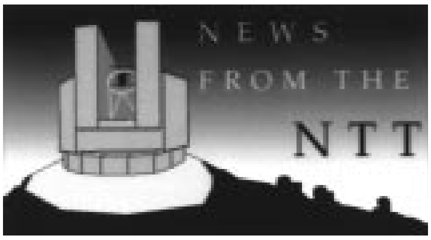

NEWS FROM THE NTT

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At the time of this writing, the big-bang phase of the NTT upgrade project has just been completed, and the project is entering its third and final phase. Namely, operations have been resumed, according to a new model, prefiguring the VLT operational model, and accordingly providing a test of the latter.

The End of the Big Bang

The NTT page that appeared in the previous issue of *The Messenger* was written almost five months before the completion of the NTT big bang. Although all the fundamental components of the new control software had been implemented, a lot of debugging, fine-tuning, and testing remained to be carried out for many of them.

Both at the telescope and at the instrument level, and at the interface between them, the solution of quite a number of weaknesses or problems that we had had to carry along for a fairly extended period of time required the installation at the NTT of a new release of the VLT common software. This installation was performed in the second half of May. The outcome was a very significant improvement of the overall robustness and reliability of the system, as well as of the smoothness of its operation. It should also be stressed that, since the part of the software that is affected by these modifications is strictly common to the NTT and the VLT, the changes made in the new release in view of meeting the NTT needs also avoid future problems at the VLT. This illustrates the importance of the role of the NTT as a testbench for the VLT control system: many problems have already been detected and fixed prior to the installation of the system on UT1.

Other than that, most efforts on the telescope front have been directed towards the improvement of the image analysis and autoguiding software. Both are now much more robust and easier to use than a few months ago. Operation of the image analysis has evolved into a routine. For the user, this should translate primarily into the achievement of more predictable and stable image quality. In addition, through logging of the results of regularly performed image analysis, a better understanding of the optical behaviour of the NTT is building up, which in the long term should allow overall performance to be enhanced. For instance, it has already been demonstrated (not surprisingly) that the autoguider performs much better when the image quality has been optimised through proper use of the active optics. This illustrates the importance of the latter even within the framework of observing programmes such as point-source spectroscopy, where users in the past often tended to regard the execution of image analysis as useless or even wasteful (in terms of observing time).

The functionality of the autoguider has been expanded. The autoguider can now automatically select and acquire a guide star when the telescope is slewed to a new field. This process includes a check that the guide probe is not vignetting the field of view of the instrument CCD. Guide-star acquisition occurs at the position in the field viewed by the image analysis camera: accordingly, it can be used to run the image analysis in parallel with observation. As before the big bang, fully automatic combined offset is possible: when the telescope is offset by some amount, the opposite offset is applied to the guide probe, so as to recover the same guide star in the same location on the autoguider camera. A new feature is that, if the motion required from the guide probe is to bring it outside its physical or vignetting position limits, the autoguider switches to a new guide star, which it selects and acquires automatically.

On the optical side, in May, a new approach to mirror maintenance has been experimented with at the NTT, when the primary mirror was taken off the telescope and washed in its cell. This intervention, which was executed 38 weeks after the last aluminisation, restored the mirror reflectivity to its value of 18 weeks after aluminisation, and the micro-roughness of the coating to the value of 9 weeks after aluminisation. Contrary to aluminisation, washing does not require to take the mirror out of its cell and it can be done at the NTT (while for aluminisation, the mirror must be transported to the 3.6-m building). Therefore, it is both less delicate and less time-consuming: the whole operation, including rebuilding the pointing models once the mirror has been reinstalled on the telescope, can be completed in two days and two nights. Given the excellent results achieved in this first attempt, regular mirror washing seems to be a viable alternative allowing one to increase the spacing of mirror aluminisations while preserving the efficiency: accordingly, it is contemplated to repeat this operation at the NTT in the future. I take this opportunity to thank our colleagues of the La Silla Support Teams (in particular, Optics and Mechanics) who have assisted the NTT Team in this intervention.

At the time when the last issue of *The Messenger* was being prepared, the

Figure 1. View of the NTT control room during the first observing run after the big bang. From left to right are Visiting Astronomer Francesco Ferraro, Support Astronomer Chris Lidman, Instrument Operator Norma Hurtado, and Telescope Operator Hernán Nuñez.

