Some Snippets of History

Richard West (ESO):
Memories of early times at ESO

My first encounter with ESO was a meeting for young European astronomers, organized in Nijenrode Castle (north of Utrecht, The Netherlands) in the summer of 1963. Here, about thirty future astronomers had a wonderful opportunity to meet some of ESO's famous founding fathers and – the real aim of this event – to become acquainted with each other. I was one of three from Denmark, as a student at the Copenhagen University Observatory at that time. With the conference programme running late, I had to speak about my work (computer studies of light curves of eclipsing binary stars) in the evening session, just before Prof. Marcel Minneart's closing lecture. It was the first such speech I had ever given in English and I remember being suitably nervous, but surviving. The meeting indeed brought together many of those young scientists who later became involved in ESO and many of us still recall this initiation to European co-operation with great pleasure. Thanks above all to the persistent efforts of my Professor in Copenhagen, Anders Reiz, Denmark was able to join ESO in 1967.

I myself came to ESO at the beginning of 1970 as Assistant to the Director General, Prof. Adriaan Blaauw. I often travelled to La Silla to perform observations with the various telescopes there during the following years. In November 1970, John Graham at Tololo found a nova in the LMC. With the ESO Director in Chile, Prof. Bengt Westerlund and another ESO astronomer there, Bob Havlen, we decided to obtain slit spectra of the fading 13th magnitude object; as far as I recall, it was only the second time this was done on an LMC nova. I spent three nights at the "Chilicass" spectrograph on the ESO 1.52-m telescope, exposing continuously for 4, 5, and 7.5 hours, respectively. To do the visual guiding properly – each photon really counted! – I had to balance most of the time in total darkness, high up on a ladder at the edge of the floor platforms. It was indeed a rewarding feeling when I finally saw a usable spectrum on the small plate in the dim darkroom light at the end of the night. Ten years later, we started using CCD's and such heroic efforts are now ancient history.

Jacques Breysacher (ESO):
Early days of the OPC

The history of the OPC goes back to June 1967 when the ESO Council decided to establish a Scientific Programmes Committee (SPC) meant to advise the Directorate and the Council on general scientific policy matters, and to evaluate the observing proposals submitted by the visiting astronomers. The SPC held its first meeting in May 1968 at the Bergedorf office of the ESO Directorate, in Germany.

The SPC proposed rules of procedure which were formally adopted by the ESO Council in July 1968: telescope time allocation was to be arranged for periods of six months; observing proposals had to be submitted 6 months before the beginning of these periods; final allocation was done by the Directorate following the recommendations of the SPC. One third of the observing time was to be allocated to the ESO staff. According to the ESO numbering system of the observing semesters, in which October 1, 2002 – April 1, 2003, corresponds to Period 70, the first observing semester (Period 1) was November 1, 1968 – May 1, 1969.

In these early days potential applicants were informed that "Observing periods granted may range from several weeks to several months", a somewhat unusual length for a run nowadays ..., but were also warned that "Defrayal of travel expenses of accompanying wives is foreseen to a limited extent and that only in the case the observers will have to stay in Chile for a period of at least six months." This last statement reveals an interesting sociological fact: in the early 1970's a visiting astronomer was by definition a man!

Svend Laustsen (ESO, ret.):
How ESO got its Optics Group

In 1970, at a time when ESO still had its European seat in Hamburg, I was given the task to build up technical groups and to install these at CERN in Geneva. Thanks to splendid help from CERN we soon succeeded to set up groups for mechanics and electronics and for site, buildings and domes. These groups worked for the design and construction of the 3.6-m telescope and other projects in Europe and at La Silla.

In the optical field, however, CERN was not of much help, and we had not succeeded otherwise in attracting optical technicians. Finally Alfred Behr and I agreed to ask Ray Wilson at the Zeiss Works, whether he new of any young man he could recommend to us. He replied: "No, I do not know of any technician for that job, but I can offer myself to ESO as an optician." A new situation indeed. After consultation with Adriaan Blaauw, we invited Ray for a dinner – in confidence of course – at the restaurant Mövenpick in Geneva. It was a long-lasting dinner, which resulted in the agreement on his appointment.

