RAPPORTS DES GROUPES DE TRAVAIL

I. Working Group on Solar Eclipses

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Introduction

At the 1961 meeting in Berkeley, the General Assembly of IAU decided to suppress the Sub-Commissions, among others Sub-Commission 12*a* on Solar Eclipses. The Commissions were entitled to replace them by Working Groups, if useful and convenient.

Following consultation between Prof. Redman and the President, Vice-President and members of the Organizing Committee of Commission 12, a Working Group on Solar Eclipses was organized. Possible members were consulted; most of them agreed to take part in the Working Group, with Dr Houtgast as chairman. The provisional membership will be reviewed at the meetings of the Commission in Hamburg.

It seems very desirable to have a permanent Working Group on Solar Eclipses, to take care of the following tasks:

— to maintain close contacts between interested astronomers for the collection and distribution of practical informations, to be used in the planning of eclipse expeditions and experiments;
— to consider co-operative programmes in connection with future eclipses;
— to promote exchange of experience in the rather special techniques of eclipse observations.

Eclipse ephemerides

In the past the advance calculation of ephemeris has been essential to all observers. They will read with interest the following statement from Dr Duncombe, Director of the Nautical Almanac Office of U.S. Naval Observatory:

'The Nautical Almanac Office of the U.S. Naval Observatory is presently computing the circumstances of eclipses in the period 1970–80. These will be published in a forthcoming U.S. Naval Observatory Circular.

In the past several years, over 200 special computations of local circumstances of solar eclipses and percentage of obscuration of the solar disk for various heights in the ionosphere have been made to aid the interpretation of observational data. This service will be provided by the Nautical Almanac Office in response to any *bona fide* research request.'

The eclipses in 1962 *and* 1963

Since 1961 two total solar eclipses could be observed: that of 1962 February 4/5, visible in New Guinea and the Pacific, and that of 1963 July 20, visible in Alaska and Canada.

The eclipse of 1962 February 4/5 was observed under excellent circumstances by eclipse parties from Japan, Switzerland and U.S.A. at the small village Lae on the east coast of Eastern New Guinea. Preliminary reports of these expeditions and the observations have been published (**1, 2, 3**). About the Japanese observations Z. Suemoto gave the following information:

Among the observers K. Saito and S. Hata obtained excellent photographs and are now busy in reductions, and N. Owaki got beautiful pictures of the inner corona through a rotating sector. As the photographic density is almost constant along the radius on his pictures, one can trace many minute coronal structures within about one solar radius. Enome, a student, is measuring the plates with a view to find small scale brightness fluctuations in the corona. Kawaguchi *et al.* made more or less successful exposures on flash spectrograms as well as on direct image of the innermost corona.

As to the report of the Swiss Expedition by M. Waldmeier it may be mentioned here that exposures were made to determine the structure and the intensity in the corona. Some results have already been published (see main Report of the Commission).

A report of J. T. Jefferies of general interest about data of the U.S.A. expedition follows here:

'Our work in the past two years has been largely concentrated toward, firstly, the observation of and later the reduction of, the Lae eclipse spectrograms. This work has been a co-operative venture by a group of people from the Sacramento Peak Observatory, the High Altitude Observatory and the National Bureau of Standards. The spectrograph and controlling electronics were mounted in two house trailers both for readier transportation and to minimize preparation time for future eclipses. The instrument actually consists of two double spectrographs, one extending to 9000Å with a dispersion of about 9Å/mm while the other obtained images down to 3200Å with a dispersion of 6Å/mm. Thanks to the clouds clearing at the last moment, good observations were possible at both second and third contacts. Spectra were obtained for height intervals respectively of about 200 km and 100 km on the Sun for the IR and the UV spectrographs. To reduce as much as possible of the enormous amount of data on these plates we have digitized (to three figures) the output of the Sacramento Peak microphotometer (at intervals of about 0·05Å along the plate) and recorded this information on standard IBM cards.

'A program was written to convert this output to the corresponding absolute intensity, to break it into the component spectral lines and finally to compute and print the wavelength and wavelength-integrated intensity of every line appearing on each plate.

