


Slew Chart



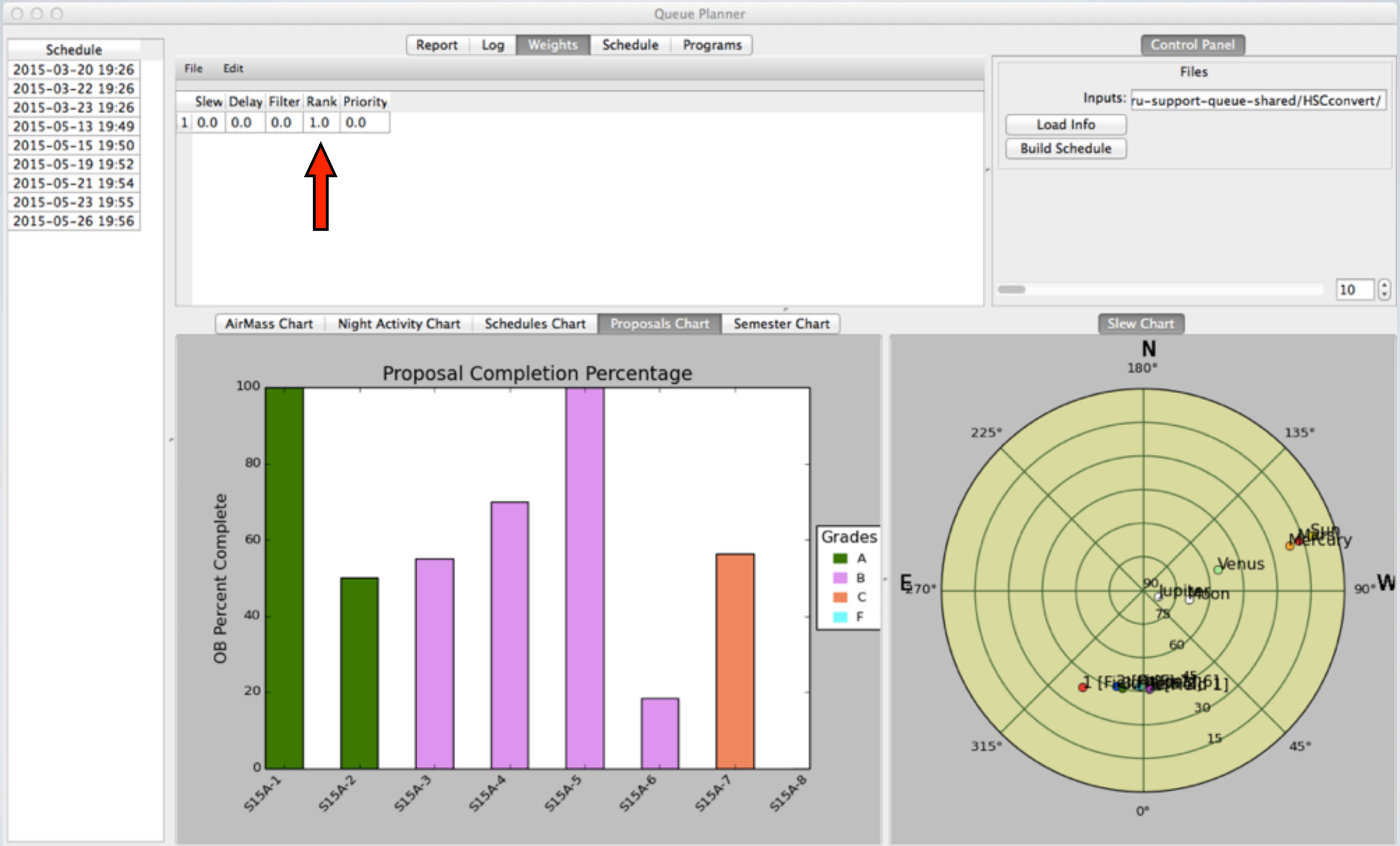
Minimum filter change

Weights: Rank



Spend every effort to finish highest ranked program

Weights: Rank



Caveat: poorer overall completion rate

Weights

Queue Planner

Schedule
2015-03-20 19:26
2015-03-22 19:26
2015-03-23 19:26
2015-05-13 19:49
2015-05-15 19:50
2015-05-19 19:52
2015-05-21 19:54
2015-05-23 19:55
2015-05-26 19:56

