Rev. Mexicana Astron. Astrof., **21**, 683-686 (1990)

CHILEAN ASTRONOMERS AND THE BIRTH OF CERRO TOLOLO

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RESUMEN. Hace treinta años que se inició en Chile la búsqueda de un lugar adecuado para establecer un observatorio astronómico, que inicialmente consistiría en un telescopio reflector de 1 m de diámetro. Es importante destacar el papel que le correspondió al Observatorio Astronómico Nacional de la Universidad de Chile – más tarde Departamento de Astronomía de la misma Universidad – en el desarrollo de este proyecto. Los resultados han sido mucho más importantes que lo esperado inicialmente, de tal modo que el programa destinado a instalar un telescopio de tamaño moderado ha llevado al establecimiento de un centro de actividad científica de relieve internacional.

ABSTRACT. Thirty years ago the search for a site adequate for the establishment of an astronomical observatory was started in Chile. Initially it was planned that the main telescope would be a 1 m reflector. It is important to emphasize the role played by the Observatorio Astronómico Nacional de la Universidad de Chile – later on Departamento de Astronomía of the same University – in the development of this project. The results have been much more important than was expected initially; in this way the program for a telescope of moderate size was transformed in a major project which lead to the establishment of an international center of scientific research.

Key words: **OBSERVATORIES**

Thirty years ago, in August 1959, the search for an adequate site for establishing an astronomical observatory in some peak of the Andes mountains, was started in Chile. It is important to emphasize the role played by the astronomers of the University of Chile in the developement of this project.

Going back to the fifties, the world astronomical community was thinking in having optical facilities in the southern hemisphere, similar to those of the giant Mount Palomar telescope. The small group of astronomers of the Observatorio Astronómico Nacional de la Universidad de Chile shared this idea, and had in mind a possible collaboration with some astronomical institution in the northern hemisphere, in order to establish a medium or perhaps a large telescope in some place of the Andes mountains, from the neighborhood of Santiago to the northern part of the country. At that time it was known that due to the weather conditions it was necessary to go to the northern part of the territory to get an adequate number of clear nights.

In 1950 Professor Federico Rutllant was appointed Director of the Observatorio Astronómico Nacional. He was a very active and enthusiastic person who had in mind many ambitious programs which in the long run could contribute to modernize the astronomical activities of the Observatory. Perhaps his most important dream was to see an international astrophysical observatory established in Chile. In 1958 Rutllant was invited by the U.S.Government to visit the principal astronomical observatories of the country. In this opportunity he discussed with Drs. G.P. Kuiper and W.A. Hiltner, of the Yerkes Observatory of the University of Chicago, the possibility of cooperation between the University of Chicago and the University of Chile to es-

tablish an observatory in some place of the Andes mountains, taking advantage of the climatic conditions for optical astronomy that could be present in many of the medium size mountains of the Cordillera de la Costa or Cordillera de los Andes. Kuiper was very enthusiastic about this program of collaboration and tried to get the support of the Association of Universities for Research in Astronomy (AURA), but at that time the first priority of AURA was to establish a national observatory in some place of the SW of the United States. He continued trying to find the economical support for this project and finally he succeeded obtaining the sponsorship of the U.S. Air Force.

It is interesting to mention some paragraphs of the letter sent by Rutllant to Kuiper at the end of this year (December 6, 1958). He wrote: "... In order to have things settled on a higher level, I went to see the Rector of the University of Chile, Prof. Juan Gómez Millas. He accepted the general outline as defined in your letter (of Nov. 30): a) construction of a 40 inch reflector ....; b) selection of a site for the erection of the observatory following your instructions; c) your universities would contribute the telescope, financial responsibility of the technical aspects of the project and a major share of the management, while the University of Chile would contribute the site, part of all the building costs including road, water and electric supplies, etc, and d) further instrument additions could be made later ....".

