PARSCA 92: the Paranal Seeing Campaign

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The fidel readers of the Messenger certainly recall LASSCA 86[1], the La Silla Seeing Campaign which gathered several scientists from the member states with the principal aim of studying the physics of the atmosphere above the observatory. The success of LASSCA significantly increased the confidence that the theory developed during the seventies for modelling the interaction of atmosphere and starlight was adequate for astronomical purposes. It was also a sound starting base for the part of the VLT site survey related to image quality.

The LASSCA group assessed in a first report[2] the general quality of La Silla, identifying the relative contribution of dome, surface layer, boundary layer and high atmosphere in the long exposure width of astronomical images (seeing). They also compared various means of monitoring the atmosphere using large or small telescopes, acoustic sounder and microthermal sensors.

In a second report[3] and several publications[4,5], a first step was taken towards a more ambitious goal in relation with emerging high-resolution imaging techniques, i.e.: to measure more exotic parameters named speckle lifetime or isoplanatic angle and to point out existing relationship with standard atmospheric parameters recorded daily all over the world by means of balloon-borne meteorological radio soundings.

During the subsequent years, the VLT site survey team in Chile dutifully gathered night after night an impressive data base on various mountains, which prompted ESO's governing bodies to take in December 1990 a decision of major consequences for ESO's future: the VLT observatory would be located in the Cerro Paranal area.

Figure 1: *The PARSCA team in front of the SCIDAR 80-cm diameter lens collector (from right to left: J. Beckers, S. Hernandez, E. Gizard, J. Vernin, J.F. Manigault, J. Navarrete, I. Gomez, M. Sarazin, A. Fuchs, B. Lopez, M. Azouit).*

The Campaign

Cerro Paranal emerged as an outstanding site with respect to cloudiness, water vapour content of the atmosphere and image quality, but little was known about the temporal behaviour of the wavefront. It was precisely to gain insights about how high above the site the thermal turbulence travels and how fast it moves that the PARSCA 92 campaign was organized, with a smaller number of participants than LASSCA because telescope time at Paranal is still a dream, but with innovating techniques using several tons of instrumentation*.

The Table below lists the recorded parameters and the measurement place. Due to the impressive levelling work still going on daily on the summit of Paranal, a nearby summit (nicknamed "NTT peak" for historical reasons) was used for the monitoring of image quality. The meteorological balloons were launched from the foot of Paranal to get them as close as possible to the summit during the initial phase of their ascent. As for the SCIDAR**, an 80-cm-diameter collector mounted in a sea-container (see picture), it stayed comfortably at the ESO base camp, being sensitive only to the atmospheric layers at more than 1 km over ground.

The campaign lasted 14 nights in March 1992 divided into two runs pro-

* External participants of the PARSCA Campaign: M. Azouit, A. Fuchs, J.F. Manigault, J. Vernin (Dept. d'Astrophysique, Univ. de Nice), S. Hernandez (Inst. de Astrofisica de Canarias), B. Lopez (Dept. A. Fresnel, Obs. de la Côte d'Azur), E. Gizard (Etablissement d'Etudes et de Recherches Météorologiques, Toulouse). The campaign was also partly attended by J. Beckers, ESO-VLT Programme Scientist.

** SCIDAR stands for SCIntillation Detection And Ranging.

Table 1: *List of atmospheric parameters measured each night during the PARSCA campaign*

Parameter	Instrument	Owner	Place
C_T^2 (1-30 km) and scintillation	SCIDAR	Astr. Nice	Base camp
Velocity of turbulent layers (1-30 km)	SCIDAR	Astr. Nice	Base camp
C_T^2 vertical profiles (0-30 km)	Balloon borne sensors	Astr. Nice	Paranal
Wind velocity/direction (0-30 km)	Radiosonde	CNRM Toulouse	Paranal
Temperature, humidity (0-30 km)	Radiosonde	CNRM Toulouse	Paranal
Seeing	Seeing Monitor	I.A. Canarias	NTT peak
Seeing	DIMM1	ESO	NTT peak
Scintillation	Scintillometer	ESO	NTT peak
Velocity of wavefront and Life time	DIMM 3 (modified)	ESO	NTT peak
C_T^2 (ground)	microthermal sensors	ESO	NTT peak
Wind, temperature, humidity	meteorological mast	ESO	NTT peak

viding the team with some days for rest and sightseeing. In addition to the gathering of an impressive amount of data (20 balloons were launched successfully), it was an opportunity to compare the new differential motion monitor of the Instituto de Astrofísica de las Canarias to the ESO DIMM. During this period also took place the first operational run of the new ESO Differential Motion and Coherence Monitor, a wonderful opportunity for calibrating this modified DIMM, able to deliver not only the seeing but also the temporal characteristics of the wavefront[6]. These parameters are awaited by the VLT planners in need of statistics for better designing the time sensitive VLT subsystems.

The more we improve our knowledge of the environmental conditions of the VLT Observatory, the more efficient is the operation of the telescope. Astro-Climatology is a tool to be used for telescope control as well as for flexible scheduling, i.e.: for optimally tuning the observation to the observing conditions. The PARSCA campaign brought a useful contribution to this task.

Acknowledgements

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References

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New R.E.O.S.C. Polishing Facility for Giant Mirrors Inaugurated

On April 24, 1992, the French Minister for Research and Space, Professor Hubert Curien, inaugurated a unique, new optical facility of R.E.O.S.C., at Saint Pierre du Perray, near Paris. The delicate polishing of the giant mirrors for ESO's 16-metre equivalent Very Large Telescope (VLT) will take place here.

The festive act took place in the presence of about 300 invited guests, who were seated in the cavernous hall of the new building, just in front of the two polishing tables. They came from all over France and also from the neigbouring countries as representatives of European Science and Technology. The event also drew a lot of media attention and most of the French TV channels were represented. (The ESO video team obtained extensive material to document the VLT Tale.)

Following an introductory speech by the ESO Director General, Professor Harry van der Laan, in which he praised the very good cooperation between ESO and R.E.O.S.C., Dr. Daniel Enard from ESO spoke about the history of the VLT project, underlining the need to equip the world's largest telescope with optically perfect mirrors. M. Jean Espiard, Deputy General Manager of R.E.O.S.C. and formerly involved in the polishing of the main mirror for ESO's 3.6-m in the early 1970's, then presented the intricacies of the new factory, whose combination of size and incredible precision did not fail to impress the audience.

After a few further, short interventions by local officials, Professor Curien expressed a great satisfaction to see the new facility ready and he warmly congratulated R.E.O.S.C. and the planning staff to this most significant achievement. He mentioned the great optical traditions in France and that there are all chances that the VLT project will be achieved in the best possible way so as to become the world's first telescope at the end of the present decade. The Minister then unveiled a plaque commemorating the inauguration.

Figure 1: *Professor Hubert Curien (middle), French Minister for Technology and Space, at the inauguration of the R.E.O.S.C. facility on April 24, 1992. To his left, M. Bujon de l'Etang, Chairman and General Manager of SFIM) and to the right, M. Dominique de Ponteves, Chairman and General Manager of R.E.O.S.C.*