

SALT BEC #59

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SALT OPERATIONS REPORT

J Chris Coetzee - SALT Operations Manager
and Éric Depagne – Acting Head of SALT Astronomy Operations

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EXECUTIVE SUMMARY

This report focuses on the integrated SALT operations activities and Special Projects since Board meeting # 37. Chapter 1 will discuss the most important joint activities and results achieved during this period. Chapter 2 will discuss the astronomy operations in more detail and Chapter 3 the technical operations.

No new SALT papers were published in June. Observations for the semester stands at a pleasing 543 compared to the previous semester's total of 575! Half way through the semester, 8 programs already have all their submitted blocks completed and 3 are above 90%.

Of course, SALT operations is responsible for the Program Completeness but only an indirect contributor (albeit a vital one) to publication production.

Astronomy Operations – Science time on the telescope for the past Semester was 40%, up from 35% last winter. SAs have been regularly using the scoring algorithm as a tool to increase efficiency in order to follow more closely the recommendations of the Board . The number of blocks observed has increased significantly too : 383 last winter, and 543 as of July 29th .

Significant resources were used to analyse and simulate Semesters in an attempt to further maximize SALT observing. These results and recommendations were presented to the Board #37. All instruments, operated nominally, including Fabry-Perot. The first re-commissioning tests were performed for the polarimetric mode. The on-sky tests should start early August (next week). External expertise has been identified in order to help us analyse properly the on-sky data that will be obtained.

Technical Operations – Downtime of the telescope due to technical problems and operational mistakes during night operations (collectively defined as Technical Downtime) has dropped sharply from ~8% for the 2014-2 semester to 4,4% for 2015-1 to date. The most important technical issue to mention is the successful demonstration of the core software modules of the rewritten Building Management System (BMS). This piece of software has given us problems over the years. In order to rewrite the software, the plant had to first be documented "as-is" and that took most of 2 years. In addition to the BMS upgrade, the PLC will also be using a new processor which enables communications via Ethernet, eliminating the need for proprietary computer cards.

CHAPTER 1

INTEGRATED SALT OPERATIONS:

The Board Meeting #37 defined the SALT operations' mission as:

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> *Mission - SALT must produce the maximum possible completed P0, P1 and P2 blocks per semester containing quality data so that partner PIs can produce quality science?*

In order to achieve the above mission, a 5 point plan was devised and progress is reported below:

1. Interactions with TACS - The Request for Proposal for 201502 has included additional information regarding telescope operations for the TACs to consider during their decision-making. No feedback from users has been received. Comments from the SASTAC has been taken into account, mostly concerning the Long Term Proposals.
2. Scheduling software development is ongoing to optimise the completion of Priority 0, 1 and 2 blocks. The scoring algorithm and the scheduler help to achieve the goals set by the Board for instance in terms of what needs to be finished (P0, P1 and P2 blocks). But since we are only mid way through the semester, it is difficult to say how successful we have been to achieved these goals
3. 10m Telescope performance – the top 3 highest priority projects have been financed

(SAMS, Tracker Upgrade and RSS New Guider) and is being monitored weekly on the Operations meetings, together with other important projects.

4. Performance Metric Tracking System – this has now been fully implemented and used on a regular basis to monitor and give feedback on performance. Some refinements are in process to make data mining for longer periods (months, semesters etc.) easier
5. PIs – Discussions with PIs to offer help, if needed, and encourage them to publish papers once they have received completed blocks from SALT. The biggest single blockage here remains the lack of HRS pipeline software.

AstroOps appreciate the weekly Ops meeting with TechOps, it makes it easier to understand each other and leads to smoother interactions and better understanding. It is difficult to quantify, but it seems that interactions are easier and more efficient

CHAPTER 2: ASTRONOMY OPERATIONS

SALT SCIENCE

A. Semester 2015-1 :

Time breakdown: Weather downtime was 46%, slightly better than last year. Technical downtime at 4.4% is lower than last year. SAMS testing is still going on, taking a significant fraction of the engineering time (8%). Science time is at 39%.

