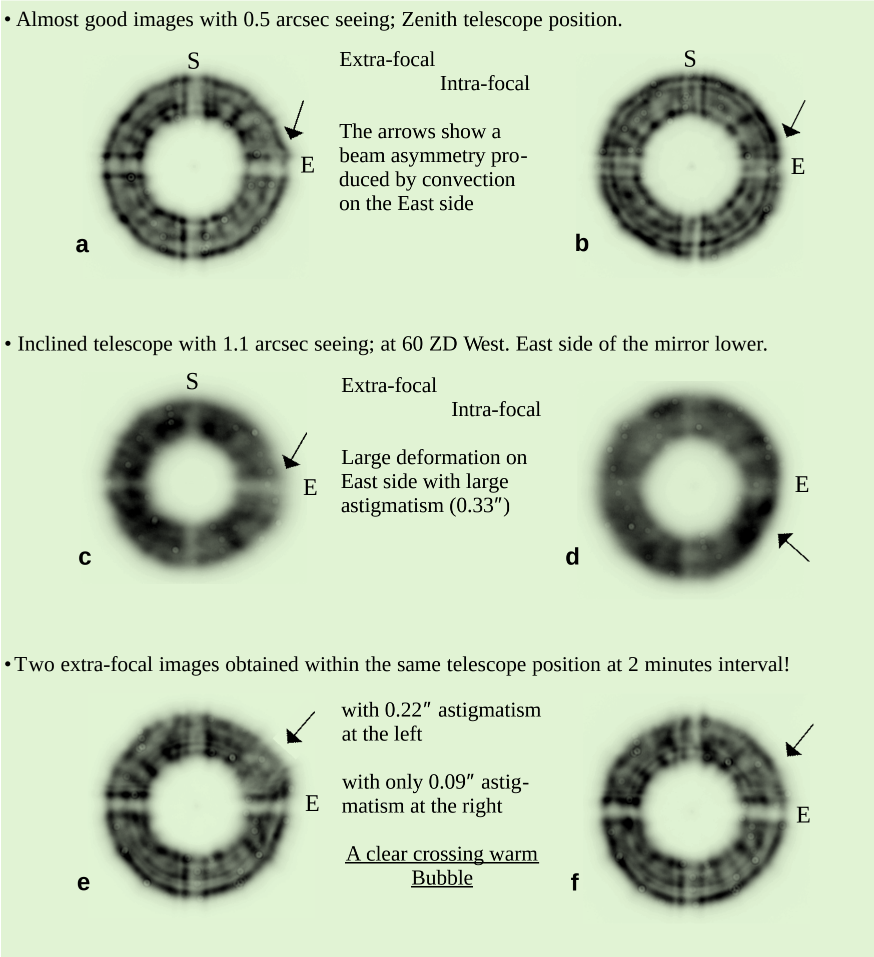

Figure 4: Thermal contribution to the image quality as seen in defocused images.

On the last night, however, the mirror was warmer by 1.5 degrees, with a corresponding degradation in the mirror seeing. The outside air temperature reached a low value of 4 degrees, causing a larger gradient with the remaining warmth of the telescope delta pads. Figure 4 clearly shows how this local effect is visible in the defocused images. The figure also shows the distortion of the defocused images due to local thermal perturbations.

Conclusion

Following the interventions performed up to and including July 2000, the telescope image quality remains good with several reports by observers as being very good. Under good external seeing conditions, it is possible to achieve sub-arcsec images, sometime approaching 0.5 arcsec. The image quality achieved with the WFI is as expected over a large part of the sky. Improvements could still be made to minimise the thermal contribution when colder temperatures are experienced. The best method (which is already in use on the 3.6-m and the NTT) would be to ventilate the main mirror with high-flux fans. A reduction in the mirror seeing, as well as local perturbations, could be achieved by blowing air across the mirror, from north to south.

The installation of load cells on the three axial fixed points will be also a forward step on the telescope improvement. The force delivered by each of the axial fixed points could be fine tuned, to reach a new minimising of the residual low astigmatism. The limit of the image quality will be then defined by the pixel size of the WFI.

Acknowledgements

We are grateful to the mechanics team for the discussions and participation during all the steps of this study. The assistance of the Medium Size Telescope Team, in allowing regular test periods and operational help, was also essential to the success of the image quality improvement.

