February 1990 and the second programme, about millimetre astronomy, is due to be shown very soon. The pictures show Patrick Moore and his team "in action" interviewing Jorge Melnick and Ray Wilson for the NTT programme.

The new ESO film had premiere on February 6, at the time of the NTT Inauguration. *C. Madsen (ESO)*

Caltech and ESO Join Forces to Produce Sky Atlas

The California Institute of Technology (Caltech) of Pasadena, California, U.S.A., and the European Southern Observatory have concluded an agreement by which ESO will undertake the responsibility of producing high-quality copies of photographic sky survey plates obtained with the Palomar 48-inch Oschin Telescope and to distribute the resulting photographic atlas.

The second Palomar Observatory Sky Survey is a decade-long project to photograph the entire northern sky using sensitive photographic techniques. The new atlas of the heavens, contained on 2,682 glass plates or film transparencies, will serve as the basic astronomical guide to the northern skies for decades to come. It will be known as the *Palomar Observatory – European Southern Observatory Atlas of the Northern Sky.*

"We are delighted that ESO will be copying and distributing the results of the Palomar Sky Survey", says Robert J. Brucato, assistant director of Palomar Observatory. "ESO has considerable experience from their work on the southern sky surveys conducted by ESO and by the United Kingdom Schmidt Telescope in Australia and the results were excellent. We had been planning on doing the copying and distributing at Caltech, but we decided to have the work done at ESO in the interest of making high-quality copies available to the astronomical community at the minimum price possible".

The photographic work at ESO will be carried out by a team of experienced photographers. The laboratory employs highly specialized techniques, many of which were invented at ESO, and which guarantee a minimal loss of information in the copying process. The laboratory staff has more than 15 years of practice with survey and atlas work in the southern sky.

The multi-million dollar Palomar Observatory Sky Survey is funded by grants from the Eastman Kodak Company, the National Geographic Society, the Samuel Oschin Foundation, and the Alfred Sloan Foundation, with additional funding from NASA and the National Science Foundation. Begun in 1986, the survey is scheduled for completion in the mid-1990s. ESO expects to terminate the copying a few years later, having then distributed the entire atlas to astronomical institutes all over the world.

Caltech took its first step in the business of sky surveys in 1948, when Institute astronomers and technicians began the eight-year task of mapping the northern sky for the first Palomar Sky Survey. This proved to be one of the most important developments in 20th century astronomy, because it provided astronomers with an unprecedented wealth of information about the heavens. ESO carried out similar surveys of the southern sky after the erec-

First Announcement

A workshop organized by ESO on

RAPID VARIABILITY OF OB-STARS: NATURE AND DIAGNOSTIC VALUE

will be held from 15 to 17 October 1990 at ESO, Garching, FRG.

The purpose of the workshop is to extensively discuss the various models which have been suggested to explain the rapid variability of early-type stars. In addition to the comparison of observations with models, an attempt will be made to assess the impact, if any, of the variability on the general understanding of OB stars.

Topics include: Observations of O, B, and Be stars – Photometry – Line profiles – Nonradial pulsation – Star spots – Circumstellar structures – Atmospheric diagnostics – Transient phenomena – Mass loss.

The Scientific Organizing Committee consists of H. Ando, D. Baade (chair), C.T. Bolton, H. Henrichs, and L.B. Lucy.

For further information, please write to Dietrich Baade, ESO, Karl-Schwarzschild-Str. 2, D-8046 Garching bei München, or send e-mail to ESOMC1::OBSTARS (SPAN), or OBSTARS@DGAESO51 (EARN/Bitnet), or PSI%026245890024::OBSTARS (X25).

tion of the ESO Schmidt telescope at La Silla, in 1972. Part of this work was done in collaboration with the UK Schmidt telescope in Australia.

In 1980, Caltech astronomers began planning for a new, northern survey because of advances in photographic and telescope technology and the changes in the heavens over the ensuing three decades. The Oschin Telescope was substantially refurbished before the second sky survey was begun. This included a new, \$ 380,000 lens that enables the telescope to focus a wide range of wavelengths. In addition, advances in photographic technology have led to the development of photographic plates that are far more sensitive than those available in 1948.

Each glass plate is 14 inches square, and photographs a segment of the sky about 6.5 degrees across, about 13 times the diameter of the full moon. It would take 894 such segments to cover the entire northern hemisphere of the sky, but since each segment is photographed at three wavelengths, the survey will finally comprise 2,682 plates. Because of the trails of overflying airplanes, plate defects, or other observational problems, the Caltech astronomers expect that they will have to expose two plates for every one that is finally accepted for the survey.