Program completeness: half way through the semester, 8 programs already have all their submitted blocks completed and 3 are above 90%.

B. Director's Discretionary Time programs :

Two DDTs were approved in 2015-1 so far. Both were completed. One lead to data published in a Nature paper, the other one awaits publication. For both, data gathered at SALT proved to be critical to their respective projects.

C. Publications :

The list of SALT papers is available at http://astronomers.salt.ac.za/data/publications/ (there may be small errors or inconsistencies).

As mentioned in Chapter 1 SALT Operations plans to facilitate paper production by concentrating on the *quality of SALT data* and helping, where resources allow, PIs to reduce and analyse their data.

ASTRONOMY OPERATIONS ACTIVITIES

A. Software :

Software development to handle science programs from planning and submissions through scheduling of observations and observing itself, to pipeline reductions and data delivery, has continued as before.

The Fault tracker is now in routine operations.

The Block Scoring algorithm is used nightly by the SA, to select the blocks to be observed. A Night Simulation Tool is also available to the SA.

B. Staffing:

We have been helped very significantly by Luke Tyas in both HRS support and SALT observing. His contract has ended at the end of May 2015. Marissa Kotze, a SAAO post-doc has also taken significant responsibility in SALT observations, and has proven to be of very significant help during unexpected circumstances.

INSTRUMENTS

A. RSS :

The instrument is performing well after the maintenance last year. RSS baffling was redone carefully in a thorough straylight investigation. Night-time used for arcs and flats decreased after the introduction of the new CALSYS. The light distribution was found to not be optimal, and a new design was installed on May 12 delivering evenly distributed light.

Detailed plans have been made for Polarimetric recommissioning. The beam-splitter has arrived with Steve Potter later in May and recommissioning tasks are already underway. The mode is still not offered to the community.

Fabry-Perot is offered to the community, and some programs are taking advantage of this mode. Training for the SAs to properly use it is on-going.

B. HRS

HRS is in normal stable operations, with no major hardware interventions done over the last 6 months.

The Acceptance committee will convene on August 18th for a final decision. Durham have provided all the software documents, and are in the process of delivering the final technical drawings.

HRS pipeline work still ongoing. Astronomy Operations will continue developing a full science grade pipeline for the LR/MR/HR modes, and while final decisions are still to be made, there are discussions in getting outside help for the HS mode. In particular, Darragh O'Donoghue has been in contact with Paul Butler from the Lick Observatory. Continuation of these efforts needs to be decided.

C: SALTICAM and BVIT. Operating nominally. An internal Astronomy Operations decision was made that since BVIT is so seldom used, it is more efficient to operate remotely from Cape Town by the most experienced local user, Marissa Kotze. This has been done successfully. This is the now standard way of operation for BVIT, and is advertised as such in the Call for Proposal for 2015-2

CHAPTER 3: TECHNICAL OPERATIONS:

Primary Mirror: 10 Segments were swapped during June and July**.** All segments have coatings of less than a year old.

RSS-VIS: All polarimetry hardware and software were installed and tested. Some small s/w add-ons must be completed but the PCON functions work. Polarimetry commissioning is ongoing with first science target to be observed scheduled for end of August. The camera barrel articulation detent failure was resolved by coding in better safety processes and making the alarms more prominent so that the SA can recognise a failure and correct it.

Tracker: the tracker has been working reliably but some problems with the payload and HRS guider occurred. A separate UPS for the tracker has been installed to prevent it from losing track during power cuts. Previously the tracker was on essential (generator) power.

Software solutions: Research into alterative control system solutions for telescope subsystems continues with successful testing of a number of subsystems on Linux, as well as evaluating the National Instruments Compact-RIO hardware architecture as a potential platform. Reducing spurious alarms and warnings has also been a priority mini-project with improvements already apparent. The complete re-write of the building management system (BMS) is progressing well with the software framework in place, successful initial hardware-in-the-loop tests completed and the final requirements review passed in June.