Report | Log | Weights | Schedule | Programs

File Edit

	Slew	Delay	Filter	Rank	Priority
1	0.2	0.2	0.3	0.3	0.1

Control Panel

Files

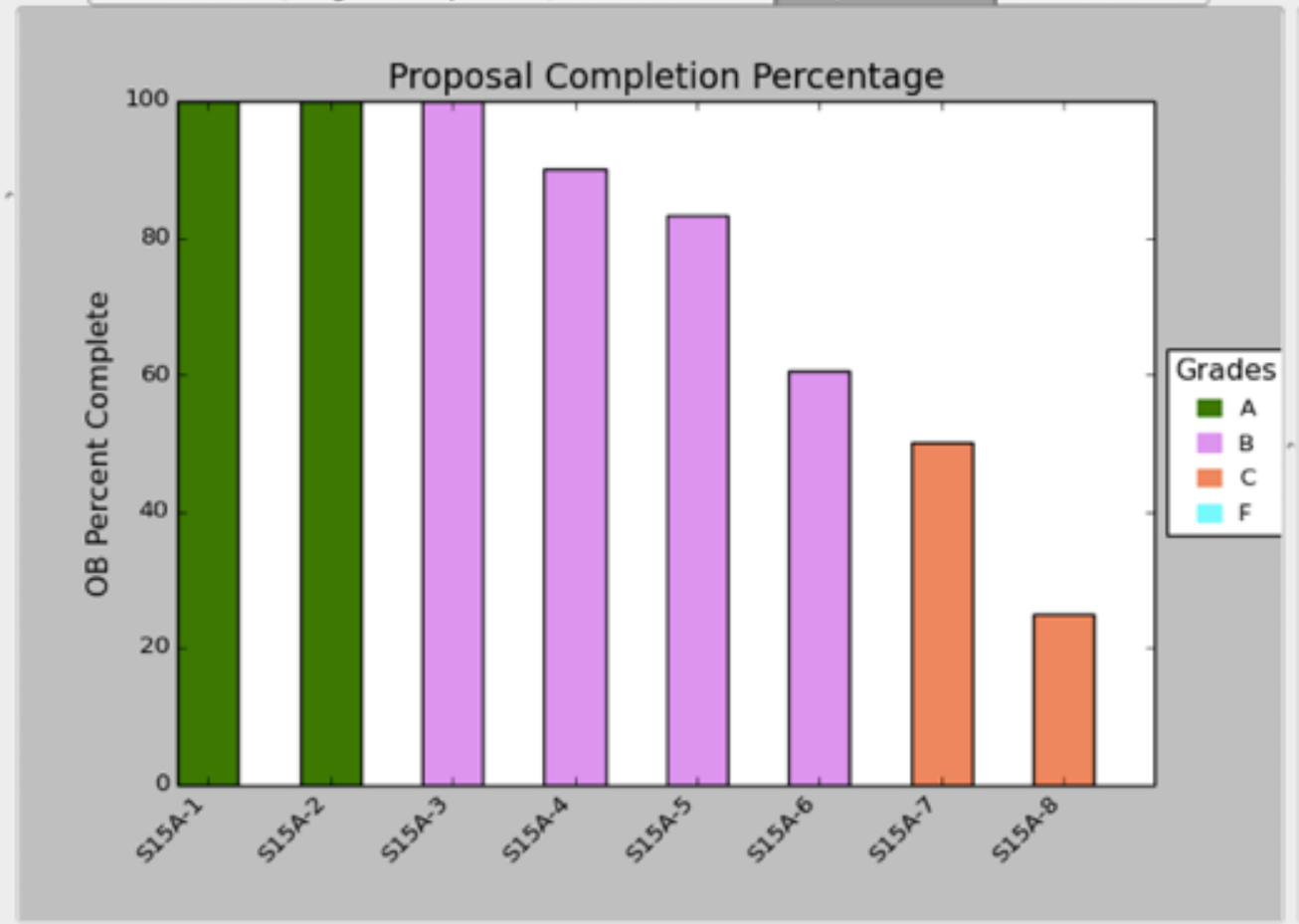
Inputs: .