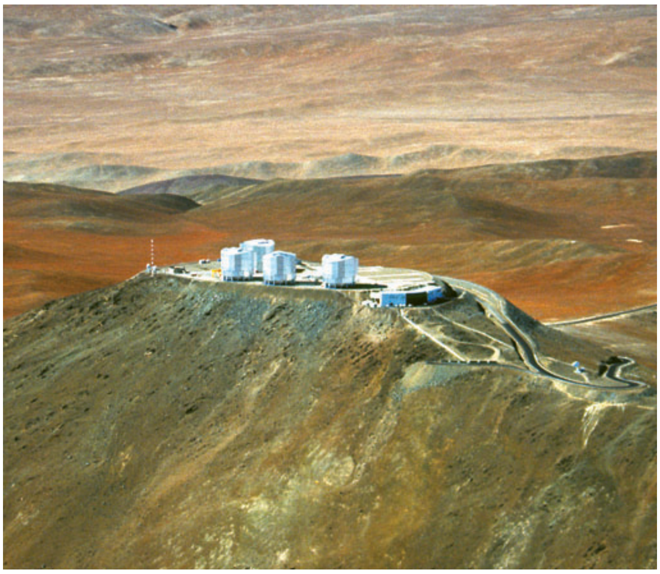
Shortly after taking up his duties Ray presented plans for an Optics Group, and according to this Francis Franza, Maurice Le Luyer, Daniel Enard, and some others for shorter periods, were engaged. Still at the time when the 3.6-m telescope was under construction and installation, they started their development of new methods for the support of big mirrors. The positive impact this group and their work has had for the NNT, the VLT and for ESO in general is well known to everybody in and around the organization.

Daniel Hofstadt (ESO):
Renata Scotto at La Silla

Twenty years ago Renata Scotto sang Madame Butterfly at the Santiago Opera House and later on visited La

Construction of the building for the 3.6-m telescope at La Silla in 1975.

Paranal before ...



... and after construction of the VLT .

Silla. Most of us were somewhat stiff in our welcome in view of her Prima Donna reputation. An incident was to break the ice in a most unexpected manner. Our colleague the "Dottore", a great opera fan, came to see the Diva and asked her to sign a music record. For a moment she acted very surprised and then signed a dedicatory with grace and smiles. The "Dottore" had approached her with a María Callas record! Such an achievement is most likely to remain a world premiere.

Daniel Hofstadt (ESO): La Silla vaut bien une Messe

Newcomers at La Silla had to learn and face the peculiarities of a world and culture which had developed at La Silla over the years. Ingenuousness was not part of that culture. Newcomers would be quickly baptized with nicknames reflecting their physical or psychological traits. Practical jokes were not absent either and most of the beginners would be sent to the telescopes to attend weird issues or support important visitors who had not shown up. Probably the most striking welcome was staged for a young technician who enquired if Mass was celebrated at La Silla. His colleagues immediately reassured him and invited him for his first Sunday Mass, a Mass which was properly and seriously officiated by a member of Team and with extensive attendance from the staff.

Jean-Pierre Swings (IAP, Liège): First experience at La Silla, and some activities for the VLT

Thirty years ago (January–February 1972) I had my first observing run on La Silla, a "luxurious outfit" after 10 nights on Las Campanas. (On Las Campanas the night assistant had been hired just when I arrived, neither he nor I knew anything about the 1-metre telescope, and we had no common language... not to mention the lodging and eating "facilities"!). I was allocated 8 or so nights at the ESO 1.52-m coudé to do spectroscopy of B[e] stars. Having observed (± discovered) some interesting objects with IR excess at Las Campanas, I requested to use the Cassegrain spectrograph to take low-dispersion spectra of those objects... but this was refused by the ESO Director for Chile: I had to do my "approved programme", period. So I did, but in "retaliation" I decided to end my fruitful run by observing HD 45677 at 3 Å mm^{-1}, which required a 3-night exposure. This enabled one to show that, contrary to the sharp-single [FeII] lines, those of FeII exhibit a double structure, qualitatively explained as originating from a ring around the star... and not from an earthquake that occurred during the second night of exposure!

I later became involved with the VLT, as successively chairman of the VLT Study Group, the VLT Advisory Committee, and the Site Selection Working Group. The Workshop on ESO's Very Large Telescope (Cargèse, May 1983, in which an ESO VLT was presented for the first time to a number of scientists from the ESO countries, showed full unanimity about the definite need for a 16-m (equivalent) telescope to be located on an excellent site. Five working groups and a VLT Advisory Committee were set up after the Cargèse meeting in order to "define realistic objectives" and to "assess the implication of the specifications (and thereby the cost!) of a VLT". Their reports were presented in Venice (2nd VLT Workshop, Sept. 1986) and received an overwhelmingly positive echo. The VLT proposal was then elaborated into the "Blue Book" that was endorsed by the ESO Council in 1987. The VLT was going to become a reality; interferometry was going to evolve from a bonus to a driver, and we now start to see its fantastic potentialities through the VLTI.