Fraction of Time Lost Due to Technical Issues:

- 4,4% For the semester to date
- ESKOM power outages had an influence on downtime because sometimes complex and lengthy start-up procedures are required. The statistics are being kept as part of our fault reporting system.
- Freezing temperatures and snow have also caused some disruptions

Maintenance: The systemised maintenance system has been fully implemented and is in daily use. Important items that received attention were the glycol ground floor system and the shutter bogey maintenance. The general and instrument air system also received maintenance and at the moment attention is given to the dome crane service and maintenance.

Electricity Saving: some work was done on the scoping of a solar energy power plant as requested by the Board. However, lack of senior manpower capacity have brought those actions to a temporary halt until April 2016.

The Failure Mode Effect and Criticality Analysis (FMECA)
No red items have been mitigated in this period but one more item, the SALTICAM Frame Transfer Mask & Drive located in the evacuated dewar was identified, giving 16 red items, 4 of which cannot be mitigated further by Tech Ops. The remaining 12 will be mitigated in time.

The SAC degradation and its detrimental effects on throughput has been identified as a risk but not added to the FMECA. The issue has been added to the Action List of the SALT Operations meeting but, on Darragh's advice, parked for the moment since it will be quite a big job to clean the SAC.

TOIL: With the activities on the telescope stabilizing, this figure stands at 1636, down from 1778 at Board meeting #37 (-8%).

Discounts: negotiated financial year to date is R53,000

PROJECTS:

Separate reports have been filed for the SAMS and Tracker Upgrade projects. The CALSYS project has been successfully completed. The RSS Throughput project was put on hold in order to determine various options going forward, including funding sources. Ockert was redeployed to help with defining

SAMS button and flexure bonding production processes and tools development to ensure higher production rates and consistent quality.

NIR – LOCAL ACTIVITIES:
Since the unfortunate death of Darragh, Martin Wilkinson has taken temporary charge of the interface meetings with Wisconsin and coordinating events at SALT. The responsibility for the new collimator design and development for the ground based NIR must be decided. Tech Ops can help with the opto-mechanical packaging.

RSS NEW GUIDER
Planning of this project is in full swing. The current year's cashflow challenges may require that all procured items (R659k) be deferred to the 2016-17 financial year. The recommendation in this case will be to put the entire project on hold and start it up in the new year.

If affordable, an alternative will be to defer R300k to the new financial year, which will enable the team to do the concept designs and determine if it will work given all the constraints and new functions (focus being one of them). This proposal will have minimal impact on the schedule and is preferred by the technical and project teams.

HEALTH AND SAFETY:
No safety incidents to report.

MANPOWER ISSUES:
Deon Bester does not want to sign his contract, to the value of R300k, to work 50% of his time on SAMS and according to the CFO, SALT does not have the money to afford a 11 months contract (May 2015-end March 2016) to the value of R583k.

Alternative solutions are being investigated to stay within the budget. One of them being to have one of the FTEs in the Software Group take over the software (SAMS, MACS, SPS and PMAS) that he has been developing since the start of SALT. It will be a significantly higher risk strategy but the fact that the software knowledge is then transferred to a more permanent member of the team will be beneficial for the future support of the system.

However, as Darragh said when Deon's contract renewal was discussed during one of the SAMS meetings, "it will be insane" not to have the experienced SAMS software engineer on board when the project reaches its climax during the Acceptance Testing, which is scheduled to be from November 2015 to March 2016. The shortfall is R283k and it is still the recommendation of the technical and project teams to retain his service until the project is successfully completed.

We will continue negotiations with Deon to determine if he will be willing to be on standby should we need him for the remainder of the budgeted money, R150k of the R300k. He was paid R50k/month for May, June and July.

RECOMMENDATIONS:
1. If money can be found, approve a 11 month contract, to the value of R583k, for Deon Bester to work full time on SAMS. The Board has already approved R300k, so the shortfall is R283k.