

12. COMMISSION DE LA RADIATION ET DE LA STRUCTURE DE L'ATMOSPHERE SOLAIRE

PRESIDENT: R. Michard.

SECRETARY: L. Delbouille.

First Meeting, 24 August 1967

The president opened the session by announcing that Professor E. Müller had asked to be replaced as secretary of the Commission 12. After having thanked Dr. Müller for her excellent work, the president announced that Dr. Delbouille has accepted the secretaryship of the Commission.

1. WORKING GROUP ON SOLAR ECLIPSES

The chairman of this working group, *Dr J. Houtgast*, presented the following administrative report of its activities.

The resolution no. 5 (see Draft Report p. 227) to the effect that interference by vapour trail from airplanes be avoided, was brought to the attention of the authorities of the countries concerned with regard to the eclipses of May 20 and November 12, 1966. It appeared that additional measures have to be taken to avoid also incidental private flights over the sites of eclipse observations during an eclipse.

The organizational work with regard to the expeditions for the observation of the 12 November eclipse, passing over South America, done by Dr R. Fleischer of the National Science Foundation, should be mentioned here. The need is felt for a similar organization for the total solar eclipse on March 7, 1970, visible near Mexico and in Florida.

There is some interest for the eclipse of September 22, 1968, being total in the U.S.S.R. Circular nr. 116 of the U.S. Naval Observatory gives information of the eclipse-path.

Some changes have to be made in the composition of the Working Group. Professor Mihailov and Dr Parijskij wish to retire because they are no more active as eclipse observers. Professor Mihailov suggests as new members M.N. Gnevyšev and G. B. Gelfreich.

In the course of the past three years M. Cimino, R. Haupt, F. Q. Orrall and M. Rigutti were proposed as new members.

All proposals are approved, so that now the Working Group has the following members:

J. Houtgast (chairman), Athay, Cimino, R. L. Duncombe, Gelfreich, Gnevyšev, Haupt, Jefferies, von Klüber, Kristenson, Orrall, G. Righini, Rigutti, Suemoto, Waldmeier.

2. WORKING GROUP ON CENTRAL INTENSITIES OF FRAUNHOFER LINES

A. K. Pierce, chairman of this working group, presented the following report of the work done since 1964.

The precision determination of line profiles and hence central intensities of Fraunhofer lines required high dispersion, a narrow well-defined instrumental profile, freedom from scattered light, and a linear system of scanning and recording. The three-year period since the Hamburg meeting has been one of implementation and application of new technological advances, the building of new equipment or the modernization of old. Lasers have helped to make the determination of the instrumental profile much easier though there are still unanswered questions: polarization and coherence. When observing the sun high speed repetitive scanning reduced the effect of low frequency observational noise. This has only been possible using on-line computers.

The members of the Working Group have suggested for standards a list of about 40 lines distributed in the wavelength interval $\lambda\lambda$ 3000 to 7700. These lines have been selected for a number of

reasons. Some of them because they are close to laser lines, others because they have been observed many times, often by very different techniques, such as the strontium line λ 4607 or the sodium D lines. The list includes lines of widely different half-widths, different central intensities and different excitation conditions. They should be suitable for the determination of spectrographic parameters, and if observed over a period of time will give us a measure of any change within the sunspot cycle.

The reduction of the observations has received much study. The filtering and deconvolution problems have been solved by the Fourier transform method. At a meeting of the Working Group held in Prague, the deconvolution problem was discussed by Delbouille and Brault. Professor Krat presented the work in Pulkovo, Minnaert commented about polarization.

The actual composition of the Working Group is:

A. K. Pierce (chairman), M. K. Bappu, J. Brault, A. H. Cook, L. D. Delbouille, G. H. Elste, J. Houtgast, C. de Jager, V. Karpinsky, V. A. Krat, M. G. Minnaert, E. A. Müller, L. Neven, G. Righini, F. R. Roddier, G. F. Roland, H. H. Voigt, O. R. White, G. G. Wlérick, C. Pecker-Wimel.

3. SCIENTIFIC REPORTS

(a) *C. E. Moore-Sitterly—The solar spectrum 2935–8770 Å, NBS Monograph 61, 1966*

Presentation of the new solar tables, published in collaboration with M. G. Minnaert and J. Houtgast. The volume contains 24000 lines of which 73% are wholly or partially identified.

(b) *L. Delbouille—Recent progress in observations of the solar spectrum at the Jungfrauoch*

Information about this work, by Delbouille and Roland, is under print in the *Phil. Trans. R. Soc. Lond. A*.

(c) *A. B. Severny—The general magnetic field of the quiet sun*

By integrating the high resolution measurements, representations of the general (polar) magnetic field of the sun have been obtained for the period 1963–1967.

(d) *G. Newkirk—Comments on the general magnetic field of the sun*

Spherical harmonic expansion of the solar surface field in June 1965 and November 1966 have been computed by Dr. M. Altschuler of High Altitude Observatory (Boulder).

Second Meeting, 24 August 1967

MODELS OF THE PHOTOSPHERE AND LOW CHROMOSPHERE

Scientific reports

(a) *C. de Jager—Review of results of Utrecht Study Week*

Presentation of the 'Bilderberg continuum atmosphere', a reference model of the solar photosphere and low chromosphere, established during an international study week held in Holland in April 1967.

(b) *O. Gingerich* gave a more complete description of the Bilderberg model.

(c) *G. Elste—Critique of the Bilderberg continuum atmosphere model*

Between 5000 and 16000 Å, the B.C.A. does not provide a satisfactory explanation of limb darkening measurements.