NEWS from the NTT

O. HAINAUT and the NTT Team

A Motor-related Disaster

At the time this is being written, the NTT is running very nicely. While this is how the NTT is supposed to behave, it has not been the case during the last month. Indeed, on January 16, it was detected that one of the 4 main azimuth motors had died. The team immediately started to reconfigure the drive system to operate without that motor (in case of emergency, we can run on 2 motors only). During that process, a second motor died! We decided to stop the operation and shut down the telescope to investigate; indeed, while we can survive with 2 motors, we cannot afford to kill one per day. The two faulty motors have been removed, our (single) spare installed, and the electronics started to perform a *complete* check of all the system driving the motors. In that process, it was discovered that a third motor presented some minor signs of damages.

The next step was to open one of the faulty motors to diagnose and, ideally, to repair it. For this purpose, we invaded the dome of the Schmidt telescope, which was de-commissioned some time ago. This large room has plenty of space, is very clean and equipped with a crane, making it the ideal place for disassembling the motors. The La Silla Mechanics, Electronics and NTT Team worked almost round-the-clock to open the motor. This task is not as simple as it sounds: the motors are actually complete servo-drive units, including in a very compact design the motor itself, its water/glycol cooling system, the tachometer and the brake, the complete unit weighing 550 kg. Moreover, some special tools had to be manufactured; indeed, when the motors were delivered, it was not foreseen that they would ever have to be re-opened, and the assembly tools were left at the factory. To make the situation even more challenging, it occurred in January, which is right in the Chilean vacation period. La Silla was operated with a reduced staff. Eventually, the main motor coil was accessed, and we realised that

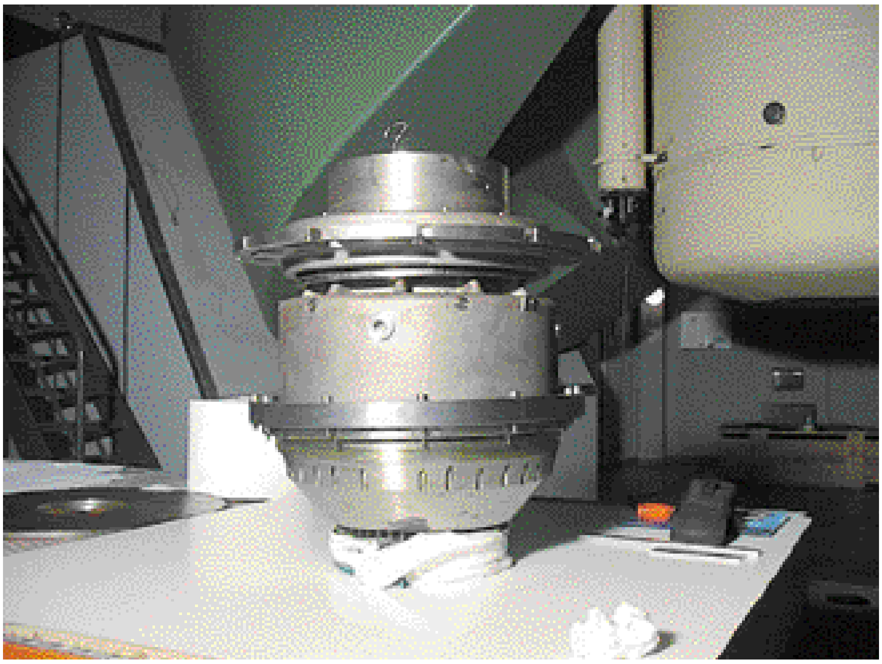

Figure 1: Dead motor in the Schmidt dome, ready for disassembly.

it was severely damaged: water had leaked on that coil over a long period of time, slowly building up a mixture of sulfate and carbon that eventually short-circuited the coil with its steel chassis. Unfortunately, even after cleaning this gunk out and restoring the connectors, the coils were still short-circuited, indicating some internal damages that could not be repaired on the spot. As we still had a motor missing for normal operation, we decided to open the spare altitude motor; while the mechanic parts are different, the coils are similar. The team, becoming expert in disassembling these motors, removed the coil from the altitude motor and placed it in the body of the azimuth motor in 24 hours only. The final rush was to re-assemble the azimuth motor and test it. I won't go into details in describing the atmosphere in the Schmidt dome when the motor started to spin; enough said that the satisfaction was palpable. The mechanics immediately re-installed the repaired motor in the telescope and adjusted it (a task that lasted till the early hours of the next day), so that the NTT electronics could immediately start the adjustments and tests. The following night, we were on the sky for a quick, but thorough test and commissioning of the new system. The NTT was back to life, after 12 nights lost for observations. This was the longest down-time ever for the NTT.

