THE DIFFERENTIAL SHIFTS OF FRAUNHOFER LINES IN SOLAR SPECTRA. I. A DISPLACEMENT OF THE ATMOSPHERIC (TELLURIC) LINES.

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During the observation from 7^h to 18^h (local time) shifts of the telluric lines of 0.005 Å or - 0.2 km/sek. on an average are being discovered. The new observation method is suggested in order to expand the spectral region in which line shifts are studied. This method includes the account of the fact of overlaying of various order spectra.

The atmospheric telluric lines are usually being used in defining the differential shifts of Fraunhofer lines of solar spectrum as reference lines - bench-marks. Naturally, it is supposed that their position do not change during the observation in regard to the Sun's Fraunhofer lines., However, in [1] it was established as a preliminary their displacement depending on the zenith distance of the Sun's observation on the base of investigations of about 30 atmospheric telluric lines placed in the region of 6400-6500 Å.

About 100 atmospheric telluric lines in the spectra of the center of Sun's disk in the region of λ 5850-6000 and λ 6250-6600 Å have been taken at the present work. Dispersion in negatives is ~1 mm/Å. The positions of telluric lines in regard to the reference of Sun lines free of blend are being measured. Observations of 122 various days and period covered from morning hours till the evening are being used. Possible errors in the position of reference as in case of Sun lines (local movements, 5 and 8 minute fluctuation of Sun's atmosphere and etc.) are being excluded thank to the averaging of a great deal of observations carried out in various hours and days. During the observation from 7^h to 18^h (local time) shifts of the telluric lines of 0.005 Å or 0.2 km/sec. on an average are being discovered. The minus sign corresponds to the removal of the gaseous mass. We suppose that this shift cannot been concerned for account of the jet stream in the atmosphere of Earth [2] so far as strong jet stream are being observed in high atmospheric layers. Measured telluric lines arise effectively in lower atmospheric layers. We are inclined to consider that this shift can be called out the Stark-effect appearance that is quite possible in the layers of effective origin of the telluric lines. Instrumental, in particular thermal reasons can't play an essential role otherwise measurements are being produced differentially. But possible errors that could be called out with the local Doppler movements in the atmosphere of Sun are excluded with the selection of reference seen lines of various force and multiple frequency of observations in different days and hours.

Though the discovered shift of atmospheric telluric lines hardly surpass the errors of measuring nevertheless it must be taken into consideration in exact measuring the positions of solar Fraunhofer lines.

In spite of the discovered lack the atmospheric telluric lines still remain as unsurpassed bench-marks in comparison with the artificial ones. In case of using the artificial bench-marks it is difficult and almost impossible the discounting of Hartman's displacement of spectral lines arising by non-uniform illumination of collimator with the terrestrial source and Sun.

Table

λ (Å)	m	λ (Å)	m	λ (Å)	m	λ (Å)	m
1	2	3	4	1	2	3	4
3540÷3576	5	5900÷5960	3	4703÷4748	4	6270÷6330	3
3762÷3798	5	6270÷6330	3	4720÷4768	5	5900÷5960	4
3933÷3973	3	5900÷5960	2	4817÷4967	6	5900÷5960	5
3933÷3973	6	5900÷5960	4	5016÷5064	5	6270÷6330	4
4180÷4220	3	6270÷6330	2	5225÷5275	6	6270÷6330	5
4180÷4220	6	6270÷6330	4	5900÷5960	4	5900÷5960	4
4425÷4470	4	5900÷5960	3	6270÷6330	4	6270÷6330	4

On the other hand the atmospheric telluric lines that may be used as bench-marks are concentrated only in limited spectral region of spectra (λ 5900 and λ 6300 Å). So we deprive of having possibility the investigation of shifts of Fraunhofer line placed in short-wave spectral region where the lines of more heavy chemical elements are placed and the investigation of which have a cosmogonic meaning. We overcome these difficulties in our research using the well-known formula of diffractional grating $m \cdot \lambda = const$ (m - the order of spectrum, λ - the wave-length). It is known that the spectra of other orders are being added on observed part of spectra. Using the diaphragm and selection of corresponding lightfilter we can print parts of λ 5900 or λ 6300 Å (where there are good bench-marks telluric lines) of the spectrum of Sun disk center (or any point of disk, even sky halo) from other orders as comparison spectrum by both sides of observed spectrum.

In the table are given: the spectral region in which the line shifts may be studied (column 1), the comparison spectra of the other orders overlaying the spectra in question (column 3).

[1] *O.A. Melnikov, R.Kh. Salman-zadeh.* Dokladi Akad. Nauk SSSR, 205, № 5, 1972.

[2] *I.G. Kolchinsky.* Monograph., Kiev,1967.

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GÜNƏŞ SPEKTRİNİN FRAUNHOFER XƏTLƏRİNİN NİSBİ SÜRÜŞMƏLƏRİ. I. ATMOSFER (TELLURİK) XƏTLƏRİNİN SÜRÜŞMƏLƏRİ.

Yerli dekret vaxtı ilə 7^h-18^h vaxt fasiləsində aparılan müşahidələr zamanı atmosfer xətləri orta hesabla - 0.005 Å və ya - 0.2 km/san. sürüşürlər. Tədqiqat aparılacaq spektral oblastı genişləndirmək məqsədilə, spektrin müxtəlif tərtiblərinin bir-birinin üstünə yatması faktından istifadə edilən yeni müşahidə üsulu təklif edilir.

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ДИФФЕРЕНЦИАЛЬНЫЕ СДВИГИ ФРАУНГОФЕРОВЫХ ЛИНИЙ В СПЕКТРЕ СОЛНЦА. I. СДВИГИ АТМОСФЕРНЫХ (ТЕЛЛУРИЧЕСКИХ) ЛИНИЙ

За время наблюдений с 7^h до 18^h (время местное декретное) обнаруживаются сдвиги теллурических линий в среднем на 0.005 Å или - 0.2 км/сек. С целью расширения исследуемой спектральной области, при изучении сдвигов линий, предлагается новый метод наблюдений, использующий факт наложения спектров разных порядков.

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