Load Info

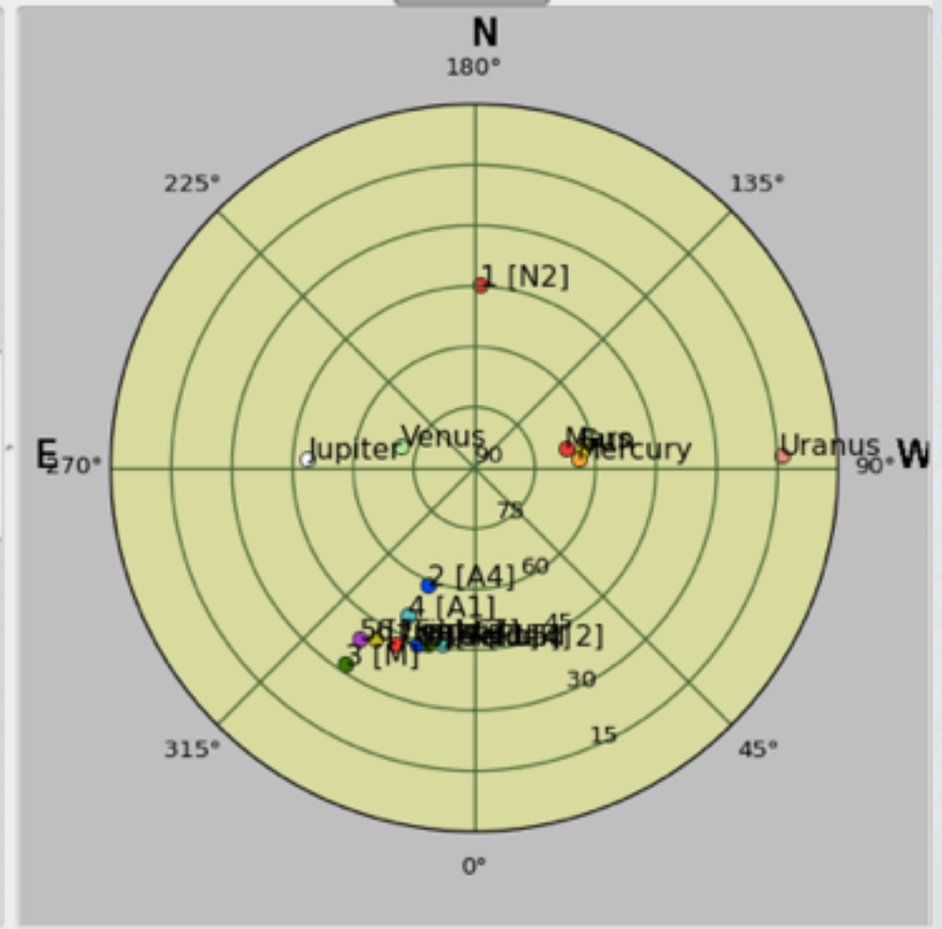
Build Schedule

10

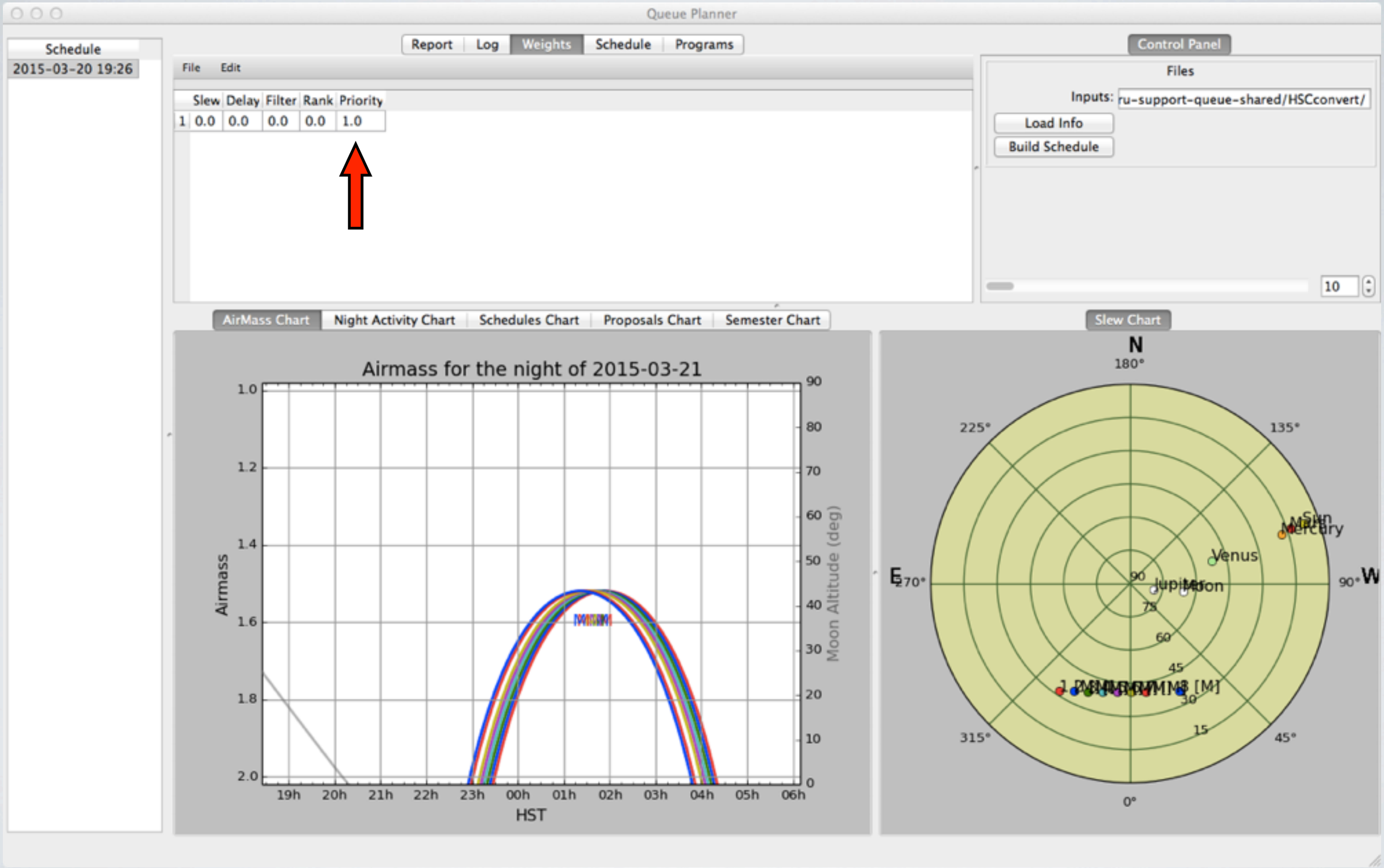
AirMass Chart | Night Activity Chart | Schedules Chart | Proposals Chart | Semester Chart



