

NOTICE

The following text was extracted from the publication by Willis et al. (2013).

The Royal Greenwich Observatory (RGO), formerly the Royal Observatory, Greenwich, maintained a very valuable programme of solar observations for more than a century. In particular, with the help of other solar observatories, the RGO acquired white-light photographs (photo-heliograms) of the Sun during an interval extending from (at least) 1874 April 17 until 1976 December 31. Thereafter, responsibility for the RGO programme of solar observations was formally transferred to the Heliophysical Observatory, Debrecen, Hungary. The majority of white-light photographs obtained by the RGO were taken using photo-heliographs located at the following observatories: The Royal Observatory, Greenwich, until 1949 May 02 and the Royal Greenwich Observatory, Herstmonceux, from 1949 May 03; the Royal Observatory, Cape of Good Hope, South Africa; the Dehra Dun Observatory, North-West Provinces (Uttar Pradesh), India; the Kodaikanal Observatory, Southern India (Tamil Nadu); and the Royal Alfred Observatory, Mauritius. The remaining gaps in the combined collection of photographs from these named observatories were largely filled by photographs generously supplied by a number of other solar observatories, including Harvard College Observatory, Melbourne Observatory, Mount Wilson Observatory and the US Naval Observatory.

The exact method of measuring the areas of sunspots on the solar photographs has been described in the books by Newton (1958) and Howse (1975) and also in the RGO publication *Royal Observatory Annals Number 11* (Royal Greenwich Observatory, 1975). The paper by Willis, Davda, and Stephenson (1996) provides further details of the method of extracting sunspot information from the solar photographs. It suffices to note here that the sunspot areas were measured from the photographs with the aid of a large position micrometer that could be used for photographs of the Sun up to 12 inches in diameter. In the case of large or complex groups of sunspots, the chief components were measured individually; similarly in the case of groups near to the East or West limbs of the Sun, where the effects of foreshortening are appreciable. In other cases, the position of the centre of the group was either estimated by the measurer using the micrometer or derived during the subsequent computations. Whenever necessary, corrections have been applied to the measured distances and position angles (defined later) to allow for differential refraction: the details of this correction are given in the

Introduction to the *Greenwich Photo-heliographic Results 1909* (Royal Observatory, Greenwich, 1910).

The RGO published the measured positions and areas of individual sunspots or distinct groups of sunspots in a series of publications that constitute the *Greenwich Photo-heliographic Results (GPR) 1874 – 1976* [*Greenwich Observations* (1874 – 1955); *Royal Greenwich Observatory Bulletins* (1956 – 1961); *Royal Observatory Annals* (1962 – 1976)]. These RGO publications provide tabulations of the measured positions and areas (umbral and umbral plus penumbral) of every sunspot group for most days of the year. The positions are referred first to a system of apparent polar coordinates (radial distance and position angle) on the Sun’s disk and second to a system of heliographic coordinates (latitude and Carrington longitude) on the Sun’s surface. The measured areas (in polar coordinates), that is the “projected areas” on the solar photographs, are corrected for foreshortening and the resulting corrected areas (in heliographic coordinates) are expressed in millionths of the Sun’s visible hemisphere.

A brief statement should be made about the archiving of the RGO solar plates and contact prints within the United Kingdom. The reference collection of contact prints for the interval 1874 – 1917 is stored in the Cambridge University Library, although it is important to note that contact prints are not available for all days on which archived data can be found in the printed RGO publications. The collection of original solar plates for the interval 1918 – 1976 forms part of the entire archival collection of RGO plates, which are currently stored in the Momart warehouse in east London but will probably be moved to the Bodleian Library, Oxford, in due course, to ensure proper curation and public access. Digitised images made from the RGO solar plates (1918 – 1976) are available on request from the Mullard Space Science Laboratory (MSSL), University College London. A smaller collection of contact prints is stored in the UK Solar System Data Centre at the Rutherford Appleton Laboratory. These visible-light prints exist for most days in the interval 1910 – 1936 (June 30). Further details of these archive collections, as well as their accessibility, are given in Appendix A of Willis et al. (2013).

References:

Howse, D. (1975), *Greenwich Observatory: The Royal Observatory at Greenwich and Herstmonceux 1675 – 1975*, Volume 3: The Buildings and Instruments, Taylor and Francis, London.

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