In March 1959, Kuiper went to Santiago to discuss the details of this program of collaboration between the Universities of Chicago and Texas and the University of Chile. The initial idea was to start with the selection of a site for the future observatory following the suggestions given by him. Due to the limitations of the funds that would be available, it was thought to install a moderate size telescope (40 inch reflector) in the vicinity of Santiago. Dr. Jurgen Stock, of the Universities of Chicago and Texas was responsible for the site survey. He had a similar experience in a site survey in South Africa.

At the same time, the Universities of Yale and Columbia were interested in the selection of a site to place a 1 meter double astrograph in the southern hemisphere, and they wrote to Rutllant about their project. The result of this common interest in a site survey, was a joint program between the University of Chile and the four mentioned U.S.A. universities.

The site survey started in August 1959, but now with more possibilities to be extended to the northern part of the country, to a region which is called "Norte Chico". Stock, Dr. Isadore Epstein from the Universities of Yale and Columbia, and Guillermo Romero and Hugo Moreno from the University of Chile, went to visit different possible sites between Santiago and La Serena.

After this trip, the procedures for studying the seeing conditions in the sites selected were established. At the beginning two 10 cm refractors of the University of Chile and two Danjon telescopes with 20 cm mirrors, on loan from the Yale-Columbia project, were used. The refractors were used to measure the motion of the images, and the reflectors, to study the appearance of the diffraction images of the stars observed. The meteorological conditions as the temperature, humidity, wind velocity, and transparency of the air were measured or registered, since they could be of interest for the future astronomical observatory. The selection of sites to be studied included Alto del Toro and Cerro El Roble near Santiago. Later on Cerro Tabaco was considered as an alternative to Cerro El Roble. In the neighborhood of Vicuña (a small town near La Serena, about 50 kilometers from the coast), Cerro Guamayuca was studied. The first observing run at Cerro Guamayuca was made by Moreno in October 1959; the results obtained were excellent, promising superior seeing conditions at the mountains of this area. All these mountains were visited periodically, remaining between three and six nights in each place. Very soon it was established that the mountains near Vicuña were by far much better than the places near Santiago. For this reason Stock planned an air trip to the area of Vicuña in order to have a general view of some peaks which could be adequate for the future observatory. By the end of March 1960 we flew in the DC3 of the U.S. Air Force Mission in Chile. The flight was very interesting; the area of Vicuña had a perfect visiblility, with no traces of haze, while in the neighborhood of Cerro Tabaco and Cerro El Roble some haze was present. As a result of this flight three mountains were selected to be investigated: Cerro Blanco, close to Cerro Guamayuca, and Cerro Tololo and Cerro Morado, some 20 km SW from Vicuña. A few days later (April 1960) Stock and Moreno went to visit Cerro Blanco and Cerro Tololo. Both trips were difficult, specially the second one, since we had to cover about 40 km, mostly on mule back and partly on foot, leading

the animal where we had to pass over rocks or the ground was very steep. In our first trip to Cerro Tololo we could not arrive to the highest peak of the mountain, but we could have a general view of the area. A month later we went to visit Cerro Tololo and observe there. We observed during two nigths and the results were excellent; they may be summarized as follows: a) a temperature gradient during the nigth of the order of 2 or 3° C; b) a mild wind in the range of 0 to 15 km per hour, coming from the N; c) no haze at all; and d) the best seeing we had encountered so far. Coming down from the mountain we went to visit Cerro Morado, a few kilometers south of Cerro Tololo, and some 80 m lower in altitude. The advantage presented by Cerro Morado was its large flat surface. The subsequent visits to Cerro Tololo showed the excellency of this site.

In addition to the mountains mentioned before, one or two visits to Cerro Llampangui, Cerro Guatulame and Cerro Negro (near Hurtado) were made during the first year of observations.

During 1960 some preliminary results were obtained in the site survey; the mountains near Vicuña promised to be one of the best sites in the world for establishing an optical observatory, since the number of clear nights with good or excelent seeing conditions was unique. The activities of the site survey increased, adding Cerro Morado and two places near Copiapó: Cerro Checo de Plata and Cerro La Peineta. New instruments, three double beam telescopes of 10 cm aperture and 165 cm beam separation, used to measure the image motions, were put in operation.

