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**ANNUAL REPORT OF THE REPUBLIC  
OBSERVATORY**

**JOHANNESBURG**

**1968**

*(Acting Director, J.Hers)*

**STAFF**

Mr B.M.F.Armstrong was appointed Assistant Technical Officer in May, while in June, Messrs A.G.Dell and J.Hansen were appointed Assistant Technicians. Mr R.Lake was promoted to Technical Officer in July. Dr W.S.Finsen continued to work as guest astronomer throughout the year.

Hers attended I.A.U. Colloquium No. 1 on 'The problem of the variation of geographical coordinates in the southern hemisphere' at La Plata, Argentina, in November, and subsequently visited a number of observatories in Chile.

**EQUIPMENT**

The 20-in. Cassegrain reflector ordered from Boller and Chivens was delivered in January and installed in the dome of the main building which previously housed the 9-in. refractor. It was officially opened on April 19 by Dr the Hon. Carel de Wet, Minister of Mines and Planning.

The photoelectric photometer previously used with the 9-in. refractor has been transferred to the 20-in. reflector, and has been modified for ultra-violet measurements.

The 9-in. refractor has been temporarily dismantled and is to be re-erected in Pretoria on the roof of the new main building of the University of South Africa, which intends to use it for teaching purposes.

**ASTRONOMICAL RESEARCH**

With the 26½-in. refractor 741 micrometer measures of double stars were obtained, the observers being Newburg (581 measures on 49 nights) and Knipe (160 measures on 17 nights). The telescope was used by Finsen on 63 nights for interferometer measures of close pairs.

With the Franklin-Adams refractor at the Hartbeespoort Annexe Bruwer and Armstrong obtained 153 plates, on 19 nights, of minor planets and comets, but much of the work of measurement and reduction still remains to be done.

The 20-m. reflector was used by Knipe on 70 nights, yielding a total of 2766 photometric measures, chiefly of visual double stars. These measures were reduced on the IBM 360/50 computer with the help of a modified computer programme, and with a new set of standard stars introduced to replace the mainly northern stars originally used. With the help of Miss J.Hewitt, of the National Institute of Mathematical Sciences, Kitamura's programme for orbital elements of eclipsing binaries was rewritten in Fortran, and observations of  $\epsilon$  CrA were used to test this programme. Observations of the eclipsing binaries RS Sgr, HD 161783 and ST Aqr were continued, while in October the eclipse of BL Tel was observed. A search for eclipses in HD 104631 yielded negative results. Another eclipse of U Oph was observed.

In addition to 16 normal occultations, three grazing occultations were observed, with the aid of predictions supplied by Mr D.W.Dunham of the U.S. Naval Observatory. On these occasions the Observatory staff was augmented by a team of amateur observers under the direction of Mr M.D.Overbeek. A total of 48 observations was obtained of the grazing occultation of Antares on August 3.

### **TIME SERVICE**

The modernization of the time equipment was continued. In December the caesium beam tube of the frequency standard was replaced, after having operated continuously for 19 170 hr. Comparisons with portable caesium clocks of the U.S. Coast and Geodetic Survey were made in February, and again in December, just after the replacement of the tube. These comparisons have shown that during the period of operation of the first tube the frequency of the local standard did not vary by more than 1 part in  $10^{12}$ .

As a result of the exceptionally severe lightning storms of the last two summers, time continuity was interrupted on several occasions, but in every case it was possible to reset the equipment within about 10  $\mu$ s by referring it to other time standards at the satellite tracking stations in the neighbourhood.

The ZUO 5 mHz transmitter was out of commission during the period March 4 to June 1, when it was moved from its temporary quarters to the rebuilt 6-7-in. telescope hut.

### **NEW OBSERVATORY SITE**

During July the region near the confluence of the Vaal and Orange Rivers was visited with the aim of selecting a number of sites where tests for a new observatory could be carried out. Three sites were subsequently chosen near the towns of Philippolis,

Fauresmith and Prieska, respectively at heights of 5700, 5400 and 4200 ft, and here automatic temperature recording equipment has been installed. This equipment is being modified to include the indication of wind speed and direction, as well as of cloudiness. During December preliminary optical seeing tests were started in Johannesburg, and these are to be continued at the test sites.

To ascertain the effect of dust on sky transparency, regular observations have been made at a number of places by means of simple solar photometers. The results show that dust will only rarely be a problem at any of the test sites, where, under nearly all conditions, sky transparency was found to be significantly higher than near Johannesburg.

### **PUBLICATIONS**

*Republic Observatory Circular* No. 127 was issued during the year. The following papers appeared elsewhere:

Hers, J., 1968. A window to the south (A.S.S.A. Presidential Address for 1968),

*Mon. Notes astr. Soc. sth. Afr.*, 27, 75.

Knipe, G.F.G., 1968. The eclipsing and spectroscopic binary HD 161783, *Mon. Notes astr. Soc. sth. Afr.*, 27, 29.

Knipe, G.F.G. & Overbeek, M.D., 1968. Grazing occultation of Antares, 1968 August 3, *Mon. Notes astr. Soc. sth. Afr.*, 27, 112.