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ASTROLABE OBSERVATION AT NATAL, BRAZIL

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ABSTRACT. Preliminary results of the astrolabe observation obtained at Natal is presented.

Key Words; Astrolabe Observation.

1 - INTRODUCTION

The establishment of the astrometric works with an astrolabe was almost finished thanks to helps of the National Observatory of Rio de Janeiro, Brazil, in August 1984 at Natal.

The observing house was built in the south-west point of the campus of the university in December 1982 and the astrolabe was installed in the house in April 1983 after the auxiliary facilities were completed. Since then we have made best efforts to complete the observing system of the astrolabe to pursue the routine works of astrometry. The system has showed several troubles in the function and they were removed with the help of the staff of the National Observatory of Rio de Janeiro.

After one year's test observation we could start the routine works of the astrolabe observation at September of 1984.

2 - SYSTEM OF OBSERVATION

The system of observation at Natal has three principal parts:

a - Astrolabe OPL Nº 9
b - Registering system
c - Clock comparison system

The Astrolabe OPL Nº belongs to the Greenwich Observatory, England, who kindly lent us the telescope through the National Observatory of Rio de Janeiro. The registering system is to register time signals transmitted from the astrolabe and is controlled by a microprocessor. The clock comparison system is to make comparison between the local clock at Natal and standards clocks kept at the National Observatory by the TV Line 10 Method. 1) These two systems were constructed and were tested in a sufficient interval to prove good function at the National Observatory.

3 - IMPROVEMENT OF ELECTRIC CIRCUITS

After we started the test observation at May of 1983, we found many defects in the electric control circuits of the astrolabe. Especially, sliding contacts to transmit time signals of two and four contacts were corrided deeply and, as it was difficult for us to exchange them with new ones at Natal, we devised a circuit to be used in place of the sliding contacts. We added an opto-electronic device to exchange two and four contacts circuits automatically.

4 - DETERMINATION OF THE INSTRUMENTAL CONSTANTS

We made determination of the instrumental constants of the astrolabe during a period from May of 1983 to July of 1984.

One revolution of the micrometer = 26".189 128

One twentieth of division of interval of reticules = 18".333 341

Middle point of Micrometer for two contacts m_o = 57^d.943 06

Difference between middle points of Micrometer for two and four contacts

$$v_{2m} - v_{4m} = - 0.001\ 1125 \text{ revolution}$$

5 - LIST OF STARS

We have selected a star list which will be used for routine works and which was published before. 2) In consideration of the present status of the observing system and weather conditions, we decided to adopt a new list which is used to determine the geographical coordinates of the astrolabe as soon as possible. Stars of the list were taken from the "Apparent Places of the Fundamental Stars" with the following selection rule:

1 - to balance the number of stars in four quadrants of azimuth,

2 - to reject stars in the regions of azimuth 0° 13° and 180° 13°,

3 - to select stars brighter than 5.5 magnitude,

4 - to take more than 28 stars in each group

6 - SCHEDULE OF OBSERVATION

In consideration of our one vear's experiences and of the small number of observers (now, one person), we adopt a schedule of observation to observe two groups of stars around 20 hours at every clear night.

Month	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
	III	IV	V	VI	VII	VIII	IX	X	XI	XII	I	II
Group	IV	V	VI	VII	VIII	IX	X	XI	XII	I	II	III

7 - PRELIMINARY RESULTS OF OBSERVATION

We started the routine observation in September of 1984. Unfortunately the comparison system of clocks did not work well and we had to abandon the precise determination of longitude. The assumed geographical coordinates are

longitude : $2^{h}\ 20^{m}\ 45^{s}.3$ W

latitude : $5^{\circ}\ 50'\ 30''.0$ S.

Group	XI			XII		
Day	$\Delta\phi$	Δz	No.	$\Delta\phi$	Δz	No. of star
IX - 20	16".489	4".174	25	16".416	5".689	17
22	16.525	4.868	24	16.387	5.906	18
23	16.661	5.478	20			
25	15.281	5.437	27	16.045	5.705	21
27	15.803	3.963	17			
28	15.112	5.653	26	15.458	6.176	16
X - 2	16.035	5.570	18	15.607	5.162	22

We did not apply the rejection criterion for the result of observation for the individual star, which might cause large deviation in the results.

8 - CONCLUDING NOTE

We have almost completed establishment of the astrolabe observation at Natal. It remains to complete the comparison system of clocks because of the financial problem in our University and this problem is expected to be solved in the near future.

The weather conditions at Natal is not excellent for astronomical observations.

Scattered clouds come from the east seaside to cover the zenith intermittently all night long. Contrary to our supposition, we can observe more than two thirds of stars in a group through breaks of scattered clouds. In addition, steadiness and seeings of star images are very good and we can easily track two images of a star in the field. We are sure that the astrometric observations at Natal will make fruitful contributions in the cooperative astrometric works in the south america.

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