(d) *D. Labs* and *H. Neckel—Critical comparison of available observations of the photospheric continuum*

Extensive survey of all the observing material available today about solar absolute intensities, solar irradiance and the solar constant.

(e) *C. Rouse—Balmer decrement in the solar photosphere and chromosphere*

The decrease in intensity of hydrogen lines in the solar photosphere and chromosphere can be considered as due to the screened coulomb interaction of the bound electron with the nucleus.

(f) *P. R. Wilson*

Discussion of two problems. Model of the mean photosphere cannot be computed without taking

into account the horizontal fluctuations in temperature and opacity. Calculations have been made of the source function for a spectral line formed by a two levels atom in an atmosphere with properties varying in the horizontal plane.

Third and Fourth Meetings, 29 August 1967

The president invited Dr J. Houtgast to be the chairman of these two sessions devoted to eclipse studies, chromosphere and corona.

SCIENTIFIC REPORTS

(a) *R.F. Haupt* made an announcement: the Nautical Almanac Office, U.S. Naval Observatory, Washington DC 20390, publishes circulars giving predicted data on solar eclipses. Upon written request, local circumstances are computed for specific locations.

Observer reports about the times of contacts will be greatly appreciated.

(b) *Dr Vinogradov* commented about the ratio Fe/N in the corona.

(c) *E. Tandberg-Hansen*—*The excitation of Ba II in the chromosphere*

(d) *G. Newkirk, M.D. Altschuler and J. Harvey*—*Influence of magnetic fields on the structure of the solar corona*

A current-free approximation of the coronal magnetic field has been calculated from Mount Wilson photospheric magnetic observations traced by computer and compared to a white-light photograph of the 12 November 1966 eclipse.

(e) *J.M. Malville*—*Some results of coronal studies*

A ratio Fe over H in the corona of 1.1 to 1.9×10^{-5} has been derived from eclipse observations made in Bolivia.

(f) *G. Henderson*—*Interferometric studies of the corona*

Line profiles of the λ 5303 emission have been obtained, using a Fabry-Perot spectrometer, during the eclipse of November 12, 1966, observed from the NASA aircraft 'Galileo'.

(g) *M.N. Gnevyshev, G.B. Gelfreich and E.K. Makarova*—*Recent observations of eclipses*

The solar eclipses of 30.V.65, 20.V.66 and 9.V.1967 were used by the soviet astronomers mostly for radio-astronomical observations (brightness distribution on the solar disk, fine structure of local radioemission sources connected with sunspots groups).

(h) *O. Jefferies* announced that the results of the observations of 1962 eclipse, made from New-Guinea jointly by the Harvard Astr. Observatory - Sacramento Peak Observatory and the National Bureau of Standards will be published soon.

(i) *J. Houtgast* reported about work made in collaboration with *O. Namba* on the self reversals of chromospheric lines in the wavelength region 3438–4101 Å and on the ratio of line strengths in the chromosphere and in the photosphere.

(j) *J. Houtgast, O. Namba, R.J. Rutten*—*Preliminary Report of the Dutch Eclipse Expeditions in 1966*

Two expeditions have been successful: one in Greece and one in Brazil. A specially designed spectrograph was used to record the spectral region λ 4450 to λ 6100.

(k) *J. Blamont, A. Maligne* (presented by *R. Bonnet*): *Assombrissement au bord solaire aux longueurs d'onde 2000–1200 Å, observé à l'éclipse du 12 novembre 1966*

Observations made from a rocket launched, in South America, during the eclipse.

(l) *R. Falciani, A. Righini, M. Rigutti*—*On the spectrum of the Corona at the total eclipse of November 12, 1966*

Search for the existence of coronal emission of Ca II H- and K-lines.

(m) *R. Falciani, A. Righini, M. Rigutti*—*A refined isodensitometric technique*

The results of this research have been published in the *Mem. Soc. astr. ital.*, **38**, 1967.

(n) *M. Cimino and de Biase*—*Results of the eclipse expeditions of Rome Observatory in 1966*

Accurate solar-limb darkening photoelectric observations have been made during the total eclipse of November 12, 1966 at Bagi, Rio Grande do Sul, Brazil.

(o) *J.T. Jefferies and F.Q. Orrall—Eclipse experiments in May 1965 and November 1966.*

Spectroscopic observations between 2950 and 9200 Å have been made in order to measure coronal lines and derive coronal abundances.

(p) *M. Waldmeier—Structure of polar rays and coronal streamers*

Temperature and electronic densities seem, in general, greater in the northern part of the corona.

Fifth Meeting

FINE STRUCTURE OF THE PHOTOSPHERE

Scientific Reports

(a) *J.M. Beckers* presented high resolution observations of the photospheric velocity fields obtained in observing the Fe line at 6569.23 Å.

(b) *J. Rösch* showed excellent quality motion pictures of photospheric granules. On some sequences, taken during an eclipse, the dark edge of the moon was recorded to show the high obtained contrast.

(c) *E. Frazier* discussed the results of Fourier analysis of photospheric velocities obtained in observing the steepest parts of line profiles.

(d) *F. Roddier* observed periodical oscillations (of the order of 300 sec) in the position of Sr I and Ca I photospheric lines.

(e) *R. Howard* and *J.M. Wilcox* have recorded the 5250 Fe I line and observed velocity oscillations, with a period of about 300 sec, in fine details of the photosphere.

(f) *M. Waldmeier* presented a motion picture film taken at the occasion of the November 12, 1966 eclipse.

Correction to the draft report

p. 199—*Atlas et tables du spectre de Fraunhofer—Identifications* paragraph 2—to read:

La préparation du nouvel atlas photométrique du spectre solaire, commencée par Delbouille, Roland et Neven à l'aide du spectromètre à double passage installé au