Slew Chart



Weights: Priority



Weights: Priority

Queue Planner

Schedule

2015-03-20 19:26

Report | Log | Weights | Schedule | Programs

```
--- NIGHT OF 2015-03-20 --- filters: g, r, i, z, y, nb921
Queue prepared at: 2015-05-22 18:17:13
Date              ObsBlk  Code      Program   Rank    Time Target    Filter   AM  Comment
2015-03-20 19:26  ob2159  ob2159     S15A-2   9.00    6.85 M         None    1.9  Long slew for ob0868
2015-03-20 19:32  ob2160  ob2160     S15A-2   9.00   35.00 M         g       1.9  Filter change for ob
2015-03-20 20:07  ob2161  ob2161     S15A-2   9.00  221.15 M         g       1.9  Delay for ob0868 vis
2015-03-20 23:49  ob0868  3          S15A-2   9.00   26.25 M         g       1.9
2015-03-21 00:15  ob0869  4          S15A-2   9.00   26.25 M         g       1.9
2015-03-21 00:41  ob0870  5          S15A-2   9.00   26.25 M         g       1.9
2015-03-21 01:07  ob0871  6          S15A-2   9.00   26.25 M         g       1.9
2015-03-21 01:34  ob0872  7          S15A-2   9.00   26.25 M         g       1.9
2015-03-21 02:00  ob0873  8          S15A-2   9.00   26.25 M         g       1.9
2015-03-21 02:26  ob0874  9          S15A-2   9.00   26.25 M         g       1.9
2015-03-21 02:52  ob2162  ob2162     S15A-2   9.00   35.00 M         i       1.9  Filter change for ob
2015-03-21 03:27  ob0866  1          S15A-2   9.00   26.25 M         i       1.9
2015-03-21 03:54  None

1 targets  2 filter exch  Time: avail=606.00 sched=286.85 unsched=319.15 min
```