The conclusion of the VLT Site Selection Working Group (SSWG) (VLT report n° 62, p. 159, Nov. 14, 1990, edited by Marc Sarazin) stated: "On the basis of scientific considerations, the SSWG unanimously recommends that the Paranal area be chosen for the location of ESO's Very Large Telescope". As chairman of that SSWG I had to defend this at the next Council meeting, and then came the truncation of a beautiful conical mountain in order to accommodate the VLTI on what was, and hopefully will remain, an excellent site. Once in a while I shiver a bit about all the consequences of the SSWG recommendation!

Daniel Enard (EGO, Pisa): The early days of instrumentation at ESO

To younger people born in the age of Megapixels and computer control, a narration of the (not so) old ESO times may sound like a medieval tale. Yet, the experience acquired in this period largely contributed to the present extensive ESO expertise.

In the early 1970s, the largest telescopes built in Europe were between 1 and 2 metres diameter. Several 3- to 4-m telescopes were being developed (3.6-m, CFH, Calar Alto, AAT) all much inspired by the 5-m Palomar telescope which was still a reference model. Astronomical instrumentation consisted largely of conventional spectrographs, with images recorded on photographic plates in which sensitivity was boosted through a complex alchemy. The forefront detectors of the time were image intensifiers, with images recorded on photographic film, and electronographic cameras that recorded photoelectrons directly on fine grain emulsions. These "electronic cameras", as they were called, resulted largely from the pioneering work of Lallemand and were the most sensitive and most linear of the time. But operation of the early models also required much delicate and complex manipulation as the photographic emulsion was placed inside the vacuum and a new photocathode had to be installed before each operation! Later electronic cameras – the Spectracon and McMullan cameras – avoided these problems but it was still a challenging task to extract the data afterwards.

I joined ESO in February 1975, by coincidence on the same date as Lo Woltjer, the newly-appointed DG. My initial position was within the optics group led by Ray Wilson which, with the arrival of Guy Ratier, Maurice LeLuyer and Bernard Delabre grew suddenly from 2 (Ray Wilson and Francis Franza) to 6 people. The ESO 3.6-metre was under test in Europe and well on its way to completion. Its instrumentation programme however did not go beyond talks and minutes of meetings. Faced with the prospect of the largest European telescope deprived of instrumentation, a crash programme was set up by the new DG. As a "first-aid" solution, a single aspheric plate corrector was developed and arrived just on time for the telescope first light in 1977. Waiting for better instruments able to fully exploit the capabilities of the telescope, in particular the large field of view of the prime focus, a number of beautiful pictures were recorded by Svend Laustsen while the telescope was being commissioned. This first experience with the 3.6-m was also our first direct encounter with a subtle and devastating devil: seeing degradation.

As part of the initial programme there was a 1-degree field triplet corrector for the prime focus that was put into operation in 1979, and a Boller and Chivens spectrograph, which had the immense advantage of being commercially available. A Cassegrain adapter, providing field acquisition, guiding and calibration facilities, already under development in 1975, was completed and installed in 1977.

The ESO Council at Ansaldo, with the mechanical structure of one of the VLT 8.2-m telescopes.

An episode will give a hint on the mood of the time. Around the Cassegrain adapter and instruments arose a fierce debate, in particular on whether the astronomer should sit in the Cassegrain cage to guide the telescope through an eyepiece or whether it was at all thinkable to trust a TV camera and perform the control from the control room! Although an eyepiece was included, the "modern" school eventually won, but not before making three prototypes of the "Cassegrain chair", an improbable object somewhere between a middle-age torture device and a dentist chair for cosmonauts.

More pragmatically, Martin Cullum meanwhile dealt with the adaptation of electronographic and electronic detectors for imaging (Spectracon in 1978 and 40-mm McMullan camera in 1979) and for spectroscopy (two Image Dissector Scanners in 1978 and 1979).

With the first set of basic instruments under way, there was more time to think about more ambitious projects. Simultaneously, the designs of the CES (Coudé Echelle Spectrometer), CASPEC (Cassegrain Echelle spectrometer) and, somewhat later, IRSPEC (IR spectrometer) were initiated, while the CAT (1.4-m Coudé Auxiliary Telescope) was being built. This first generation of modern instruments was put into operation in the early 1980s together with the first solid-state detectors (Reticons and CCDs).