EMMI control software was just undergoing first tests. This software, given the very complex nature of the instrument that it drives, is quite intricate, and its verification and debugging proved extremely demanding. As much time was required for the latter, some functionality was only added at a fairly late stage: dichroic mode for medium-dispersion (grating) spectroscopy, driving the punch tool for multi-object spectroscopy, and control of the calibration lamp. But the most troublesome part of the new EMMI control software proved to be the control panel, an extremely sophisticated graphical user interface. At the time of this writing, while all the functions of EMMI can now be regarded as controlled in a quite satisfactory manner, the control panel still shows on occasion some apparently erratic behaviour. This is regarded as a minor drawback, since this panel is mostly used for engineering purposes, and not generally to drive the instrument in normal operating conditions: indeed, scientific observations are primarily carried out through the high-level operating software, via templates (of which more below).

On the other hand, recurrent problems have been met throughout the EMMI commissioning with the CAMAC motor controllers. Only those of our readers with the deepest knowledge of the NTT upgrade project will remember that, early on, it had been decided that while the electronic controllers of all other NTT subsystems would be replaced by VLT standard modules, the CAMAC controllers of EMMI would be kept and they would be interfaced to the rest of the system through a layer of software making them look like VLT standard. Financial and manpower constraints fully justified that decision, which unfortunately now appears as a major source of trouble. The problem could not be tackled during the big bang due to lack of time, and it is being investigated at this very moment. The current approach consists in studying operational workarounds that will limit or cancel the impact of the problem on scientific observations, since a solution at a more fundamental level cannot be envisaged in the short term.

By contrast with EMMI, SUSI had already long ago reached a fairly stable state (thanks, of course, to its much greater simplicity). Work done on the SUSI control software over the last months has been mostly cosmetic, with in particular the implementation of a new control panel which looks much more similar than the previous one to the control panel of EMMI.

The bad news for SUSI come from the CCD, the newly installed Tektronix #42, whose charge transfer efficiency drops, causing image smearing, above levels of 60,000 e^- for slow readout, and of 110,000 e^- for normal and fast readout (with the settings currently offered to users). This problem appears to affect all the CCDs of that type, but the level at which it starts is lower for #42 than for other similar chips on La Silla. There is no easy solution apart from the replacement of the CCD. No adequate spare being available for the time being, CCD #42 will be left on SUSI until the instrument is decommissioned to be replaced by SUSI-2 at the end of 1997. Users will accordingly be warned against observation at too high levels.

The end of the big bang has suffered not only from the technical difficulties reported above, but even more of the unusual extended period of very bad weather on La Silla in May and June. During the latter, it was not only impossible to do any observation at all for about one month, but in addition, on several instances, it proved impossible to move the building closed because of the extreme strong wind, or even to drive the telescope or the instrument inside the building as water leaks forced us to keep them parked, covered with plastic protections. These circumstances have, of course, severely hampered our attempts to complete the verification and commissioning of the control system. They have had an even worse impact on the development of operational tools and procedures.

Operations of the NTT are intended to be fully embedded in an end-to-end data flow model. At the front end of the data flow, the user whose programme has been approved by the OPC, goes through a Phase 2 Proposal Preparation (P2PP) process, during which with the help of a sophisticated software tool (also called P2PP) he defines Observation Blocks (OBs). An OB can be seen as the smallest complete description of an observation. OBs are stored in a database, from which they are passed to the high-level operating software (aka Bob, Broker of Observation Blocks) by the Observing Tool (OT). Bob uses the information contained in the OB to trigger the execution of a series of templates, or sequencer scripts. The latter are essentially sequences of commands that are passed to the telescope, instrument, and detector control systems. While P2PP and OT have been developed by the Data Management Division (DMD), and Bob is part of the VLT common software, the specific templates for EMMI and SUSI were to a large extent created by the NTT Team. From the description above, it must be clear that proper certification of the templates requires that the underlying control system is operational: given the delays that have affected the latter, it can be understood that templates could not be as fully tested and debugged as one might have hoped. Consequently, the first post-big-bang NTT users have faced and still should expect to face on occasion some difficulties in the use of the templates. (I would like to apologise here for the inconvenience). The latter should be kept to a minimum thanks to the fact that the know-how about the templates is fairly widespread among the members of the NTT Team supporting daily operations.

At the back end of the data flow, the original design was to have a copy of the CCD frames, after readout and storage in the instrument workstation, forwarded directly to an archive machine, and from there to a pipeline workstation and a user workstation. The former is to be used for on-line standard (pipeline) processing of the data, while the latter is at the disposal of the astronomer for analysis of his observations using some standard image processing software (for the time being, IRAF and MIDAS are available). The whole transfer chain, as well as most of the pipeline and associated quality control products, are being developed by the DMD. For very much the same reasons already mentioned, however, the transfer chain could not be brought into a stable operational state yet, so that its implementation had to be postponed. Instead, as a provisional workaround, a simpler tool, offering less functionality, has been installed by the NTT Team to transfer data from the instrument workstation to the astronomer and pipeline workstations. The pipeline processes, which appeared to be working reliably (although still fairly rudimentary algorithms were used for data processing), are being modified to allow them to ingest input from the simplified transfer chain. Once this is successfully completed, the change should be mostly transparent to the user. But there will be no on-line connection to the archive: accordingly archiving of the data is, for the time being, based on tape copies sent by courier service from Chile to Germany.

