lease. The SV Teams plan to release UVES data by March 31, 2000, and the FORS2 data by April 30, 2000. Observations will be made in Service Mode with SV Astronomers on Paranal for part of the time. SV observations may actually be taken from February 6 through March 31 in a flexible scheduling, depending on the needs of other commissioning and training activities that may arise.

SV observations will be conducted in coordination with the PIs of the two instruments, the Instrument Scientists, and the Kueyen (UT2) and instrument Commissioning Teams.

The scientific programmes have been selected in such a way as to produce first-quality data for cutting-edge science in areas of interest for a wide section of the potential users in the ESO community. Moreover, programmes that require very good seeing are complemented by others that would still be well feasible in less demanding conditions.

The SV Teams includes the following scientists: Joao Alves, Stephane Arnauts. Jacqueline Bergeron, Tom Broadhurst, Stefano Cristiani, Chris Gorski, Vanessa Hill, Richard Hook, Rodrigo Ibata, Tae-Sun Kim, Markus Kissler-Patig, Benoit Pirenne, Mario Nonino, Francesca Primas, Michael Rauch, Alvio Renzini, Piero Rosati, and Eline Tolstoy.

The following list of SV programmes has to be taken as indicative. In particular, some additional relatively small programme could be accommodated, depending on the actual observing conditions on Paranal. Any modification will be promptly reported in the SV WEB pages (http://http.hq.eso.org/science/ut2sv/), where more detailed information can be found, including target lists, modes and planned exposure times.

2. UVES SV Plan

Three main SV Programmes have been planned:

• **A Spectroscopic Survey of Intermediate Redshift QSOs**. Five out of a list of 8 QSOs with $2 \lesssim z \lesssim 3$ will be observed. These observations are meant to be the first step towards a public survey of QSO absorbers which aims at creating a large and homogeneous dataset to allow the study of the intergalactic medium in the redshift interval $z = 1.6 – 3$. A team co-ordinated by ESO will submit a proposal to carry out such a Public Survey in Period 66.

• **Abundance Ratios of Extremely Metal Poor Stars from the Hamburg ESO Survey**. At least 5 stars with [Fe/H] $\lesssim –3$ will be observed. The high S/N spectra will allow to determine the abundances of a number of interesting elements, such as Li, α-elements, and s- and r-process elements.

• **Chemical Abundances in LMC Clusters in a Wide Age Range**. A set of Red Giants ($16.5 < V < 17$) will be observed in seven LMC Globular Clusters with ages from 0.1 to ~ 14 Gyr. This should allow a detailed reconstruction of the chemical enrichment history of LMC.

3. FORS-2 SV Plan

The following programmes have been planned for the SV observations of FORS2:

• **Deep Imaging of the Cluster of Galaxies MS1008-1224**. This z = 0.3 cluster was extensively observed for SV of FORS1. With FORS2 SV one intends to complete the database by adding deep *U* and Gunn *z* images of the cluster.

• **Hα Rotation Curves of Dwarf Galaxies**. This is a "bad seeing" programme. Long slit spectra should allow to constrain the mass distribution at large radii in a set of three dwarf, dark matter dominated galaxies.

• **Kinematics of Previously Microlensed Stars in LMC**. Over two dozens microlensing events have been detected so far towards LMC. The plan foresees to take spectra of at least 10 of the stars that were microlensed, in order to obtain their radial velocity with an accuracy of ~ 10 km/s. Constraints on the nature and location of the lensing objects could then be derived.

• **Lyα emission at high redshift**. The NTT Deep Field will be imaged with a custom narrow-band filter (FW = 7Å) searching for Lyα emission from large-scale structure centred on a damped Lyα system at $z = 3.2$.

• **Near-IR Imaging of the NTT DF**. Imaging in IF_{915} and Gunn *z* filters will ensure the completion of the deep multicolour database of this deep field, thus allowing a photometric redshift search for very distant galaxies.

• **Spectroscopy of High Redshift Galaxies**. Distant, photometric redshift selected galaxies to $I_{AB} \simeq 25$ from public NTT data will be observed in MOS mode, possibly using the mask option.

• **Abundance Measurements in Giant Ellipticals**. MOS and long-slit spectroscopy for the abundance determination of globular clusters and the dwarf galaxies surrounding NGC4472 and of the galaxy itself out to ~ $3R_e$.

