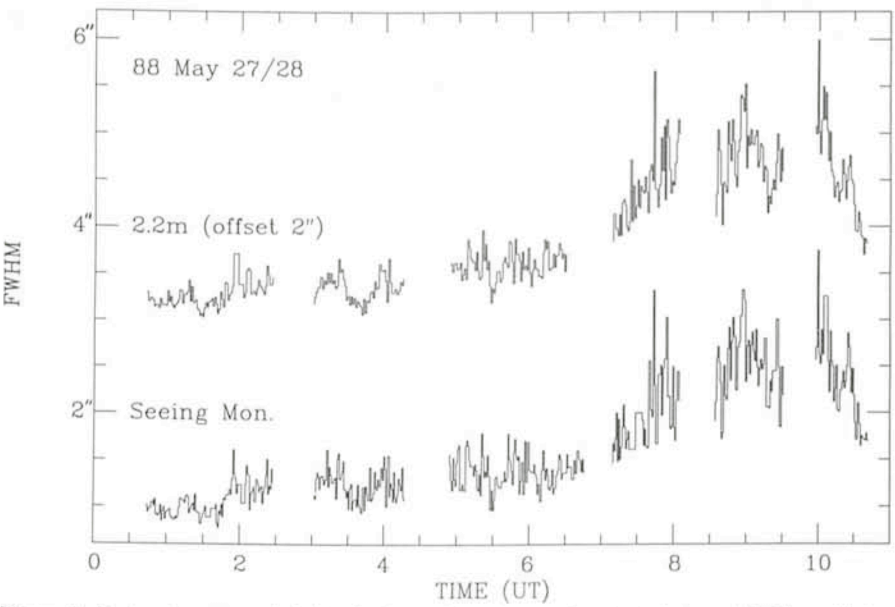

Figure 2: *During the second night of observation, the seeing started around 0.8″, and later became worse. In this presentation the 2.2-m data have been rebinned to match the DIMM time slots, and corrected to a standard wavelength 560 nm.*

assigned 0.4″ as the intrinsic image quality of the 2.2-m telescope.

During the nights of simultaneous seeing measurements, the 2.2-m CCD camera employed a detector with pixel size 0.365″. At this resolution proper sampling is ensured. The optical filter was RG-9 and we have assumed that this corresponds to 800 nm effective wavelength. The integration time was 50 seconds, followed by 15 seconds dead-time. Standard software was used to fit Gaussian profiles to star-images. The seeing at full width, half maximum, was calculated in two orthogonal directions, S_x and S_y, and transformed to 560 nm wavelength. The astigmatism was noticed through slow drifts of the focus, caused by temperature changes of the telescope structure. To minimize the effect, we used the average, S, in the two directions. The rms error of a single determination of S is smaller than 0.1″, as shown by an analysis of $S_x - S_y$.

The simultaneously acquired DIMM measurements lasted 1 minute each, and the statistical error was 6%. The conversion from differential image motion to equivalent seeing was also made at 560 nm. Note, however, that the DIMM results are independent of the detector's chromatic characteristics, since image motion is not a function of wavelength [3].

Figure 2 shows the results obtained during one of the test nights. The seeing ranged from 0.8″ in the beginning, to more than 3″. Periods without data correspond to change of star, combined with a careful refocussing of the 2.2-m. The 2.2-m data have been rebinned in time to correspond to the time-slots of the DIMM.

The direct comparison (using data from both nights) gives a best linear fit: $S_{2.2\,m} = 1.05 \times S_{DIMM} + 0.14$ arcseconds, with a correlation coefficient of 0.965. Following correction for the known aberrations of the 2.2-m telescope the relation (Figure 3) changes to $S_{2.2\,m} = 1.02 \times S_{DIMM} + 0.08$ arcseconds.

The difference from a one-to-one relation is more likely due to an undescribed problem in the 2.2-m data than to a systematic underevaluation on part of DIMM. Therefore we believe that the present comparison provides sufficient reassurance for the use of DIMM as a quantitative seeing measurement tool.

DIMM in Operation

The first DIMM unit has been in regular use since April 1987 when it was installed at Cerro Paranal, one of the candidate sites for the VLT. Over 40,000 individual seeing measurements are available from that place. A second system was recently built, and is now mounted at another candidate site, Cerro Vizcachas, a few km south-east of La Silla.

The hardware of both systems is prepared for automatization. This will be completed in the near future, whereafter seeing monitoring can be done on a permanent basis. As a by-product, we obtain quantitative data on the photometric quality of the sky.