The execution in service mode of some shared-risk observations with SUSI which had started in February, continued through March and April. Distribution of the corresponding data is currently in progress. Regrettably, the already described delays due to technical and meteorological factors have later on prevented the NTT Team from executing many of the service observing programmes that had been approved by the OPC for the first half of Period 60 (in particular with EMMI). Even though there was no definite commitment to deliver data during that period, we would have strongly wished to obtain at least some observations then, to acknowledge the confidence placed in us by the applicants and the efforts made by them for programme preparation, as well as to gain practice in operations. I can only reiterate here the apologies that the affected investigators have already received through personal letters.

Back to Operations

On June 27, as had long been foreseen, the NTT went back into normal operations. The first few observing runs had been scheduled for classical observing. The first Visiting Astronomer to come back to the NTT after the big bang was Dr. Francesco Ferraro. Figure 1 shows a view of the renovated control room during this first run.

It is too early to draw conclusions from the first observing runs at the NTT after its reopening: this will be left for a next issue of *The Messenger.* It may be sufficient here to mention that if these runs were affected by some minor hiccups, as could be expected after such a long suspension of operations and given the difficulties encountered in the last phase of the big bang, the general behaviour of the system revealed no major flaw. The users so far have generally expressed an overall satisfaction, assorted with a number of constructive suggestions. The latter are extremely valuable to us, especially since the current NTT prefigures the VLT. Thus we are urging our users to tell us what they like and dislike in the current NTT, so as to enable us to shape the VLT more to their taste.

Personnel Movements

The transition of the NTT from a stage of technical development work to regular operations has been accompanied by a change of leadership. Jason Spyromilio, who had been NTT Project Scientist since September 1995, has left the NTT team and his function has been taken over by the author of these lines. The key role played by Jason in the successful completion of the NTT big bang cannot be overstated. His dedication to the project, his indefatigable activity towards its achievement, and his extreme competence have been examples and catalysts for the work of all team members. Jason is now headed towards the VLT, where he is to lead the commissioning team. On behalf of the NTT Team, I wish him the best of success in this new challenge.

At the same time, Anders Wallander has left the NTT Team too. One of the members of the team since its creation in 1993, Anders, as chief engineer of the upgrade project, has been instrumental in its technical achievements. He now is back in the VLT software group, where the experience that he has accumulated through his work for the NTT will without doubt prove extremely valuable.

Finally, I am taking this opportunity to welcome Chris Lidman in the NTT Team, where he is taking the position of staff astronomer left vacant by the departure of Roland Gredel to the team in charge of the 3.6-m telescope and of the CAT at the beginning of the NTT big bang. Chris, who was until then a postdoc in the La Silla medium-sized telescope team (aka 2.2 team) where he was in charge of the IRAC instruments, will in the NTT Team assume the responsibility of SOFI instrument scientist. Until the latter comes on line, Chris is sharing the load of astronomical support of EMMI and SUSI with the other astronomers of the team.

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ESO at the Leipzig Fair

Thanks to the hospitality of the German Federal Ministry of Education and Research, ESO was able to entertain a 60 square metre information stand at the “Forschungsforum ‘97”, held in connection with the INNOVATION Fair at Leipzig’s impressive, new Fair grounds from September 16–20.

The stand itself had a circular layout with a diameter of 8.2 metres and featured a model of the VLT, ESO videos, Internet connection and colour panels with text and graphics. An 8-metre panorama photo of the Milky Way formed the background and provided an ample setting for the display.

The first day was dedicated to the youth, and about 5,000 young people passed the counters, eager to learn about the latest results and ideas in the numerous areas of fundamental and applied research that came together at the Research Forum.

Three ESO staff members were busy during the day answering questions from the many visitors. It was evident that many of the young people were informed about the VLT project and did not want to miss the opportunity to ask very specific questions to the ESO staff present.

Later in the day, the extensive programme of public lectures included talks by ESO astronomers focusing on VLT science and the issue of Astronomy and the Youth.

Also during the following days, the ESO stand was well visited. Among the many visitors were the Mayor of Leipzig, high-ranking officials from the German Federal Ministry of Education and Research and representatives from industry. Physics teachers spent substantial time on the stand, browsing through the ESO Web pages about the VLT as well as Astronomy On-line.

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