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The First Six Months of VLT Science Operations

R. GILMOZZI, ESO

Science Operations started at UT1 Antu on April 1, 1999. This article is a brief account of the first six months (Period 63). As the statistics below will show, operations have been fairly successful. Visitor and Service modes were intermixed during P63, in a 50/50 ratio for the available time (i.e. discounting Guaranteed time, which is by definition in Visitor mode): we had 62 nights in Visitor, and 60 in Service. To this one should add 10 Service nights for the Calibration Plans, and any time allocated but not used for technical time, target of opportunity time and director discretionary time (so that in the end, more than 85 nights were devoted to Service Mode observations and calibrations).

Period 63 started under less than promising omens: the mask wheel of ISAAC had just had to be taken out of the instrument to be repaired, so ISAAC could only work in imaging mode; the decontamination of the FORS1 CCD had not resolved the infamous "quadrangle" problem, and the CCD had to be taken out to be baked more thoroughly, so FORS could not be used. And the weather was the worst seen in the last year (at least by the Science Operations staff): foggy (!), cold and very windy. April 1 and 2 were spent with the Paranal Engineering department, the Garching Optical Detector Group and other Instrumentation Division staff working overtime on one side to bring ISAAC up in imaging mode so that the first Service Mode episode of the Period could start, on the other to decontaminate the CCD in time for the first dark moon and the first FORS1 run.

It is a testimony of the excellent work of all the people involved that on April 3, the wind and humidity having abated to the more normal Paranal values, the first OBs could be executed on the sky. Paranal was finally a full-fledged astronomical Observatory!

From then on, the month spent in 'dry runs' to acquaint ourselves with the telescope and the instruments showed its results: it was immediately clear that the efficiency of the operations was quite high, even if some programmes were not as efficient as they could have been (the fact that ESO had decided to absorb the overheads being possibly a reason for this), the seeing was co-operating very nicely (though not all through the Period, alas), the instruments were behaving very well. Total downtime, both the weather and the technical flavours, was less than 20%.

Ten days later the next challenge: the first Visiting Astronomers started coming to the mountain. I should probably explain that Service Mode and Visitor Mode, as seen from the Operations point of view, differ only in who makes the scientific decisions about ‘what to do next’. A Paranal astronomer is always present to run the instrument, to advise the Visitor and to help preparing the OBs beforehand. Therefore the Visiting Astronomers can devote their time to analysing the data and decide on the observing strategy.

The experience with Visitor Mode has been very positive, the interaction with the Operations Astronomers on the whole resulting in satisfactory observations (or at least this is what we gather from the end of run reports!).

We have learned a lot during the first six months, and we have also made a few mistakes.

One thing that we have to clarify better to our “proposers” in the future is that a successful Service Observing Mode (SM) needs to include programmes designed for various types of conditions: if everybody wants 0.4 arcsecond seeing, photometric sky and be one day from new moon, it’s very difficult that we can satisfy all requests...

In Period 63 there were two main issues that caused some confusion with our users: the oversubscription (especially of category A) SM programmes, and the constraints set.

The first is not a problem per se: oversubscribing the available time adds to the scheduling flexibility and makes for an efficient operation. Of course, it also creates unhappy users, who have to submit their OBs without guarantee of execution. The OPC ranking, which is our primary decision input, helped in selecting among programmes competing for the same conditions.

In P63 we were not helped by the time being assigned in terms of shutter open time: of the 600 available hours in Service Mode, 720 were allocated in P63. With the measured values of overhead (~30%) and downtime (~20%), we were oversubscribed by $(1.3\times720)/(0.8\times600) \sim 2$. Add to this that weather variability sometime caused the conditions to change during an exposure, so that it had to be repeated, adding to the oversubscription. We are actively studying ways to decrease the impact of this problem; in P63 we were lucky enough that part of the technical time (and some of the discretionary time) were not used, so that we put it into the SM pool, and were able to carry out more observations (see the statistics below).

The other problem we had is the constraints set: the number of programmes that could be observed when the seeing was > 1″ or the moon was up (for FORS), or for nights with cirrus was very small. In part this was compensated by the oversubscription, but in some cases it has been very difficult to decide what to observe. This problem is more acute at the end of a period (again, we are thinking of ways to improve this). Particularly demanding was the August full moon episode when ISAAC was not available for 7 nights, and we had to use FORS1 with very few programmes that made sense to execute.

Sometimes there is no alternative but to violate some constraint: when we had to do that, we always tried to compensate in some way (for example: higher than requested moon background usually meant that we would observe in better than requested seeing, to improve the contrast, or in the longest possible wavelength, where the effect is smallest, or both). Not always this has been possible; ranking has played a role (if a choice had to be made, we tried to avoid affecting very highly ranked programmes). But we have found ourselves in situations (fortunately few) where it was either observe something outside the constraints or keep the telescope idle.

