and the MPG, have already agreed to also contribute to the beam combination and fringe sensing instruments in the form of equipment and manpower. ESO invites the wider community to participate in this effort, and to help defining and developing the beam combination and fringe detection equipment.

4. Conclusions

We have described the new implementation plan for the interferometric mode of the ESO Very Large Telescope. ESO proceeds with VLTI with a larger effort in terms of manpower than ever before and involves a significant fraction of the ESO astronomical community into this endeavour. The development plan for the VLTI has been adapted to the difficult financial situation by substantial modification of the concept and by gradually increasing the capability. We feel that the modifications simplify the project in many areas while strengthening the scientific potential. However, introducing the astrometric capability is a new requirement which will certainly be difficult. When Phases A and B are completed, a large subset of the initial goals for VLTI will have been put into existence.

At this time, the VLTI will be far from complete, and one should prepare for further upgrades. An important capability will be the near-infrared capability of Unit Telescopes through adaptive optics. Another important capability would be extending the spectral regime towards the visible, opening a wide range of spectral diagnostics and even higher resolution. Similarly important would be adding a fourth Auxiliary Telescope and more delay lines to bring the number of beam lines up to a number of eight. VLTI will then unveil its full potential as an optical aperture synthesis array.

References

Léger, A., Mariotti, J.-M., Rouan, D., Schneider, J., "How to search for extra-solar planets with the VLT/VISA?" in *Science with the VLT,* Proceedings of the ESO Workshop 28 June–4 July 1994, J.R. Walsh and I.J. Danziger (eds.), Springer 1995, pp. 21–32, 1995.

Shao, M., Colavita, M.M., "Potential of long-baseline infrared interferometry for narrow-angle astrometry", *Astron. Astrophys.* **262**, pp. 353–358, 1992.

Quirrenbach, A., "Astrometric detection and investigation of planetary systems with the VLT Interferometer", in *Science with the VLT,* Proceedings of the ESO Workshop 28 June–4 July 1994, J.R. Walsh and I.J. Danziger (eds.), Springer 1995, pp. 33–37, 1995.

von der Lühe, O., Quirrenbach, A., and Koehler, B., "Narrow-angle Astrometry with the VLT Interferometer", in *Science with the VLT,* Proceedings of the ESO Workshop 28 June–4 July 1994, J.R. Walsh and I.J. Danziger (eds.), Springer 1995, pp. 445–450, 1995.

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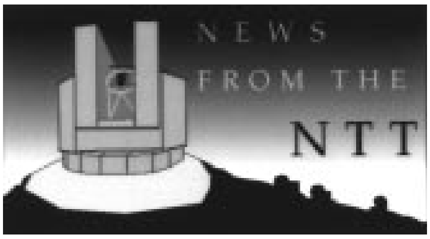

The NTT upgrade project has the following goals:

1. *Establish a robust operating procedure for the telescope to minimise down time and maximise the scientific output.*
2. *Test the VLT control system in real operations prior to installation on UT1.*
3. *Test the VLT operations scheme and the data flow from proposal preparation to final product.*

J. SPYROMILIO, ESO

Last time I wrote for *The Messenger*, the NTT upgrade was progressing well. We had been able to point and track with the telescope but still had some problems with telescope oscillations. The telescope realignment was about to start and the instruments had not as yet been used. Since then a huge amount of work and progress has taken place.

The alignment of the telescope, a practice run for the VLT Unit Telescopes, was successful. The telescope altitude axis was redetermined and the adapter-rotators were re-aligned to ensure that the mechanical and optical axes of the telescope were as close to each other as possible. We found that the telescope was within the specifications but nevertheless we decided to compensate for the small misalignment present. The adapter-rotators were moved by approximately 100 microns. In addition, the setting angle for the tertiary mirror was also redetermined. Here the change was somewhat larger, possibly explaining an effect found in the old NTT whereby when tracking in an unguided mode across the meridian the stars moved. This would not have affected guided exposures. In addition, the position of the secondary mirror was redetermined. M2 is within the specifications as well, although close to the limit. During the next months we shall be using the active optics results to determine if we should undertake to move the secondary mirror.

In December and January, an intense period of commissioning and integrating the software, the telescope was brought from an engineering mode to an operational state. The telescope oscillations proved very hard to fix. A combination of problems contributed to causing the telescope to misbehave at random intervals. Only in the very last days of January were the most critical problems really solved. The telescope now tracks very well in most areas of the sky. However, there seems to be significant friction, especially in the altitude axis, causing some problems as the telescope moves past the meridian (where the altitude speed slows down to zero before changing sign). The azimuth axis seems to behave very well but we have not been running the telescope long enough to be sure that all is well.

The telescope pointing is excellent, with the exception of a zone of avoidance around the zenith. This of course is a problem all alt-az telescopes have and is not new to the NTT. However, we hope with more detailed pointing models we will be able to make the zone of avoidance small enough so as not to impact any scientific programme. On other fronts the telescope control system is also improving. Image analysis is being run regularly and although as yet it is not robust, it is functioning and the telescope image quality is back to the excellent values we have come to expect from the NTT. Autoguiding is now working reasonably well, and automatic guide star selection by the control system is available either in blind mode (let the system select for you) or manual mode (let the system offer you a choice). Selection of the guide star to be used is a matter of clicking with the mouse on any suitable star seen on the guide camera output.