We note that seeing monitors are not only of interest in the site-testing phase. Also remote controlled observations, and automated programme selection can benefit much from such information.

References

1. M. Sarazin: "ESO-VLT Instrumentation for site evaluation in Northern Chile", in *Advanced Technology Optical Telescopes III"*, SPIE, Vol. **628,** 138–141 (1986).
2. J. Stock and G. Keller: "Astronomical Seeing", in *Stars and Stellar Systems* Vol. **1,** 138–153 (1960).
3. F. Roddier: "The effect of atmospheric turbulence in optical astronomy", in *Progress in Optics XIX,* editor E. Wolf, 281–376 (1981).
4. M. Sarazin: "Site evaluation for the VLT: a Status Report", *The Messenger* No. **49,** 37–39 (1987).
5. H. Pedersen: "Seeing at La Silla", Internal Report, ESO (1988).

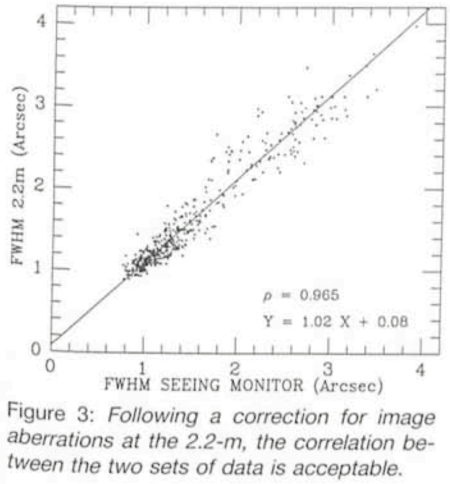

Figure 3: *Following a correction for image aberrations at the 2.2-m, the correlation between the two sets of data is acceptable.*

Visiting Astronomers

(October 1, 1988–April 1, 1989)

Observing time has now been allocated for Period 42 (October 1, 1988–April 1, 1989). As usual, the demand for telescope time was much greater than the time actually available.

The following list gives the names of the visiting astronomers, by telescope and in chronological order. The complete list, with dates, equipment and programme titles, is available from ESO-Garching.

3.6-m Telescope

October 1988: Wampler, Guzzo/Collins/Heydon-Dumbleton, Soucail/Fort/Tyson/Turner, Mellier/Mathez/Soucail, Maccagni/Gioia/Maccacaro/Vettolani, Iovino/Shaver/Cristiani/Clowes, Danziger/Gilmozzi, Moorwood/Oliva, Danziger/Moorwood/Oliva, Danziger/Fosbury/Lucy/Wampler/Bouchet.

November 1988: Moeller/K. Rasmussen, Danziger/Cristiani/Guzzo, Barbieri/Clowes/

Iovino/Cristiani/La Franca, Surdej/Borgeest/Kayser/Kellermann/Magain/Remy/Refsdal/Swings, Breysacher/Azzopardi/Lequeux/Meyssonnier/Westerlund, Kudritzki/Méndez/Husfeld/Herrero, Zickgraf/Wolf/Gail/Gass, Israel/Koornneef, Danziger/Fosbury/Lucy/Wampler/Bouchet.

December 1988: Renzini/D'Odorico/Greggio/Bragaglia, Madejsky/Bender, Meylan/Shaver/Djorgovski, Marano/Boyle/Zamorani/Zitelli, Kunth/Augarde/Chalabaev/Comte/Lequeux/Machara/Takase, Heydari-Malayeri/Schwarz, Lortet/Testor/Schild, Foing/Collier/Soderblom/Rucinski/Pettersen/Penston/Robinson, Ferlet/Lallement/Vidal-M./Grenier/Andreani, Wampler, Danziger/Fosbury/Lucy/Wampler/Gouiffes.

January 1989: van Paradijs/Augusteijn/van der Klis, Giraud, Röser/Meisenheimer, Weigelt/Baier/Fleischmann, Chalabaev/Perrier/Mariotti, Wolf/Stahl/Davidson/Humphreys, Ardeberg/Lundström/Lindgren, Webb/Carswell/Shaver, Schwarz/Huggins.

February 1989: van der Kruit/Pickles, Bignami/Caraveo/Mereghetti, Capaccioli/Cappellaro/Held, Sparks/Macchetto/Miley, Weidemann/Koester/Jordan, Nissen/Schuster, Kudritzki/Méndez/Husfeld/Herrero, Danziger/Fosbury/Lucy/Wampler/Gouiffes, Möllenhoff/Madejsky.