'Up to the present time (October, 1963), tracings have been made for one point on the limb on those UV and IR plates covering the approximate height range—500 to 5000 km. The UV data has been completely processed; no added difficulty is anticipated with the IR.

'Three aspects of the reduced data are stored on magnetic tape: firstly the absolute intensity corresponding to each digitized point; secondly, the wavelength and the total intensity (integrated over wavelength) of each line on each plate, and thirdly a collation of this latter data which gives the intensity as a function of height for each plate.

'All this data is readily retrievable for detailed study if necessary; the amount which can feasibly be printed is limited however. Anyone interested in specific aspects of the data should write to me at JILA, University Avenue, Boulder, Colorado, U.S.A.'

Of about 40 parties that went to observe the 1963 eclipse in Canada, those that had a clear sky during totality were in the minority. This was expected before, because weather predictions were uncertain, which encouraged several groups to plan airborne observations. From these much valuable experience has been obtained and for the future we may think of doing more airborne observations, to minimize frustration by clouds. They should be organized well ahead of the eclipse date!

A report of the programmes and successes of all eclipse parties known to have participated in Canada has been composed by M. M. Thomson of the Dominion Observatory (**4**). It would be very valuable to have such surveys also for future eclipses and if possible to have the programmes of observations before-hand and to distribute them. In my opinion the Working Group on Solar Eclipses should act as a centre for this work, for which, however, the co-operation of all eclipse observers is needed.

Waldmeier reported in (**5**) on the expedition of the Zürich Observatory. He also noted that during the 1963 eclipse a number of airplanes were flying over the eclipse track in Canada. Some of them have caused considerable condensation bands and cirrus, which disturbed ground-based observations at several sites.

The 1963 eclipse could also be observed in Japan and in Alaska. The programmes of two Japanese parties, one on Hokkaido, Japan and the other one in Alaska, have been carried out as scheduled, with the only modification that the observation of zodiacal light and sky brightness, planned to be made from a balloon, were made from an airplane.

Other observations related to the polarization of the outer corona. Recently Suemoto informed me, that due to the patchy clouds on or near the Sun, no results of much scientific value could be obtained.

Jefferies reports that 'a small expedition under J. Faller of the JILA observed the Alaska eclipse with photo-electric equipment designed specifically to measure the continuum intensities to the red and blue of the Balmer limit. Good data were obtained at second contact from well inside the limb up to coronal heights. The experiment was designed as a prototype for observations of the 1965 eclipse at which we plan to study in detail the intensity in restricted wavelength regions of the chromospheric spectrum.'

Future eclipses

There is nothing to add to the list given by Redman in the previous report of Sub-Commission 12*a*.

Plans for the observations of the eclipses of 1965 and 1966 may be discussed at special meetings of the Working Group in Hamburg.

Suggestions

1. Airplane disturbances:

Waldmeier notes the disturbances caused to ground-based observations in Canada by the condensations trails of airplanes flying along the eclipse track for scientific (or sightseeing!) purposes. Since at future eclipses, still more use of airplanes may be expected, he proposes the following Resolution:

'In the organisation of observations to be made during solar eclipses care should be taken that condensations in the atmosphere caused by airplanes will not hamper the observations made from ground-based observations'.

2. Solar limb co-operative programmes (Kristenson):

In order to create a firm ground for interpretative work on the chromosphere, observations of the solar limb radiation at optical wavelengths should be carried out by several ground or airborne stations in *co-operation*, according to a general scheme jointly outlined by experienced observers and theorists in the field. At least this would be one way of narrowing down the wide gap existing between the great number of atmospheric parameters on the one hand, and the really insufficient amount of observational data on the other. Both things seem to be equally important: co-operation among observatories to increase the volume of useful and overlapping data and consultations between the two kind of workers to give the results a maximum of discriminating power.

3. Exchange of experiences or instrumentation (Houtgast).

It would be of great value if eclipse observers could ensure a better exchange of experiences in connection with advanced means of observations: photo-electric devices, spectrographs of high-speed and resolving-power, use of balloons, airplanes and rockets should be considered. Difficult and modern observations should be attacked in agreement with the needs of present solar research.

Bibliography

(see also main Report of the Commission)

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