The cause of the short-circuit was obviously water. The main question is then to know where this water came from. The presence of glycol indicates that it was from a leak of the cooling system, not from condensation. The O-rings sealing the cooling pipes were found in perfect condition, so it seems they are not at the origin of the leak. A careful examination of the upper part of the motor chassis revealed little specks of oxidation right were the cooling tubes are located, so we suspect that the water diffused through micro-porosity of the steel. The next step is now to maintain and repair the remaining motors, and to fix them so that this problem does not repeat itself in the future.

By re-arranging the schedule and using a 4-night technical run combined with a 2-night service observing run, we could perform the priority observations of all but one of the observation runs that had been lost.

Instruments

Since the previous report from the NTT, SOFI still had a few hick-ups related to its cryo-mechanics. The wheels, which suffer from the same problems as ISAAC on the VLT, will eventually be replaced by equivalent ones made of different material, hopefully solving the problem in a definitive way. In the mean time, the instrument control software has been modified to avoid the problem.

Asymmetric spectral lines have been reported by some of our observers using EMMI in Blue Medium Dispersion mode. This was tracked to a misalignment of the blue arm that has been corrected: the BLMD mode now provides perfectly symmetric lines. We still have to re-align the instrument for the dichroic mode. At the same time, the calibration of the long-slit unit used in medium dispersion spectroscopy has been checked and found quite accurate.

SUSI2's detector head has been replaced by a new model that will not cause any contamination of the chips, a problem that plagued SUSI2's early days. The detectors themselves have been baked and cleaned, and SUSI2 is now as good as new.

Improvements

In addition to the upgrade of the control system to the 2000 release of the VLT software (which is extremely stable and reliable), new workstations have been installed. Visitors will appreciate the power of the HP Visualise B2000 and J2240 that are put at their disposal.

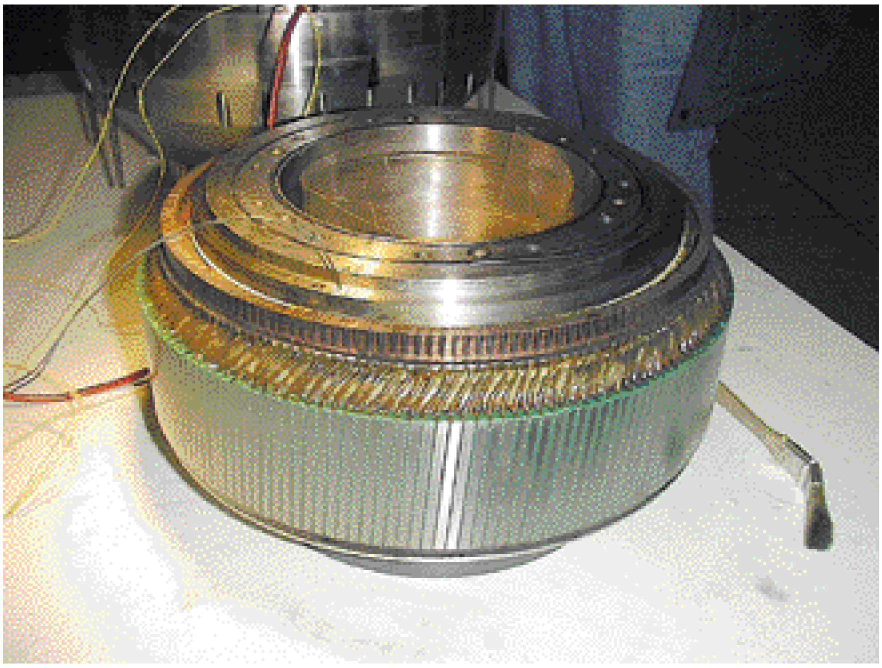

Figure 2: The faulty coil removed from the motor; the brush on the right gives the scale of this 60 kg piece.

Figure 3: Final moments of the re-assembly of the motor.