March 1989: Bertola/Buson/Danziger/Sadler/de Zeeuw, Tadhunter/Fosbury/di Serego Alighieri/Danziger/Morganti, Courvoisier/Danziger, Bergeron/Yee, Hammer/Le Fèvre/Proust, Fosbury/di Serego A./Tadhunter/Hook/Robinson, Jarvis/Dubath/Martinet, Moneti/Moorwood/Tapia, Danziger/Fosbury/Lucy/Wampler/Bouchet.

2.2-m Telescope

October 1988: MPI TIME, Heydari-Malayeri, Danziger/Moorwood/Oliva.

November 1988: Cetty-Véron/Sandage/Véron, Johansson, Surdej/Borgeest/Kayser/Kellermann/Magain/Remy/Refsdal/Swings, Azzopardi/Lequeux/Rebeirot, Westerlund/Azzopardi/Rebeirot/Breysacher, Melnick/Hunt, Westerlund/Azzopardi/Rebeirot/Breysacher, Baade/Krautter, Danziger/Fosbury/Lucy/Wampler/Bouchet, Lundgren.

December 1988: Lindblad/Jörsäter, Wagner/Bender, Bender/Nieto, Meylan/Djorgovski, Brahic/Smith/Grenier/Terrile/Vidal-Madjar, Caplan/Deharveng, Heydari-Malayeri, Falomo/Tanzi/Treves.

January 1989: Franx/Illingworth, Walton/Pottasch/Taylor, Giraud, Paresce/Nota/Clampin/Viotti/Lamers/Burrows, MPI TIME.

February 1989: MPI TIME, Tanzi/Bouchet/Falomo/Treves, Danziger/Fosbury/Lucy/Wampler/Bouchet, Reipurth, Prusti/Wesselius/Assendorp, Gioia/Bouchet/Maccacaro/Vettolani/Maccagni, Piotto/Ortolani.

March 1989: Capaccioli/Ortolani/Piotto, Tosi/Focardi/Greggio, Bertola/Buson/Danziger/Sadler/de Zeeuw, de Jong/van den Broek/van Driel/Lub, Tadhunter/Fosbury/di Serego Alighieri/Danziger/Morganti, Appenzeller/Bender/Wagner, Grosbøl.

1.5-m Spectrographic Telescope

October 1988: Arsenault, Danziger/Fosbury/Lucy/Wampler/Gouiffes, Guzzo/Collins/Heydon-Dumbleton, Danziger/Fosbury/Lucy/Wampler/Gouiffes, Schulz/Rafanelli, Danziger/Fosbury/Lucy/Wampler/Gouiffes, Khan/Duerbeck, Doazan/Sedmak/Barylak/Bourdonneau, Danziger/Fosbury/Lucy/Wampler/Gouiffes, Böhnhardt/Vanysek/Grün/Massonne/Beißer.

November 1988: Böhnhardt/Vanysek/Grün/Massone/Beißer, Danziger/Fosbury/Lucy/Wampler/Gouiffes, Balkowski/Proust/Maurogordato, Danziger/Fosbury/Lucy/Wampler/Gouiffes, Johansson/Bergvall, Danziger/Fosbury/Lucy/Wampler/Gouiffes, de Boer/Heber/Möhler, Danziger/Fosbury/Lucy/Wampler/Gouiffes, Buzzoni/Mantegazza/Malagnini/Castelli/Morossi.

December 1988: Lundgren, Pakull/Motch, Danziger/Fosbury/Lucy/Wampler/Gouiffes, Lortet/Testor, Spinoglio/Malkan, Danziger/Fosbury/Lucy/Wampler/Gouiffes, Boffin/Jorissen/Arnould, de Ruiter/Lub, Danziger/Fosbury/Lucy/Wampler/Gouiffes, Greve/McKeith.

January 1989: Greve/McKeith, Pottasch/Pecker/Karoji/Sahu, Danziger/Fosbury/Lucy/Wampler/Gouiffes, Courvoisier/Bouchet, Mathys/Maeder, Danziger/Fosbury/Lucy/Wampler/Gouiffes, Faraggiana/Gerbaldi/Ramella/Böhm, Pallavicini/Giampapa/Cutispoto, Baade/Simon.