The realization of this instrumentation programme within a few years by the small and somewhat novice group in Geneva was not only a great achievement but also a defining experience for many of us. Working on the Boller and Chivens spectrograph, I realized the significant light losses occurring within instruments, in particular in the popular solid-Schmidt cameras, due to vignetting, the large central obstruction and mirror reflections. High efficiency coatings were already available, yet relatively little used in astronomy because of their limited spectral bandwidth. A rather obvious idea was to split the spectrum into blue and red channels within the same instrument so that high efficiency coatings could be used. This not only provided an important throughput gain but also allowed the use of many more optical surfaces without significant losses, hence opening the path to more complex optical solutions. In particular, with the new fluorine glasses then available, it became possible to design high-quality and efficient transmission optics instead of mirror combinations. This allowed instruments to be designed that could satisfy both imaging and spectrographic requirements by simply removing or exchanging the dispersive element. On the logistic side, one of the many lessons learned by the 3.6-m experience

The ESO Council at Paranal Observatory, December 1996.

was that frequent change-over of instruments and of telescope configurations (Prime, Cassegrain, IR secondary, etc.) was a major contributor to telescope down time.

From all these considerations, the idea progressively emerged of a *high-productivity* telescope having a single configuration and several focal stations equipped with fixed multimode instruments. This idea inspired first the NTT and became fully mature with the VLT, which was conceived around this concept. As a forerunner, the multimode instrument EFOSC was developed in 1982 and put into operation in 1983 with great success. The multimode concept was then fully developed with EMMI, then used in several VLT and other large-telescope instruments. Another conceptual idea which directly emerged from the 3.6-m experience was the use of natural ventilation to eliminate dome seeing, a concept fully validated with the NTT and the VLT.

This quick glance at the past would not be complete without mentioning the gigantic progress made in detectors in about two decades. Up to the late seventies, image recording was still essentially done with photographic plates, and solid-state arrays were very much laboratory curiosities. The first solid-state detector at ESO was installed on the CES in 1981; this was a then state-of-the-art Reticon array with a read-out noise of 1000 electrons! Our first CCD put into operation in 1982 had about 300 × 500 pixels and a read-out noise of some 80 electrons (plus a lot of fringing). Today, when megapixel image formats and quasi photon-counting performance are routine, it is difficult to appreciate just how significant an advance these early electronic detectors represented.

The completion of the 3.6-m telescope and the development of the first modern instruments has been an extraordinary learning period and contributed to the creation of a core team of instrument builders fully familiar with the problems of astronomical observation as well as with the latest technical advances. Capitalizing on the progresses in detectors, optics and computer control technologies, several highly advanced and successful instruments and telescopes were built in the early 80's that moved ESO to the forefront of astronomical instrumentation. The international recognition of this competence, and the confidence this generated, contributed greatly to the enthusiastic endorsement of the VLT programme in 1987. It belongs now to the new generation of instrumental developers to maintain and further develop this capital.

Alan Moorwood (ESO): The early days of infrared instrumentation at ESO

ESO's commitment to infrared astronomy was expanded in 1977 by the creation of a new staff position for an Infrared Astronomer to advise the Director General on the development of infrared instrumentation. I actually only became aware of the advertisement via a letter from Franco Pacini, then Head of the ESO Scientific Division, with a request that I let him know of any suitable candidates. The surprising end result, despite having felt protected by my non-member state nationality, was that I found myself leaving ESA to take up duty at ESO in Geneva on October 1st, 1978!

As it happens, I was fortunate to have had been preceded by Piero Salinari, who had worked with me to build a balloon-borne IR spectrometer at ESTEC but had then been hijacked to Geneva by Franco on his way back to Italy. As I was to do later, Piero had already discovered that 'advise on infrared instrumentation' could be loosely translated as 'build infrared instrumentation'. He had thus already commandeered a somewhat dilapidated container on wheels, reminiscent of a gypsy caravan but converted into an authentic looking infrared laboratory by installing the golden looking cryostats and pumps associated with infrared astronomers in those days. (His later attempt to improve the container by painting it was less successful, at least the idea of drying it by leaving a powerful heater on all night which considerably changed its shape). Despite that, the first ESO-developed infrared photometer system was finished and installed at the 3.6-m on La Silla in 1979 (and tested with software written by Daniel Hofstadt).

