

Q.Jl R. astr. Soc. 11, 272, 1970.

ANNUAL REPORT OF THE REPUBLIC OBSERVATORY

JOHANNESBURG

1969

(Acting Director: J.Hers)

STAFF

Mr G.H.Smith was appointed Assistant Research Officer in January, while in April Mr G.Roberts was appointed Technical Officer, both to assist with the programme of planetary photography. Messrs A.G. Dell and J.Hansen, who had been assisting with the site-testing programme, resigned in January and were succeeded by Mr E.L.Berry and Mr J.Jannetta, who were appointed Assistant Technicians in January and October respectively. Mr M.A.Klerk was appointed Technician in September. From August to October Miss B.J.C.van Schalkwyk helped with the reduction of site-testing data. Mr B.M.F.Armstrong resigned in August.

ASTRONOMICAL RESEARCH

Visual double stars

With the 26½-inch refractor 217 micrometer measures of double stars were obtained, the observers being Newburg (199 measures on 31 nights) and Knipe (18 measures on one night). The large decrease as compared to previous years was partly due to the requirements of the planetary photography programme, which during the period April to September took up most of the telescope time, and partly due to the fact that many observers were absent from Johannesburg for considerable periods in connection with the site-testing programme.

The telescope was used by Finsen on seven nights for interferometer measures of close pairs.

Minor planets

With the Franklin-Adams telescope at Hartbeespoort Bruwer and Armstrong obtained 125 plates on 13 nights, and derived 204 minor planet positions.

Photometry

The 20-inch reflector was used by Knipe on 72 nights for photometric measures of eclipsing binaries and visual double stars. Observations of the primary minimum of

RV Pictoris were completed, and a note written for publication in the 'Circulars'. Observations of the times of minimum of QS Aquilae which have been observed since 1961, during the periastron approach of the visual binary Kuiper 93, have shown that periastron occurred about 1964 January. Observations of the eclipsing binary HD 161783 have been completed, and orbital elements computed using Kitamura's programme. Several nights were spent observing the eclipsing binary ST Aquarii to complete the light curve.

An integrating photometer was built using an integrated circuit amplifier with digital voltmeter readout. A printer is to be associated with this equipment for routine use. Although only in the 'breadboard' stage, it works well, and on a clear night 30-second integrations repeat to 1 or 2 parts in 1000.

Occultations

Thirty-four occultations were observed by various members of the staff, chiefly with the 20-inch reflector and 6/7-inch refractor. The Observatory co-operated with teams of local amateur observers under the direction of Mr M.D.Overbeek to observe three grazing occultations. On 1969 March 23 at Kameeldrif a total of 63 observations was obtained of the grazing occultation of ZC 638, while on 1969 June 24 at Potgietersrus the occultation of Spica yielded 56 observations.

An experimental photoelectric recorder for lunar occultations was set up. Stars down to 6th magnitude can be timed with an accuracy of 1/10 or 1/20 second.

Planetary photography

The Observatory is collaborating with the Planetary Research Center of the Lowell Observatory, and the Observatories of Cerro Tololo, Hawaii, Mount Stromlo and Kodaikanal in a five-year programme for photographing the planets Venus, Mars and Jupiter. In 1969 March a special 35-mm camera with associated control equipment was received from the Lowell Observatory. A special correcting lens was fitted to the 26½-inch reflector, which was at the same time modified for the rapid interchange of camera and micrometer. The photographic equipment was installed in April, and from then onwards observations of Mars and Jupiter were continued on every clear night until August. Observations were made during 977 hours on 145 nights, which means that only 10 per cent of the possible number of nights was lost due to bad weather. A total of 43,470 exposures was made of Mars and 15,280 of Jupiter.

NEW OBSERVATORY SITE

Temperature recordings on some of the high hills in the neighbourhood of Philippolis, Fauresmith and Prieska were continued, and supplemented with recordings from the Radcliffe, Boyden and Republic Observatories. In February this was extended to the Langeberg, between Postmasburg and Upington. Here a double-beam telescope was installed shortly afterwards, and was kept in operation until the end of August.

Observing conditions on this mountain, 1680 metres above sea level and 420 metres above the surrounding country, were on the whole good. Temperature variations were found to be significantly lower than at any of the other sites which had been tested. This region is at present rather isolated, but as it is known to be rich in minerals, it is likely that mining will be greatly expanded in the years to come. While this may help to make the region more inhabitable, it may well degrade it astronomically.

The second double-beam telescope was installed in Fauresmith district in June, and operated until the end of October. Results were somewhat disappointing, and it was concluded that this was probably due to the fact that at night cold air from the mountains in the east would tend to fill the whole Orange River valley to a considerable height, which would almost certainly exceed that of the relatively low mountains in this region.

It was therefore felt that better overall conditions might be found in the high Karoo region, in the triangle Richmond~Middelburg~Graaff Reinet, even at the expense of a slight reduction in the percentage of clear nights. It is known that the edge of the escarpment is often cloudy, and it would therefore be necessary to go as far to the north as possible. A suitable mountain in this area was found on the farm Kookfontein, in the Richmond district, and here the double-beam telescope which was initially on the Langeberg was installed in August, at an altitude of about 2000 metres. This was supplemented shortly afterwards by an 8-inch reflector, used for making Danjon diffraction ring tests, and by microthermal recording equipment.

Observations at this site are being continued in association with the Royal Observatory at Cape Town, which has been conducting similar tests at a site near Sutherland since 1968.

In Johannesburg equipment has been built for the direct reception of weather satellite photographs.

TIME SERVICE

The modernization of the time service was continued, but at a some-what slower rate as the result of the many demands by the site-testing programme.

Among the improvements made during the year were the following: a transistorized oven temperature control unit was developed and put into operation; the 100-kHz phase shifter and its drive unit were improved; new IC frequency dividers were designed and built, and modified after a period of operation; work has been started on a digital time readout.

Travelling clock comparisons between the time standard of the U.S. Naval Observatory and the local caesium standard were made on four occasions, once by the U.S. Coast and Geodetic Survey, once by N.A.S.A., and twice by the U.S. Naval Observatory. It is understood that these valuable comparisons, which until now have been

made at very irregular intervals, will in future take place according to a more or less fixed schedule.

PUBLICATIONS

Republic Observatory Circular No.128 was issued during the year. The following papers appeared elsewhere:

Armstrong, B.M.F., 1969. Grazing occultation of ZC1925 (Spica) observed at Potgietersrus, on 1969 June 24, **Mon. Notes astr. Soc. sth. Afr.**, 28, 97.

Knipe, G.F.G., 1969. Photometric observations of BL Telescopii, **Mon. Notes astr. Soc. sth. Afr.**, 28, 54.