Control Panel

Files

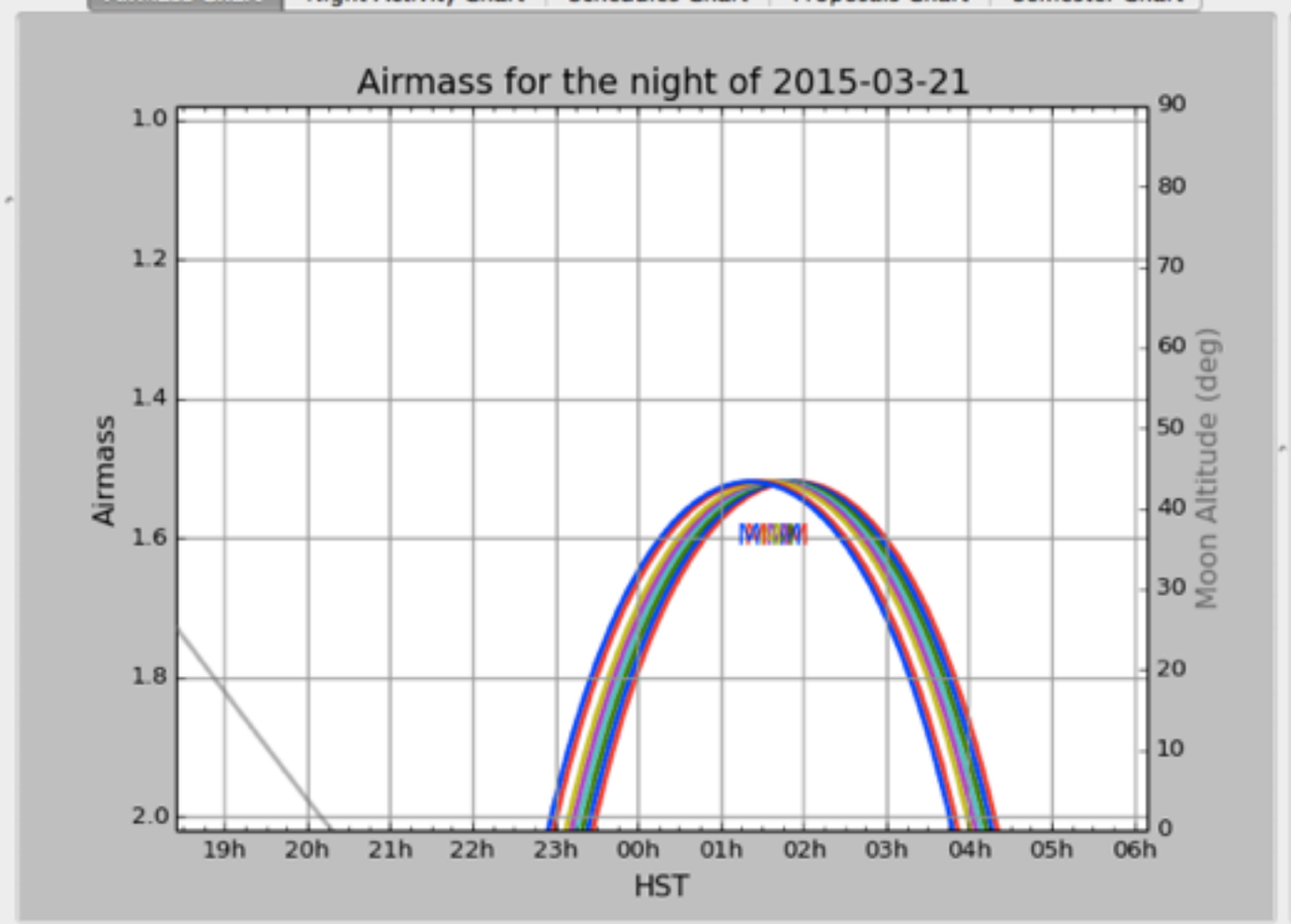
Inputs: ru-support-queue-shared/HSCconvert/

Load Info

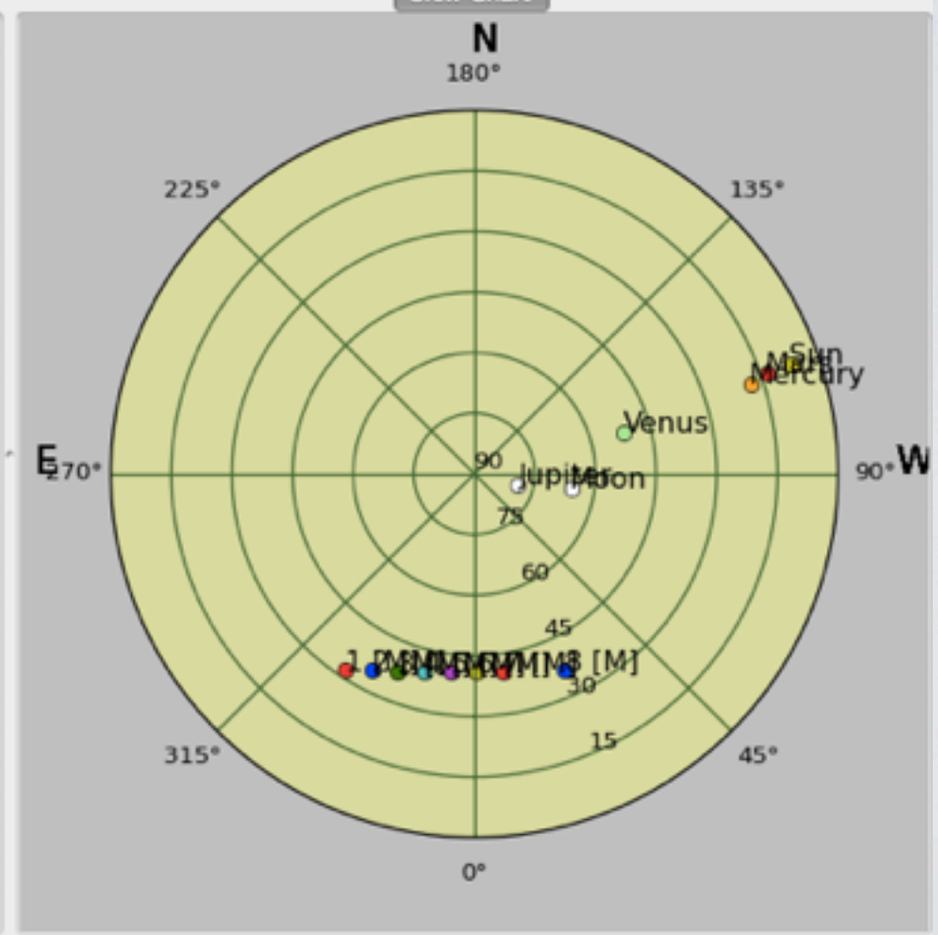
Build Schedule

10

AirMass Chart | Night Activity Chart | Schedules Chart | Proposals Chart | Semester Chart