Orders for the new Atlas should be sent to the ESO Information Service, Karl-Schwarzschild-Straße 2, D-8046 Garching bei München, Federal Republic of Germany.

The cost of one atlas (894 copies each in B, R and I; in total 2,682 copies) is DM 60,000 on film and DM 460,000 on glass, if prepaid. It is also possible to pay before each shipment; in this case an inflation variation will be applied and it is expected that about one-tenth to one-eighth of the total price will be called up each year. Reservations can be made until July 1, 1990.

(From ESO Press Release 2/90)

Near-Ground Seeing on an Interferometric Platform

L. ZAGO, ESO

1. Introduction

The ideal location for an optical telescope, short of being in orbit, would be being magically suspended in the air, out of all ground-induced turbulence. Most observatories try the next best, a location on a steep peak or ridge, in the generally correct assumption that the abrupt rising of the mountain does not give the air flow the time and space to bring ground-induced turbulence on the telescope.

An interferometric observatory, however, which is made of several, possibly mobile, telescopes, will need a much larger flat space than is usually the case for a single telescope. This is in particular the case for the VLT, which requires a large and rather flat platform of the order of 180 × 150 m to accommodate the four main unit telescopes, the optical laboratories and the tracks for the smaller auxiliary telescopes. One may then fear that telescopes located at some distance from the edge of the platform will have their seeing affected by turbulence created along the stretch of flat surface upwind.

The purpose of this article is to describe a simplified model of the near-ground seeing phenomenon aimed at identifying the main influencing parameters and the order of magnitude of their effects.

2. A Simplified C_T^2 Model

The temperature structure coefficient C_T^2 is the local parameter which most suitably represents the optical quality of an atmospheric layer. The local C_T^2 can in principle be expressed in terms of bulk parameters of the atmosphere, such as temperature, pressure, wind velocity and their derivatives. However, a rigourous formulation will generally be very complex for any non-trivial aerodynamic field and the calculation of C_T^2 will require a finite element or difference scheme.

Therefore we will take here some simplifying assumptions in order to derive a simple analytical formulation, which at the price of some quantitative accuracy, yet allows to identify the physical quantities influencing the seeing phenomenon and obtain useful comparative data for different situations.

We start from the relationship of C_T^2 with dissipation rates:

$$C_T^2 = a^2 \varepsilon_\theta \varepsilon^{-\frac{1}{3}} \qquad (1)$$

List of symbols
ε_θ = dissipation rate of temperature variance.
ε = dissipation rate of turbulent kinetic energy.
α^2 = a constant equal to about 3.
θ = potential temperature.
z = height above ground.
U = wind mean velocity.
σ_u = wind turbulent velocity.
u_* = flow friction velocity.
K_H = eddy diffusivity for heat.
K_m = eddy diffusivity for momentum.
k = von Karman's constant ≃ 0.4.
g = gravity acceleration.
q (z) = local vertical heat flux.
q_s = air-ground heat flux.

Neglecting transport in the longitudinal and transversal direction and under conditions of stationary turbulence, the dissipation rates can be expressed as:

$$\varepsilon_\theta = K_H \left(\frac{d\theta}{dz}\right)^2 ; \qquad \varepsilon = K_m \left(\frac{dU}{dz}\right)^2 - K_H \frac{g}{\theta}\frac{d\theta}{dz} \qquad (2)$$

For K_H we take here the expression valid for a stationary boundary layer (K_m is then assumed equal to $K_H/1.35$):

$$K_H = k^2 z^2 \left|\frac{dU}{dz}\right| \qquad (3)$$

In this way C_T^2 is expressed in terms of the vertical temperature and velocity profiles only. One should note that the velocity gradient represents here a scale of the mechanical turbulence: indeed for a stationary boundary layer, the turbulent velocity σ_u (rms of velocity fluctuations) is directly related to the velocity gradient through the friction velocity u_*.

$$\frac{dU}{dz} = \frac{u_*}{kz} = \frac{\sigma_u}{z} \qquad (4)$$

Note also that temperature and velocity are not properly independent variables, as the temperature gradient is linked through K_H to the velocity turbulence by the heat flux equation:

$$q(z) = K_H \frac{d\theta}{dz} = k^2 z^2 \left|\frac{dU}{dz}\right| \frac{d\theta}{dz} \qquad (5)$$

The local flux q(z) is generally a function of the surface-air heat flux q_s, which depends on thermal ground characteristics, solar irradiation and also on wind turbulence as a more turbulent flow will