

PRELIMINARY REPORT ON THE ASTRONOMICAL SITE AT SAN PEDRO MARTIR, BAJA CALIFORNIA. MEXICO

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SUMARIO

Datos astronómicos y meteorológicos que cubren al periodo 1968-1971 indican que el Observatorio Astronómico de San Pedro Mártir, Baja California es uno de los mejores sitios que existen en todo el hemisferio norte. Se dan cifras del número de noches totalmente despejadas, el brillo del cielo nocturno, la cantidad de agua precipitable y el tamaño de imagen producida por turbulencia óptica.

In recent years, the quality of the observing conditions at Tonantzintla showed a marked decrease, due to the rapid increase of city lights and smog in the neighboring area. Clearly, a new site for an observatory should be selected satisfying the following characteristics:

- i) Large number of entirely cloudless nights.
- ii) Dark Sky.
- iii) Low total H_2O content of the overlying atmosphere.
- iv) Minimum optical turbulence.
- v) Large extent of protected area around the site.

Meteorological data, for many areas, have been studied over a number of years. This study has indicated that the northwest of Mexico offers the best possibilities for an astronomical site. Thus, in 1966 we made an expedition to Baja California to examine closely the northern mountainous area. Finally, we decided to study, in more detail, the Sierra San Pedro Martir. Photographs, taken by Tiros satellites, helped to make this decision. These were kindly made available to us by NASA.

Since 1968, we have been gathering observational data to assess the quality of the site. These data and additional information will be given with great detail in a later publication. The present note is intended to give only a brief account of the main characteristics of astronomical interest at the San Pedro Martir Observatory.

a) Location of Telescopes

longitude = $115^{\circ}27'3''$ W,
latitude = $31^{\circ}02'9''$ N,
altitude = 2800-2850 meters.

b) Number of Clear Nights per Year (1968-1971)

- i) 229 photometric nights (0% cloud cover)
- ii) 331 spectroscopic nights ($< 50\%$ cloud cover)
- iii) 34 mostly cloudy nights ($\geq 50\%$ cloud cover).

c) Dark Sky (Feb-March 1971; near the zenith)

$V = 22.0$ mag/sq. sec. of arc
 $B = 23.0$ mag/sq. sec. of arc.

d) Daytime H_2O measures (1968-1971)

The measurements consist of readings of the solar intensity through two interference filters: one, centered on the atmospheric H_2O band at 9350 \AA ; the other, on the nearby continuum at 8900 \AA . The ratio of the two readings determines the precipitable water vapor content of the overlying

atmosphere. The ratio has been reduced to equivalent amounts of water vapor for $p = 1$ atm. The instrument, and its calibration, has been made by F. Low. The main results are:

$$\begin{aligned} \text{H}_2\text{O} &> 3 \text{ mm, } 14\%; \\ \text{H}_2\text{O} &\leq 3 \text{ mm, } 86\%; \\ \text{H}_2\text{O} &< 2 \text{ mm, } 47\%; \\ \text{H}_2\text{O} &< 1 \text{ mm, } 5\%. \end{aligned}$$

e) Optical Turbulence (1968-1971)

To measure the optical turbulence (seeing), two methods have been used:

- i) Danjon (30-cm and 15-cm telescopes)
- ii) Polaris star-trail (15-cm and 16-cm telescopes).

The combined results are:

$$\begin{aligned} \text{seeing} &> 1''.5, \quad 15\%; \\ \text{seeing} &\leq 1''.5, \quad 85\%; \\ \text{seeing} &< 1''.0, \quad 30\%. \end{aligned}$$

The above results clearly indicate that San Pedro Martir Observatory is one of the best astronomical sites on the Northern Hemisphere. It is interesting to mention that two reflectors are installed already on this site: an 84-cm telescope, property of the University of Mexico (whose optical design and construction was carried out at the University of Mexico) and a 152-cm telescope that is part of a joint project between the University of Mexico and the University of Arizona. Soon, there will be two more telescopes, a 40-cm and a 100-cm.

It should be added that the observatory is protected against air-pollution and other forms of atmospheric deterioration by a forest with an area larger than six hundred square kilometers and that the probability of population expansion is low in an even larger area.

This note is the result of the contribution of colleagues from several countries. From Mexico — M. Alvarez, R. Costero, E. Chavira, G. Haro, O. Harris, T. Hayasaka, B. Iriarte, J. Luna, M. Méndez, E. Mendoza, M. Orona, R. Peniche, A. Poveda, E. de la Rosa, and J. Ruiz; from U. S. A. H. L. Johnson, G. P. Kuiper, W. Roberts, and M. F. Walker; from France — J. C. Pecker and M. Ravaut; from Chile — J. Stock; and from U. S. S. R. — G. A. Gurzadian. It is a pleasure to thank them all.

ERRATUM

In the paper "BVRI-Photometry of the brightest stars in the Magellanic Clouds" (*Bol. Obs. Tonantzintla y Tacubaya*, 5, 269, 1970) the legend of Figure 9 should be corrected to read as follows:

Fig. 9. ...Large Magellanic Cloud...

The legend of Figure 18 should be that of Figure 19 and viceversa.

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In the paper "Studies on Star Clusters: The Open Cluster T9", (*Bol. Obs. Tonantzintla y Tacubaya*, Vol. 5, No. 35, 293, 1970) the V magnitude of star number 25 in Table 2 should read 12.23 instead of 13.23.

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