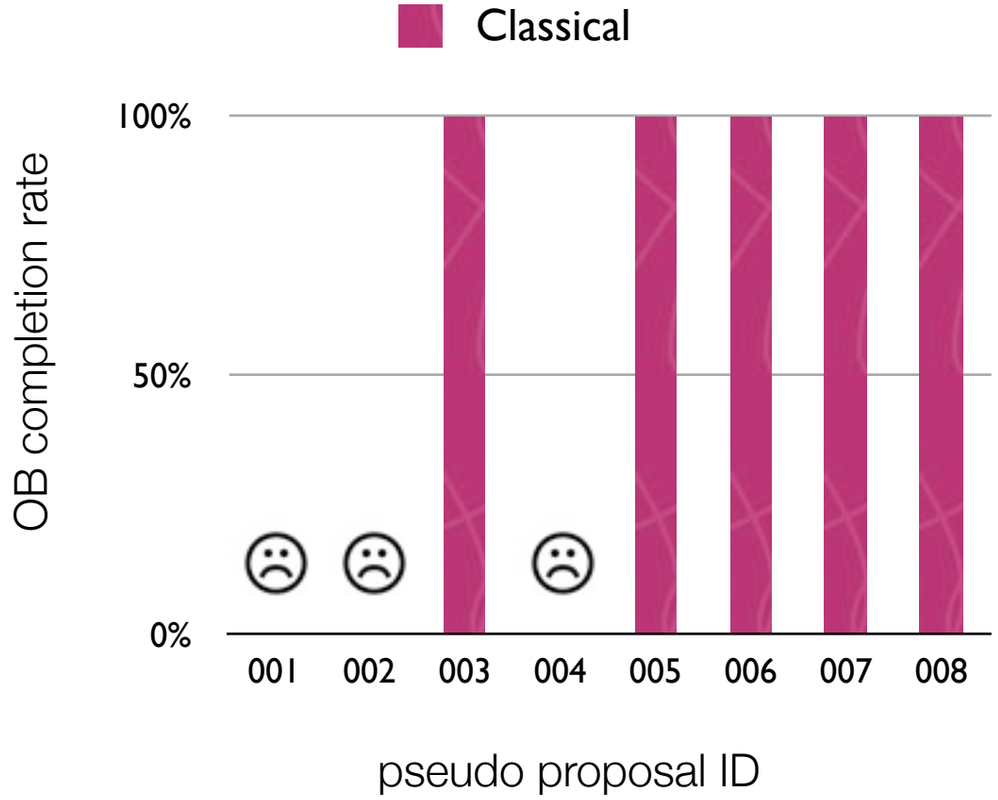
Slew Chart

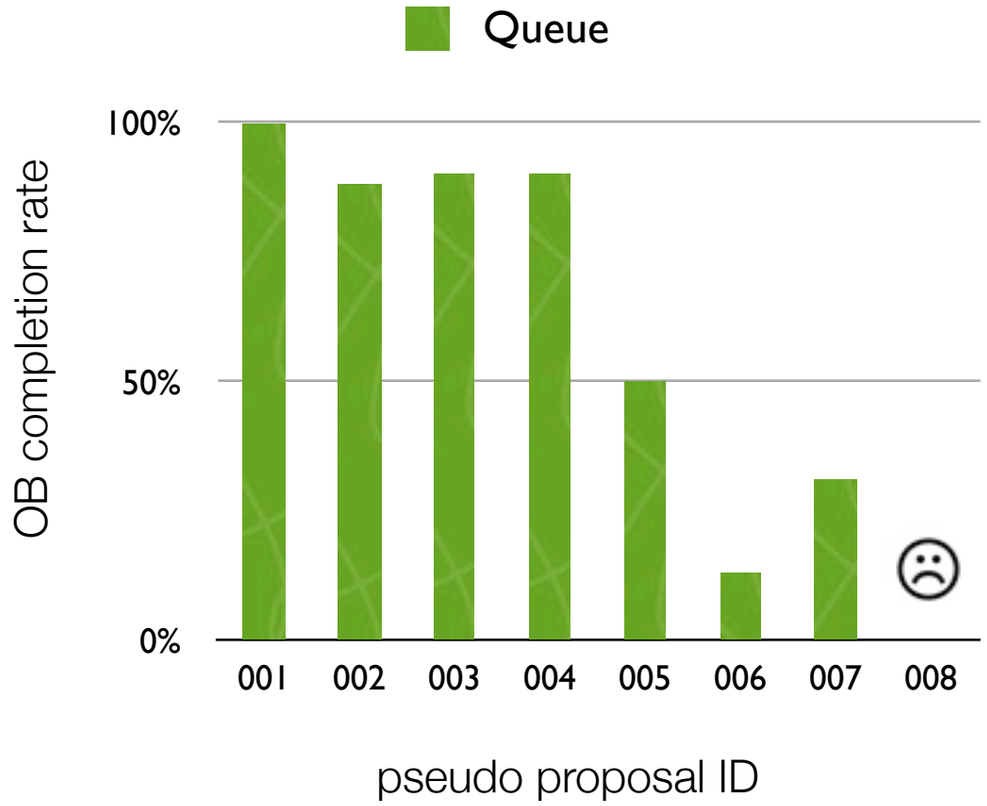


Questions?

Simulation scenarios

- Weather lost, 3 