In parallel, we had been developing the idea of building a cryogenic infrared array spectrometer for the 3.6-m telescope (IRSPEC, later transferred to the NTT) which was subsequently enthusiastically approved by Lo Woltjer and the STC. Unfortunately, this did not win me many friends amongst the majority of ESO astronomers who were members of a committee still deliberating on the choice of the next visible spectrograph! Being a relatively major undertaking I was also subjected to more management control, starting with a summons to appear before Lo Woltjer, Ray Wilson and Wolfgang Richter to outline the resources I would need. For a young man on a short-term contract this was a somewhat awe-inspiring event but one which I believed to have mastered with bravado by replying that I wished first to absorb their wisdom as to how best to develop such an instrument at ESO. The answer of ' if only we knew' was unexpected but at least an honest admission that these were still pioneering days in the adventure of instrument (as opposed to telescope) building at ESO. I therefore decided to concentrate first on the problem of finding a larger caravan which was solved surprisingly quickly – albeit with the additional work involved in transporting our golden cryostats and pumps from Geneva to Munich.

Walter Nees (ESO): ESO's first step into the world of minicomputers

In today's world of automation, computerization, data-processing, etc., it is rather difficult to imagine how it all started. The story goes back to early 1970, nearly 33 years ago. I had just joined ESO in the Hamburg-Bergedorf office when I became witness to a major ESO event, synonymous to setting the cornerstone of automation technology at ESO. Unknown to most people at ESO today, it was the exciting moment (at least for most ESO staff at the time) when ESO acquired and introduced its very first digital minicomputer, a Hewlett Packard HP-2114B system. This "workhorse" computer had a core memory of 16 kbytes (interesting to compare with today's computers!).

The ESO Grant machine.

In order to close a technological gap, ESO committed itself to employ leading-edge technology for acquisition, process control, and reduction of astronomical data. This first computer system was selected to serve as the central control for the "Grant Machine", an automated photographic-plate measuring and scanning facility for stellar-line radial-velocity determinations, and for microdensitometry recordings of stellar spectrograms.

The NTT at La Silla.

Before this so-called automated mode of operation was feasible, a significant number of technical modifications and extensions became necessary to the original Grant Machine, initially conceived for manual operation: the incorporation of an analogue to digital data-acquisition system, the attachment of precision rotary digital encoders for Grant table X and Y position decoding, and the integration of the computer with all peripherals and I/O-interfaces. The main tasks of the minicomputer were automatic scan control of the table, table position recording, as well as digitization and recording of the density or intensity data from the spectral photographic plate. The required electrical and electronics hardware adaptation on overall system controls had been contracted by ESO Bergedorf to a specialist electronics company in Stockholm, Sweden.

The initial installation of the Grant machine and its dedicated computer system at ESO Headquarters in Santiago was in July 1970. In spite of the positive acceptance tests in Stockholm, significant technical work was necessary until all problems had been resolved. The data-acquisition and control software (all written in awkward Assembler and Fortran code) was designed and implemented by ESO's chief programmer, Mr. Frank Middelburg (deceased November 1985), in collaboration with a few of the leading staff astronomers (Dr. J. Rickard, Dr. A. Ardeberg, and others) from the ESO Santiago Vitacura office. At the end a reliable and successful product was produced. The "ESO Grant machine" became for many years a well-known tool in astronomical data reduction and was used extensively by many ESO and visiting astronomers. Eventually it was transferred to ESO's Headquarters in Garching were it served until its retirement some years ago.

Ray Wilson (ESO, ret.): First Astronomical Light at the NTT

The night beginning on 23rd March 1989 was the culmination of my career at ESO and indeed of my work on telescope optics, which started as an amateur when I was six and continued professionally at Zeiss in 1963.

Intensive work by many colleagues in Garching and La Silla had preceded this great night of first light at the NTT: above all I would mention Francis Franza, Paul Giordano and Lothar Noethe on the optics and Krister Wirenstrand on the pointing. The active optics was working only in open loop, as we had "borrowed" its CCD to record the test object I had chosen, the globular cluster ω Centauri. The night was perfect, a light laminar wind giving excellent ventilation and seeing. The results started to come in and were evaluated by the astronomers. The best one was evaluated by Jorge Melnick, but he checked it a second time because he couldn't believe the result, but then confirmed it: FWHM = 0.33 arcsec. Jubilation and amazement in La Silla, also in Garching as expressed by Richard West. A journalist was also present with us: he absolutely wanted to record that this result had occurred on my birthday (23rd March), but it actually occurred about 02.00 hours on 24th March. I didn't mind this at all, but the journalist did! This best frame of our test night was shown in a beautiful comparison set-up by Richard West, with blown-up sections of photos from the ESO 1-m Schmidt and 3.6-m telescopes, in the next *Messenger* and is reproduced in my RTO II (p. 293).