February 1989: Danziger/Fosbury/Lucy/Wampler/Gouiffes, Johansson/Bergvall, Bässgen M./Bässgen G./Grewing/Cerrato/Diesch, Pettersson, Tanzi/Bouchet/Falomo/Treves, Danziger/Fosbury/Lucy/Wampler/Gouiffes, Weiss/Schneider, van Paradijs/van Kerkwijk/Zuiderwijk, Sterken, Danziger/Fosbury/Lucy/Wampler/Gouiffes, Waelkens/Lamers/Trams/Waters.

March 1989: Waelkens/Lamers/Trams/Waters, Gosset/Surdej/Swings/ Woltjer, Danziger/Fosbury/Lucy/Wampler/Gouiffes, Vettolani/Chincarini/Fairall/da Costa/Willmer, van Genderen/v.d. Hucht/Schwarz/de Loore, Danziger/Fosbury/Lucy/Wampler/Gouiffes, Friedjung/Bianchini/Sabbadin, Danziger/Fosbury/Lucy/Wampler/Gouiffes, Courvoisier/Bouchet, de Jong/Hu/Slijkhuis, Thé/Hu.

1.4-m CAT

October 1988: Gerbaldi/Faraggiana, Crane/Palazzi, Schwarz/Bode/Duerbeck/Meaburn/Seitter/Taylor.

November 1988: Lèbre/Mennessier, Pasquini/Restaino/Falciani, Martin N./Maurice, Maurice/Martin N., Cayrel de Strobel, Lagrange/Ferlet/Vidal-Madjar, Ferlet/Andreani/Dennefeld/Vidal-Madjar.

December 1988: Ferlet/Andreani/Dennefeld/Vidal/Madjar, Thimm/Hanuschik/Schmidt-Kaler, Danks/Crane/Massa, Schwarz/Bode/Duerbeck/Meaburn/Seitter/Taylor, Lagrange/Vidal-Madjar/Ferlet, Ferlet/Lallement/Grenier/Vidal-Madjar/Andreani, da Silva/de La Reza.

January 1989: da Silva/de La Reza, Pottasch/Pecker/Sahu K.C./Sahu M., Barbuy, Grenon/Barbuy, Pottasch/Sahu K.C., Gredel/v. Dishoeck/Black, Mathys/Solanki, Westerlund, Reimers/Toussaint/Schröder, Pallavicini/Giampapa/Cutispoto.

February 1989: Baade/Kürster/Schmitt, Gustafsson/Gray/Norberg, Baade/Kürster/Schmitt, Pettersson/Westerlund, Waelkens/Lamers/Trams/Waters, de Vries/v. Dishoek/Habing, Reimers/Toussaint/Schröder.

March 1989: Thimm/Hanuschik/Schmidt-Kaler, Clausen, Gillet, Foing/Jankov/Char/Butler/Rodono/Catalano, Gratton/Gustafsson/Eriksson.

1-m Photographic Telescope

October 1988: Hesselbjerg Christensen, Alcaino/Liller, Di Martino/Zappalà/Cellino/Farinella, Jockers/Rauer/Wagner/Barteldrees/Dettmar/Hoffmann/Geyer, Encrenaz T./Bouchet/Combes M., Danziger/Fosbury/Lucy/Wampler/Bouchet, Bouvier/Basri/Bertout/Bastien/Bouchet/Imhoff.

November 1988: Bouvier/Basri/Bertout/Bastien/Bouchet/Imhoff, Gouiffes/Cristiani, Johansson/Bergvall, de Boer/Heber/Möhler, Johansson/Bergvall, Danziger/Fosbury/Lucy/Wampler/Bouchet, Encrenaz T./Bouchet/Combes M., Gouiffes/Cristiani.

December 1988: Gouiffes/Cristiani, Mattila/Schnur, Sterken, Spinoglio/Malkan, Danziger/Fosbury/Lucy/Wampler/Bouchet, Encrenaz T./Bouchet/Combes M., Courvoisier/Bouchet, Le Bertre, Schneider/Jenkner/Maitzen.

January 1989: Schneider/Jenkner/Maitzen, Gouiffes/Cristiani, Barucci/Fulchignoni/Harris/Binzel/Di Martino/De Angelis/Burchi/Di Paolantonio, Danziger/Fosbury/Lucy/Wampler/Bouchet, Bouvier/Basri/Bertout/Bastien/Bouchet/Imhoff, Courvoisier/Bouchet, Le Bertre, Balkowski/Arimoto/Durret/Proust, Wolf/Stahl/Davidson/Humphreys, Balkowski/Arimoto/Durret/Proust.