high-ranked program nights, 15A schedule





Simulation scenarios

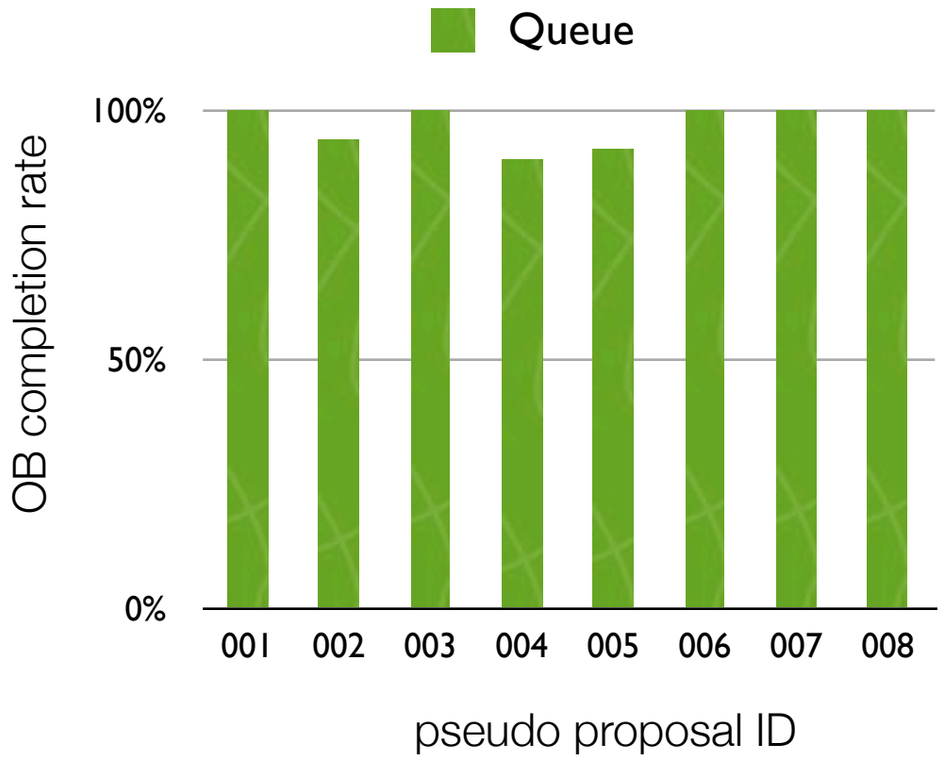
- 15A HSC open-use nights + 5 April dark nights