The foundations of the incredibly successful active optics system of the VLT, based on identical principles, had been laid.

The first of the VLT 8.2-m telescopes (Antu) saw "First Light" in 1998, the last of the giant telescopes (Yepun) on September 3, 2000.

Piero Benvenuti (ST-ECF):
Recovery of a historical document

While clearing his office of over a decade of accumulated papers recently, in preparation for an extended stay at the ST ScI in Baltimore, Richard Hook knocked on my door and, smiling, handed over a paper with an handwritten note on the front page: "An excellent idea! Sorry it took 13 years for me to reply! Richard".

The "historical" document was entitled "A proposal for the astrophysical classification of HST targets" and was drafted by me in March 1989, in a final attempt to convince the HST Project to implement a classification scheme of the observed targets that would facilitate the browsing through the HST Archive. At the time the proposal was received with interest, but was never implemented.

Perusing the paper today, it still makes a lot of sense, although one would implement its concept differently. Indeed its scientific goal would be better achieved today as a functionality of the Virtual Observatory environment, correlating data from more than a single instrument together with direct link to the existing literature. Nonetheless, it shows some kind of coherence (stubborn-mindedness?) in the ECF!

Catherine Cesarsky (ESO):
First Light of UT4

(from *The Messenger* No. 101, Sept. 2000)

At 21:44 hours on the night of September 3, 2000, the test camera at the Cassegrain focus was opened for 30 seconds, and the fourth VLT Unit Telescope, Yepun, saw First Light. A historic event in the life of ESO; this first light marked the successful conclusion of the important period which started with the approval of the VLT project by the ESO Council in December 1987. Exceptionally for such a complex and expensive project, the four VLT telescopes came into operation ahead of schedule. The VLT was no longer only a project, it was now also an Observatory.

By virtue of becoming ESO's Director General at the right time, I had the privilege of actually being in the observing hut of Yepun at the crucial moment, sharing the excitement of the VLT Manager, Massimo Tarenghi, of the Director of Paranal Observatory, Roberto Gilmozzi, and of the members of the commissioning team, Jason Spyromilio, Krister Wirenstrand and Rodrigo Amestica. It was a cold night, appropriate to the late Chilean winter, and we could hear the wind howling outside. We had chosen our first light target in advance: the planetary nebula He 2-428. In a few minutes, the guide star was acquired, the position and shape of the mirrors were actively corrected, and we could see on the computer screen the unmistakable shape of the source, with an image quality limited only by the atmospheric seeing (0.9 arcsec at the time). The rest of the evening was spent in the VLT Control room in the appropriate celebratory manner, taking more images, attending to the PR requirements, and drinking champagne with the teams observing on the other telescopes.

Everyone present felt the sense of accomplishment, triumph and elation that always accompanies the culmination of a great human adventure.

Andreas Glindemann (ESO) et al.:
First Fringes with ANTU and MELIPAL

(from *The Messenger* No. 106, Dec. 2001)

On October 30, 2001 at about 1 a.m., the two 8-m Unit Telescopes ANTU and MELIPAL of Paranal Observatory were combined for the first time as a stellar interferometer observing fringes on the star Achernar, only seven months and twelve days after the VLTI produced the first fringes with two siderostats. This was the first time that the VLTI was operated as a truly Very Large Telescope Interferometer.

The night started with tests of the Coudé Optical Trains and the Relay Optics, converting the light from the Coudé focus to a parallel beam in the Delay Line Tunnel. Around midnight, when the UT team finished the tests and the search for fringes could start, not everybody on the mountain would have bet how quickly the search was successful.

Barely one hour after we had started, the automatic fringe search routine in VINCI reported 'flecos en el cielo', and the fringes appeared on the screen. We found that the baseline of 102.5 m between ANTU and MELIPAL differed by only 28 mm from their nominal length. After refinement, fringes were subsequently found within 0.4 mm of their calculated position.

With the experience that we had gathered over the last six months of commissioning, 'routine operation' with the 8-m telescopes started almost immediately.