We also installed a set of high-speed fans around the main mirror, to produce a constant artificial wind which disrupts the hot air cells that could form over the mirror. This strongly contributes to improve the image quality when there is no wind. The baffle of the secondary mirror has been changed for a light-weight, Kevlar and Carbon fibre structure that is optically equivalent to the former baffle, but whose upper part is completely transparent to the wind. This provides an air-flow over the secondary mirror, and avoids the formation of a hot-air bubble that would introduce some aberrations. Another article in this issue of *The Messenger* describes these improvements and their results in more details.

Staff

Since our last report, Ismo Kastinen and Hernan Nuñez (Telescope and Instrument Operators) have left the team; Ismo is now a Software Engineer at La Silla, and Hernan a TIO at the VLT. Gabriel Martin (TIO) is about to leave the NTT to works at the Magellan Observatory on Las Campanas as Instrument Specialist. Monica Castillo and Duncan Castex have joined the Team as TIO. There are also many changes in the astronomical staff: Vanessa Doublier (fellow) has left the Team, and Stephane Brillant (fellow) is currently on his last shift at the NTT; both of them have been hired as staff astronomers at the VLT. Obviously, the NTT is an excellent training camp for Paranal! Malvina Billeres and Merieme Chadid have joined the NTT Team as fellows.

2p2 Team News

H. JONES

Personnel Movements

In December we welcomed Emanuel Galliano to our team. Emanuel is a French student at ESO Chile who is already familiar with La Silla, through his previous work with the DENIS group. He will be working primarily on operations at the 2.2-m.

In February, however, we bade farewell to Emanuela Pompei after nearly two years with the team. Although Emanuela is leaving La Silla, she will remain with ESO in Chile, commencing work as a Staff Astronomer on Paranal in March. We wish her all the best in her move north.

P2PP and BOB Now on the 2.2-m

In December, the final commissioning phase of the new operating software at the 2.2-m took place. This means that Wide Field Imager (WFI) observing programmes at the 2.2-m telescope are now performed using VLT Observing Software, with all pointing and exposure acquisitions controlled through Observation Blocks (OBs).

If you have upcoming Service Mode observations, then you will be contacted directly about the creation of OBs as part of the Phase-2 preparations for your programme.

If you have an upcoming Visitor Mode WFI run, then you will need to familiarise yourself with the P2PP software. Specifically, you should know how to create and edit OBs in this environment, as this is what is used at the telescope. You should also be aware of the different types of WFI-specific templates available to build OBs, and plan your observations accordingly. Whether or not you choose to prepare your OBs in advance of coming to observe is up to you. If you already have experience with P2PP, you may wish to install the software at your home institute and create your OBs ahead of time. Otherwise it is better if you can create your OBs on the mountain. In this case, it is highly desirable that you arrive the day before your first night if this is at all possible. Allowing ample time for preparation plays a major part in the efficiency of the observing run.

Further information can be found at our 2.2-m P2PP/BOB web page, at http://www.ls.eso.org/lasilla/Telescopes/2p2T/E2p2M/WFI/P2PP_BOB/ . It contains links to the P2PPHome Page and the new WFI Templates Manual, which describes observing templates available for OB creation. The page also has instructions for installing and running the software at your home institute, including use of the WFI Instrument Package. As always, questions or comments can be directed to the 2p2 Team at any time (2p2team@eso.org).

New CCD on the Danish 1.54-m

A new CCD was commissioned at the Danish 1.54-m in September by a team from the Copenhagen University Observatory. The new EEV/MAT CCD (2048 × 4096 pixels) replaces the old Loral 2048 × 2048 detector to bring about improvements on two fronts. First, the new device does not suffer from the same charge diffusion problem as the old CCD. This problem was thought to have been responsible for the consistently poorer seeing measured at this telescope compared to others. Second, the EEV CCD has half the read-out noise (3 e^- rms) of the old device, and a much larger full-well.

However, the optics of DFOSC do not allow the full area of this large format device to be used. The region used suffers from some defects such as bad columns and charge traps, in a similar way to the Loral chip. The quantum efficiency of the EEV device is slightly less, peaking around 450 nm and declining steadily to the red. The parallel charge transfer efficiency shows no losses although there is a small but non-negligible loss in the serial direction due to trap in the serial register.

A full report on the characteristics of the device (by Anton Norup Sorensen of the Copenhagen University Observatory), is available from the 2p2 Team Web Page at http://www.ls.eso.org/lasilla/Telescopes/2p2T/D1p5M/misc/ringo.ps .