Discussions are ongoing within ESO, and with the community, to minimise these problems in the future. Users can help too, by not requesting indiscriminately conditions that happen only a small fraction of the time.

In the following I would like to offer some statistics for Period 63. Some of this statistics comes from the engineering data stream that is recorded every night, much in the same way that satellite engineering data are recorded (indeed, this has proven to be among the best tools produced by the Commissioning team to understand the performance of the telescope and instruments).

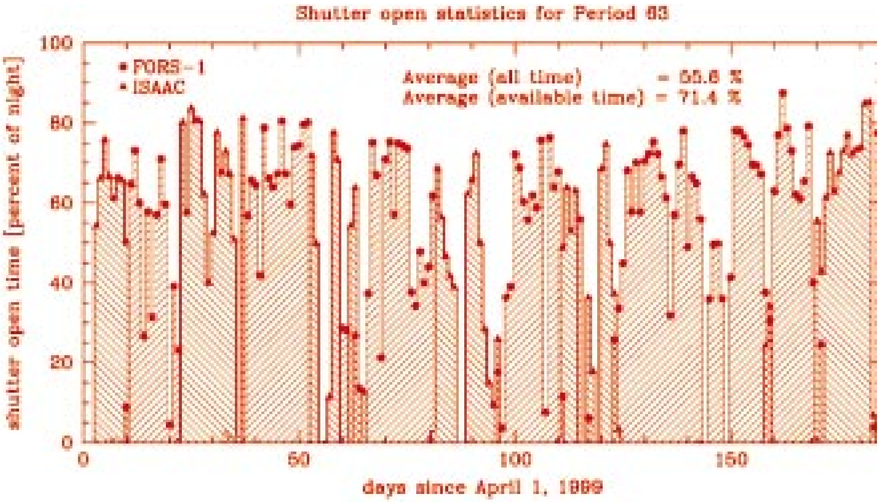

Figure 1.

Performance of Antu

During period 63 there have been 3907 presets (21 per night), 22,491 offsets (6 per preset) and 121,537 image analyses (98% of which resulted in an active optics correction). For those of you who have not yet had a chance to see the active optics in action, it is something really impressive: once you acquire a new field, the guide probe goes automatically to a guide star, acquires it, starts the image analysis and, usually about 30 seconds later, sends the first correction to the mirror actuators: at this point you see the guide star shrink to the outside seeing value, and you can start your science exposure (see http://www.eso.org/outreach/press-rel/pr-1999/phot-34-99.html).

This is the most visible difference with the way we used to do astronomy: from this moment on, the telescope is kept at the best focus, with the best optical figure for the pointing, all in parallel with the science observations and without requiring any additional time. The typical overhead to move to a new field, acquire a guide star, and start the active optics is about 5 minutes.

Downtime Statistics

One way to “measure” how well we did in Period 63 is to compute the total downtime. The technical downtime was 13,561 minutes (11.4% of the total available time). This statistics includes any observing time affected by the technical problem (e.g. a problem which can be fixed in 5 minutes but which has caused the loss of a, say, 30 min exposure would count as 35 min downtime).

The weather downtime was 12,700 minutes (10.7% of time). This includes clouds (5.6% of time), high winds (>18m/s) and high humidity (or combinations). Considering that P63 was during the southern winter, this percent loss does not seem surprising.

In total, therefore, we lost 22.1% of the time.

Weather

Of the 163 nights that were not lost to bad weather, 118 (72%) were apparently photometric, 18 (11%) possibly photometric, 17 (11%) had thin cirrus and 10 (6%) had thick cirrus. We are currently finalising the analysis of the standard stars observations to confirm the number of "true" photometric nights.

The statistics on the seeing is based on 116,761 ASM data points, each averaging one minute of measurements. The median seeing in P63 was 0.76". The seeing was better than 1" 72% of the time, and better than 0.5" 13% of the time.

You may have heard that sometimes the seeing measured by the instruments on Antu is better than the outside seeing. Discounting wavelengths effect (i.e. yes, it is true that ISAAC with its 0.15″ pixels sometimes undersamples the atmospheric PSF), we have indeed seen this effect. It is however fairly rare, and needs special circumstances (in particular, the appropriate wind speed, a pointing such that the wind can flush the primary at the right angle, and an excellent seeing to start with). On some occasions, in service mode, we have had enough programmes in the queue that we could choose to observe in the right direction, and so took advantage of this. In general, however, and especially in visitor mode, it is an unlikely occurrence.

Operations Statistics

ISAAC was used 73 nights, or 40% of the time. FORS1 was used 110 nights. This reflects in part the instrumental problems described above, in part the actual time allocation (or the user preferences).