In August 1960 the Yale-Columbia project decided to finish the site survey activities in Chile and to continue this work in Argentina. Later on they established an astrometric observing station at El Leoncito, near San Juan.

The excelent results obtained during these early days and the need for a large astronomical observatory in the southern hemisphere moved AURA to accept from the Universities of Chicago and Texas the responsibility for the site survey in Chile. In this way, the initial collaboration between these Universities and the University of Chile widened its base, and in August 1961, a "Cooperative Agreement to Establish a Southern Hemisphere Observatory" was signed by Dr. C.D.Shane, President of AURA, and Prof. J.Gomez Millas. Rector of the Universidad de Chile.

Two small telescopes (13 inch and 16 inch reflectors) equipped with photoelectric photometers were put in operation. The first one was first installed at Alto del Toro and later on at Cerro La Peineta. The 16 inch telescope was put in operation at Cerro Tololo in September 1961. A few photoelectric observations were made during 1961. Later on, in March 1962, some systematic UVB photoelectric observations of bright stars began at Cerro Tololo. This was the first astronomical work done at the future observatory, published later by astronomers of both institutions (Gutiérrez-Moreno et al. 1966). In the same year (May 1962) Moreno began to observe a group of stars of the Scorpio Centaurus Association (Gutiérrez-Moreno and Moreno 1968). It is worthwhile to mention that the portable domes for the telescopes, with sliding roofs, were built at the mechanical shop of the Observatorio Astronomico Nacional.

The site survey concluded after three years of work. Two mountains were the candidates for the future site of the observatory: Cerro La Peineta and Cerro Tololo. It is impressive the number of observing records gathered during the site survey. The most extensive observing records belong to Carlos Torres of the Observatorio Astronómico Nacional and to Jurgen Stock. The astronomers of the University of Chile who collaborated in the site survey were Carlos Torres, Hugo Moreno, Herbert Wroblewski, and Guillermo Romero.

In November 1962, the AURA Board of Directors visited both places, and in November 23 decided to put the observatory on top of Cerro Tololo. Thus, Cerro Tololo Inter-American Obervatory was born.

This was the seed that fructified in an arid land, the southern boundaries of the Atacama desert. From the beginning of the site survey in Chile the European Southern Observatory (ESO) was kept informed about the excellent astronomical conditions found in some places of the Andes mountains. By June 1961, ESO decided to send an experienced observer to Chile, with one of the Danjon telescopes used in South Africa. In December 1962, two members of

the ESO site-testing team, Dr. A.B. Muller and Mr. P. McSharry, came to visit Cerro La Peineta and Cerro Tololo, and spent two weeks in each mountain. We met with them in these mountains and discussed the results found during the site survey. They confirmed the superior astronomical quality of both sites, by far much better than those found in South Africa. The report given by Muller to the ESO Committee in February 1963 changed the interest of ESO to a site in Chile rather than in South Africa. Finally, during the ESO Council meeting on May 26, 1964, they decided to install their observatory at Cerro La Silla, about 100 km north of Cerro Tololo.

In the meanwhile, Dr. H. Babcock, Director of Mount Wilson and Palomar Observatories, came to visit Cerro Tololo (Dec. 1963 - Feb.1964) to study the possibility of establishing a Carnegie Southern Observatory on the grounds of AURA, which included some other interesting peaks. They made an extended test, principally at Cerro Morado, but finally decided to build the observatory at Cerro Las Campanas, in the neighborhood of Cerro La Silla.

Adding the optical surfaces of the telescopes installed in these Observatories, we have the biggest concentration of telescopes in the world. The scientific productivity has been so important, that in the near future we will see the installation in this zone or a little further north, of several new technology telescopes, which will be much larger than the largest ones now in operation.

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