Good weather

5.7 hrs difference between
queue and classical schedules

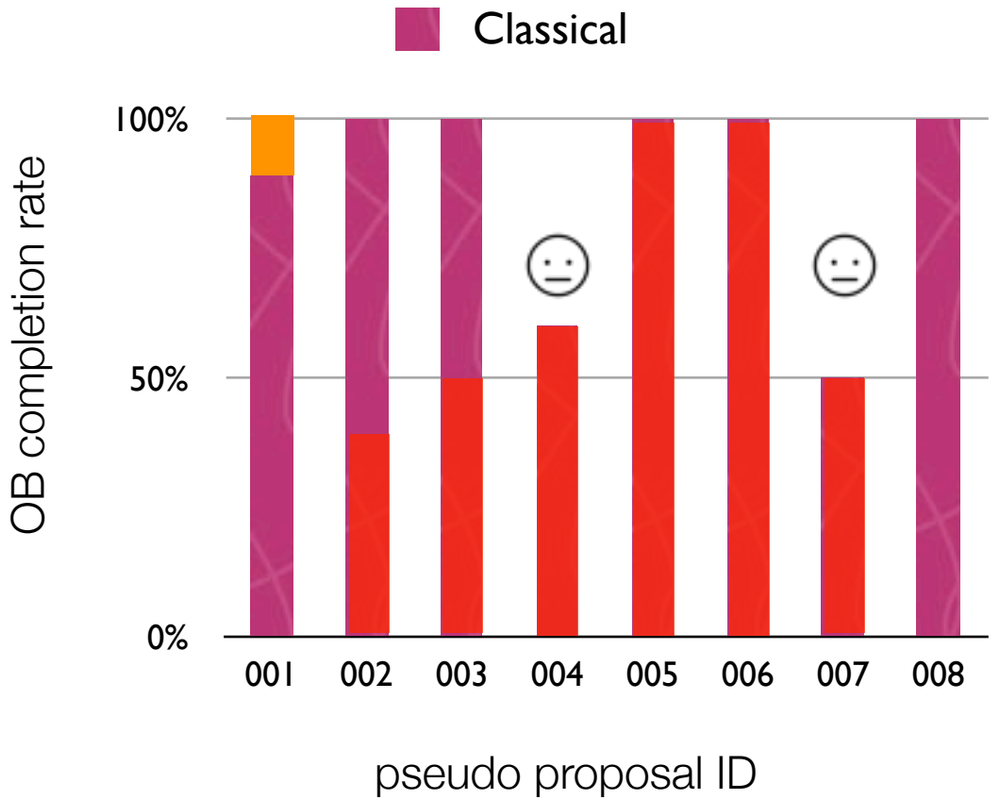
Completed all programs
(over 9 nights)
77.6 hrs; 55.6 hrs dead time
(c.f. 83.3 hrs in classical over 9 nights)

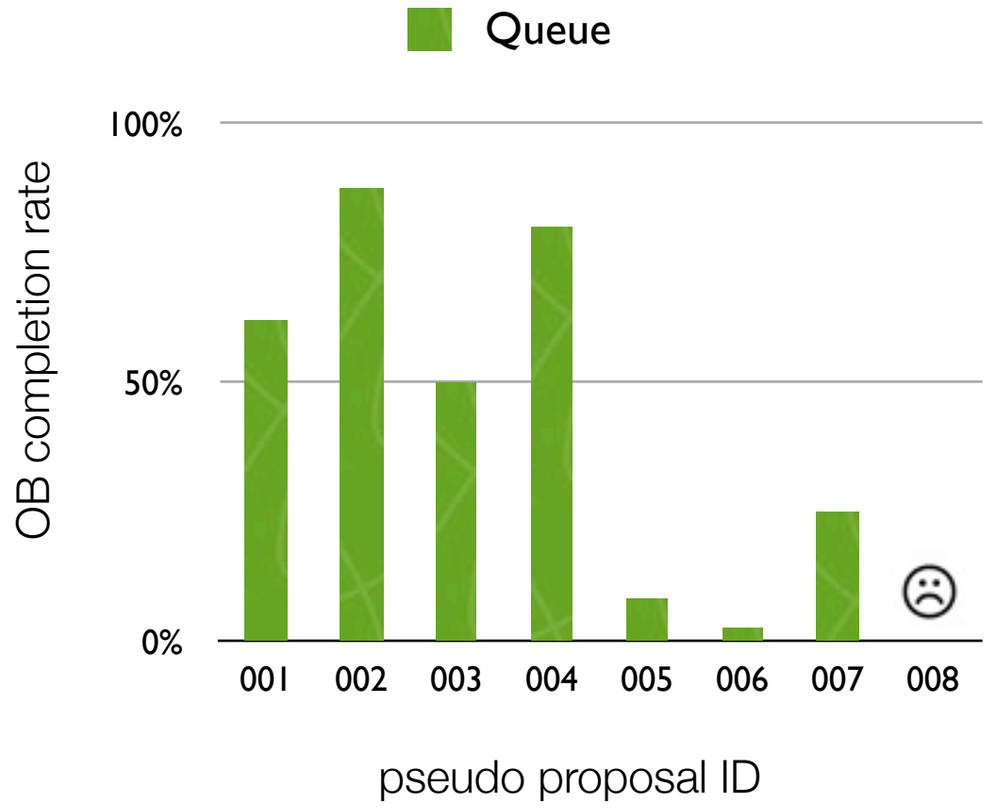
3 bad-weather nights



Simulation scenarios

- 15A HSC open-use nights with actual weather info (as of 5/31)





Data taken under non-optimal envcfg

System trouble time lost

Data taken under desired envcfg without system malfunction

Simulation remarks

- Partially completed queue program data may be useful and/or publishable.

- Few relatively high-ranked programs are not granted time due to classical schedule constraints.
  In queue simulations they get data.

- High demand for March and April (popular RA) and dark time (g & NB filters).

- Classical observations: take what you can
  Queue observations: take the best when you can

June 17

- Phase 2 Tool spreadsheets
- Go through all functions in ph2-spdsht-exp.xls
- Hands-on session using ph2-spdsht-prac.xls