Once one discounts the downtime, there were 1484 available "observable" hours. Of these, 651 were used for FORS1 and 403 for ISAAC. This results in a total "shutter open" efficiency of 71% (see Figure 1). In period 63, the archive "ingested" 19,794 ISAAC frames and 24,039 FORS1 frames.

In Service Mode, we had 75 accepted programmes (40 in category A, 19 in B and 16 in C, or 40/19/16 for simplicity). The completion statistics is 34/16/11 (of which 13/10/8 are partial completions, usually meaning that most of the programme was carried out, the remainder being impossible to observe because of target RA or non realised constraints etc). The programmes not initiated were 0/3/5. The remainder (6/0/0) are category A open programmes that the Director General has allowed to carry over into Period 64 so that they can be finished.

The success of the first six months of operations is the result of the commitment and professionality of a very large number of people, both in Europe and in Chile. Naming all of them would look very much like the ESO internal organigram! However, I would like to mention at least the Science Operations Team at Paranal (now under the leadership of Gautier Mathys), the Paranal Engineering Department (Peter Gray), the User Support Group (Dave Silva) and the Data Flow Operations Group (Bruno Leibundgut) for their dedication and enthusiasm, and for their crucial contributions. Jason Spyromilio and his team delivered fully commissioned telescope and instruments. Massimo Tarenghi as director of Paranal provided oversight and direction to the whole process.

Special thanks to Jason, Gautier, Dave, Chris Lidman and Jose Parra for providing the statistics in this article.

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Configuration Management of the Very Large Telescope Control Software

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1. Introduction

One of the elements of the success of the development, integration and commissioning of NTT, VLT and the attached Instruments has been the Configuration Management of the related Control Software. It has been based on the Code Archive and the VLT Software Problem Report (VLTSPR) procedure.

2. Code Archive

The code archive supports code configuration during development *and* integration on geographically distributed sites. The design keys are the following:

• The configuration item is the software module. This allows a reasonable but still simple flexibility in system configuration (a system is made up of 15 to 100 items, identified by their name and version, corresponding to 2000 to 20,000 files). Each module is a set of files organised in a fixed directory structure and has a unique name. Figure 1 gives the modules divided by VLT common software and applications.

• There is only one central archive. Users get local copies using a simple client server mechanism. In our projects, there is typically only one person at a time dealing with a specific part. A modification must be started, implemented and tested, then archived. During this period the module is locked.

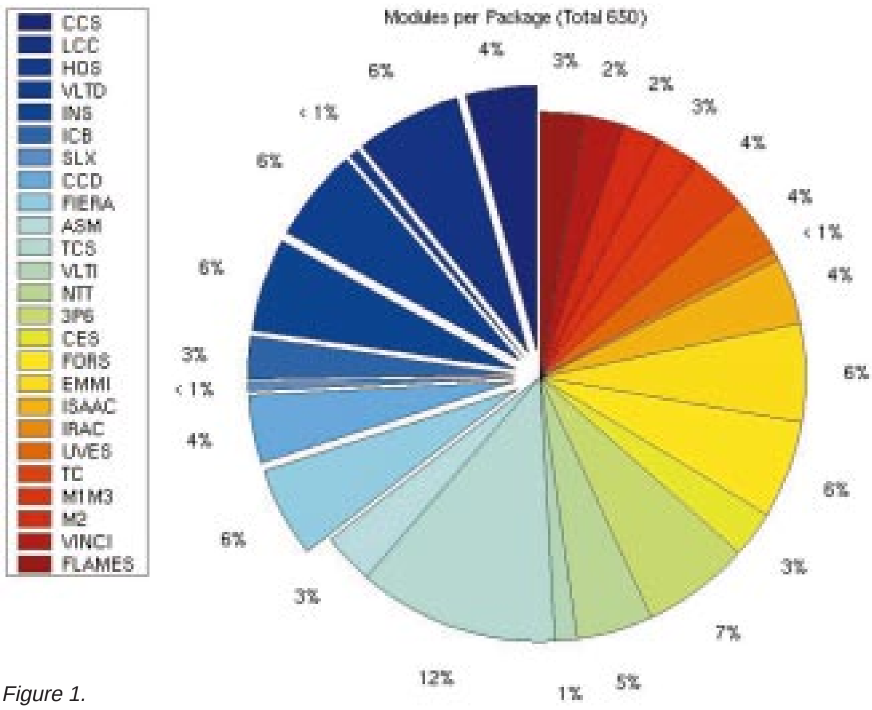

Figure 1.