February 1989: Trefzger/Labhardt/Spaenhauer, Pettersson, Caraveo/Bignami/Mereghetti, Gerbaldi/Faraggiana, Heske, Danziger/Fosbury/Lucy/Wampler/Bouchet, Waelkens/Lamers/Trams/Waters, Le Bertre.

March 1989: Courvoisier/Bouchet, Gouiffes/Cristiani, Manfroid/Vreux/Gosset, de Jong/Hu/Slijkhuis, Thé/Hu, Danziger/Fosbury/Lucy/Wampler/Bouchet, Le Bertre, Courvoisier/Bouchet, Brocato/Di Giorgio/Richichi.

50-cm ESO Photometric Telescope

October 1988: Group for Long Term Photometry of Variables, Bouvier/Basri/Bertout/Bastien/Bouchet/Imhoff.

November 1988: Bouvier/Basri/Bertout/Bastien/Bouchet/Imhoff, Group for Long Term Photometry of Variables, Carrasco/Loyola, Morell/Gustafsson, Vidal-Madjar/Sevre/Ferlet/Lagrange.

December 1988: Mattila/Schnur, Bernacca/Massone/Lattanzi, Foing/Collier/Soderblom/Rucinski/Pettersen/Penston/Robinson.

January 1989: Kohoutek, Bouvier/Basri/Bertout/Bastien/Bouchet/Imhoff, Wolf/Stahl/Davidson/Humphreys, Pallavicini/Giampapa/Cutispoto.

February 1989: Carrasco/Loyola, Trefzger/Labhardt/Spaenhauer, Gustafsson/Gray/Norberg, Cutispoto/Rodono/Ventura/Giampapa, Debehogne/Di Martino/Zappala/Lagerkvist/Hahn/Magnusson/De Campos.

March 1989: Cutispoto/Rodono/Ventura/Giampapa, Foing/Jankov/Char/Houdebine/Butler/Rodono/Catalano S., Thé/Hu.

GPO 40-cm Astrograph

November 1988: Böhnhardt/Vanyek/Grün/Massonne/Beißer, Böhnhardt/Geffert.

December 1988: Madsen/West, Bernacca/Massone/Lattanzi.
January 1989: Aniol/Seitter/Duerbeck/Tsvetkov, Scardia.
February 1989: Scardia, Debehogne/Machado/Mourao/Caldeira/Vieira/Netto/Zappala/De Sanctis/Lagerkvist/Protitch-B./Javanshir/Woszczyk.

1.5-m Danish Telescope

October 1988: Olsen, Gyldenkerne, Hansen, Møller/Kjaergaard Rasmussen/Møller, Olsen, Magain/Remy/Surdej/Swings.
November 1988: Johansson/Bergvall, de Boer/Richtler/Sagar, Bergvall/Jörsäter/Olofsson, Balkowski/Arimoto/Durret/Proust, Liller/Alcaino, Baade/Krautter, Storm/Andersen.
December 1988: Storm/Anderson, Reiz/Piirola, Reipurth, Ardeberg/Lindgren/Lundström, Häfner/Schoembs.
January 1989: Naylor/Charles/Smale/Callanan, West, Duerbeck/Vogt/Leibowitz, Augusteijn/Schwarz/van Paradijs, Andersen/Nordström, Reipurth, Knude.
February 1989: Knude, Hansen, Knude, Andersen/Nordström/Mayor/Olsen, Nordström/Andersen, Griffin R.F./Griffin R.E.M./Mayor/Clube, Mayor/Duquennoy/Andersen/Nordström.
March 1989: Meylan/Mayor, Fusi Pecci/Buonanno/Ortolani/Renzini/Ferraro, de Jong/van den Broek/van Driel/Lub, de Jong/Hu/Slijkhuis, Andersen/Nordström, Gammelgaard/Kristensen.

50-cm Danish Telescope

October 1988: Olsen, Rodriguez/Lopez/Rolland.
November 1988: Rodriguez/Lopez/Rolland, Group for Long Term Photometry of Variables.
December 1988: Lampens, Lampens/Dommanget.
January 1989: Lampens, Lampens/Dommanget, Ardeberg/Lindgren/Lundström, Lodén K.
February 1989: Clausen.
March 1989: Clausen, Group for Long Term Photometry of Variables.