We believe that the new NTT is a telescope that is easy to use, with most of the complexity hidden from the user by the graphical user interfaces. No cryptic commands need any longer be issued and a fair amount of work has gone into the on-line help available.

On the instrumentation front, the new ACE controllers have now been commissioned and we have an improvement of a factor of 2 in readout time over the old VME controllers for the same noise figures. In addition, the re-aluminisation of the telescope mirrors and the refurbishment of the instruments have given us an improvement in throughput of a factor of 2 to 3 in most bands. In the case of SUSI we also replaced the detector with one which has high UV sensitivity. The early estimates suggest we may have improvements as high as a factor of 20 in the U band in SUSI. The SUSI control software is going through final testing and seems to work well, although some parts of the system, especially linked to the interaction of SUSI with the telescope, are still not fully tested. EMMI underwent a complete clean-up and has had a new grism wheel, the refurbished red camera, and the new RILD mirror re-installed. The new EMMI software, which is almost identical to that running in SUSI is also being tested.

The plan for the NTT upgrade which was approved by the STC and ESO management had the telescope returning to partial operations on the 1st of February. Some of you who submitted applications have already been through ESO and completed the Phase 2 Proposal Preparation process. After seven months of keeping to the daily NTT upgrade schedule religiously, I am sorry to say that the project has slipped. The first execution of a service programme took place 4 days later than planned for, on February 5th. The telescope is still in shared-risks mode and we have quite some way to go before the requirements set on the telescope and instrumentation are met. However, we believe we are close enough to be exercising the telescope and trying to do real science. I should emphasise that we are not guaranteeing any performance figures before the 27th of June when the NTT returns to full operations. However, we shall do out best to deliver science quality data to as many users as possible.

On the operations front, an enormous amount of progress has been made. The output of P2PP is now being passed to the control system in a transparent fashion and provides the parameters for the automatic execution of the programmes. The observing and target acquisition templates are running and some calibration templates are also available (e.g. automatic focusing and sky flat fields). In this way we can ensure to be doing exactly what the users specified. In December/January, we took delivery of the archive and pipeline data reduction workstations. They have been integrated into the NTT control system and while they are still running prototype software, the data do flow across the complete system and do get automatically reduced. The reductions right now are pretty rudimentary but there is no reason why this work cannot be expanded to provide the users with a first cut at their data.

As mentioned earlier, the NTT upgrade still has 5 months to run. For the time being we have been finding and solving the 1 in 1 bugs. Over the next months we have a lot of work to do. Not only do we have to acquire the necessary experience with service observing, but also find the 1 in 10 and hopefully the 1 in 100 bugs. We also have some maintenance we wish to do, which we did not wish to perform while the first phase of the upgrade was taking place. This was a decision based on various planning and technical reasons. We plan that the NTT shall continue over the next months to improve in reliability and expand the functionality of the telescope. In April we plan to start with some limited service observing using EMMI.

I would like to take the opportunity to thank all our colleagues in all the ESO divisions that have helped to make the new NTT a reality.

Staff Movements

I would like to welcome to the NTT team our new instrument operator Norma Hurtado.

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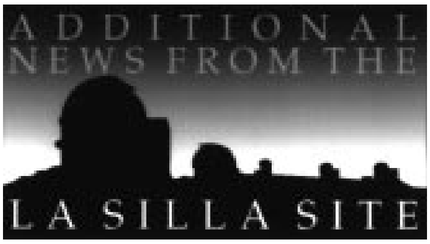

The La Silla News Page

The editors of the La Silla News Page would like to welcome readers of the sixth edition of a page devoted to reporting on technical updates and observational achievements at La Silla. We would like this page to inform the astronomical community of changes made to telescopes, instruments, operations, and of instrumental performances that cannot be reported conveniently elsewhere. Contributions and inquiries to this page from the community are most welcome. (P. Bouchet, R. Gredel, C. Lidman)

The Image Quality of the 3.6-m Telescope (Part V)

What Happens far from Zenith?

S. GUISARD, ESO-La Silla

Earlier articles about the Image Quality (IQ) at the 3.6-m telescope (part I to part IV, see previous Messenger issues) concerned the IQ near zenith. Final conclusions and improvements have been written already [1]. In this article we will present the results of the study since September, 1996, when we started to analyse the telescope behaviour far from zenith.

1. Introduction

The IQ of a telescope degrades as the telescope moves from zenith. For a mechanically perfect telescope, this degradation is due only to the natural seeing which worsens with increasing airmass. However, for real telescopes, mechanical flexures accelerate the degradation. These flexures affect the structure of the telescope itself and the mirror supports.

Flexures of the Serrurier struss misalign the two mirrors of the telescope and cause mainly decentring coma aberration. Malfunctionning of the mirror cell with zenith distance is more likely to create astigmatism and triangular coma. We shall see that the 3.6-m is no exception to this rule.