90-cm Dutch Telescope

October 1988: Van Genderen/Hadiyanto.
November 1988: van Genderen/Hadiyanto, van Paradijs/Winget/Warner/Augusteijn, v. Amerongen/v. Paradijs.
December 1988: de Loore/Hensberge/Verschueren/David/Blaauw.
January 1989: Greve/van Genderen/Laval, v. Amerongen/v. Paradijs.
February 1989: Schneider/Weiss.
March 1989: Schneider/Weiss, van Genderen/v.d. Hucht/Schwarz/de Loore, Thé/Hu.

61-cm Bochum Telescope

October 1988: Seggewiss/Moffat.
January 1989: Schneider/Jenkner/Maitzen.

SEST

November 1988: Tacconi, Mebold, Gredel, Brand, Reipurth.
January 1989: Israel, Dupraz, Radford, Huchtmeier, Becker, Israel, Cernicharo, Pottasch, Reipurth.
March 1989: Bajaja, Dahlem, Israel, Armstrong, Le Bertre, Boulanger, Bel, Cerin, Gredel, Bronfman, Omont, Tapia, Haikala, Loup.

The First ESO-OHP School in Astrophysical Observations Blessed by Clear Skies!

A. CHALABAEV, Observatoire de Haute-Provence, C.N.R.S., France, and S. D'ODORICO, ESO

In the last decades, the search for better conditions for astronomical observations as well as the need to cover the southern sky led many countries to develop observatories at relatively remote sites. Among many positive consequences, this move also has a negative one. Because of the cost of travelling, the training of European students in astronomy is too often limited to data reduction or, if the students are sent overseas, they lack the guidance of a senior astronomer during their first observing run. As a consequence, sophisticated and expensive facilities are often not used in the most efficient way, since the gathering of accurate and reliable data in a minimum of telescope time – while not an impossible art to learn quickly – greatly benefits from experience.

The aim of the Summer School in Astrophysical Observations, organized jointly by ESO and the Observatoire de Haute-Provence (OHP) with the support of the C.N.R.S. of France, was to fill this gap in the professional preparation of young European astronomers. The OHP has a number of characteristics which makes it a unique place in Europe to fill this role. It is placed at a relatively central location with good observing weather during summer and autumn. Besides classical instrumentation, still using photographic plates, the observatory is equipped with CCD-based modern spectrographs. The data-aquisition sys-

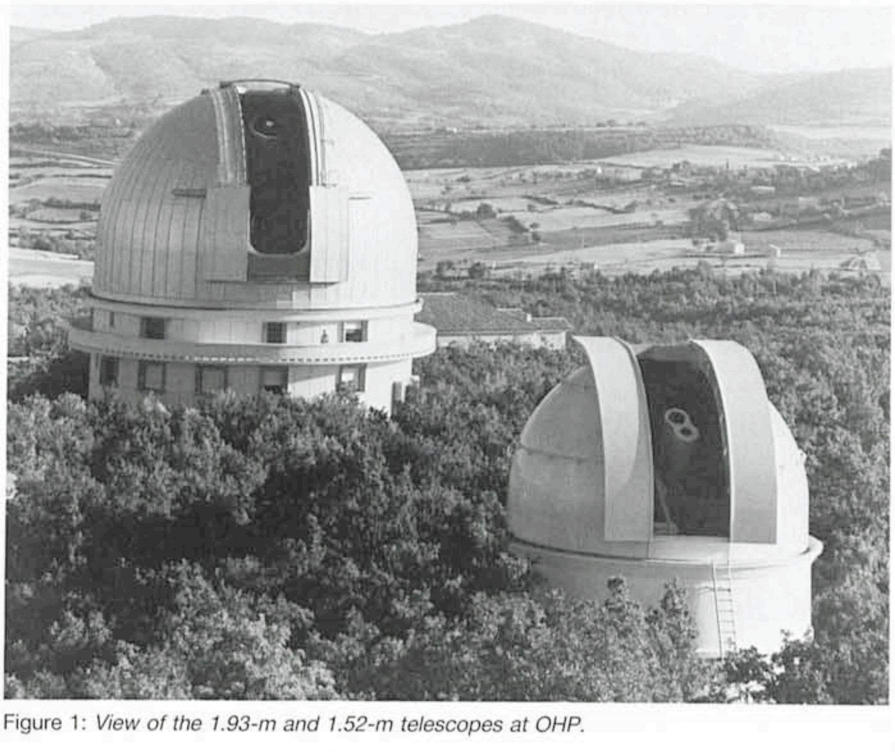

Figure 1: *View of the 1.93-m and 1.52-m telescopes at OHP.*