

Determination the values of Ultra Violet  
Radiation intensity at Ulaanbaatar  
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**Abstract.** The methods and primary results of the Ultra Violet Radiation investigation from measurement data of integral solar radiation at Ulaanbaatar ( $\varphi = 47^{\circ}56'$ ,  $\lambda = 106^{\circ}59'$ ,  $h = 1330$  metres above sea level). Solar radiation measurements were performed with the help of thermoelectric actinometer AT - 50 and pyranometer M - 80. For the calculation of Ultra violet radiation has been used the simplified model of the Earth atmosphere developed by V.A.Belinsky.

Using these data we calculated the values of direct, diffused and global Ultra Violet Radiation

Key word index: Solar radiation.

## 1.Introduction

The values of Ultra Violet Radiation (UVR) can be received from the solar integral radiation measurements.

A measurements of the direct and global solar radiation will make it possible to determine the values of UVR. Investigation of the UVR plays an important role for the development of geophysics, biology, oncology, health resorts and so on. Hence, in this paper we present the primary results of our studies on UVR at Ulaanbaatar.

## 2.The methods of data treatment.

V.A.Belinsky developed and successfully used the simplest model of the Earth atmosphere (SMEA) (Belinsky, 1968). Using this model and measurement data of the direct and global solar radiation with the help actinometer AT - 50 and pyranometer M-80.

In advance, has been determined the values of radiation equivalent ( $Q_p/Q_m$ ) (J.Gombojav et al, 1992) presented a ratio of global solar radiation measurement data on the pyranometer  $Q_p$  to the values of global

solar radiation calculated by SMEA  $Q_m$ . Using these data we calculated the values of direct and global UVR intensity at Ulaanbaatar.

### 3. Determination of UVR values at Ulaanbaatar.

Monthly mean and annual mean values of direct UVR sum  $\Sigma S'_{uv}$  at Ulaanbaatar are given in Table 1. It is seen from Table 1 that the values of  $\Sigma S'_{uv}$  achieves maximum in April and May in 1992-1994 and in June only in 1995. Least values of  $\Sigma S'$  are in November, January, and in December only in 1995.

Fig.1 illustrates monthly mean and annual values of diffused UVR sum. One can see from Fig.1 the greatest values of  $\Sigma D_{uv}$  is observed in July (296.67 and 13 MJ/m<sup>2</sup>) or in May (201.83 and 290.0 W/m<sup>2</sup>) and the least values - in December, November or January.

Monthly mean and annual mean values of global UVR at Ulaanbaatar are presented in Table 2. It is seen from Table 2 that the greatest values of global UVR is marked in May, July and June.

It is noticed that monthly mean and annual values of UVR in 1995 at Ulaanbaatar has comparatively the most values almost in all months, than in other years.

### Conclusion.

All above giving to account leads to main following results:

1. Monthly mean and annual mean values of direct UVR sum ( $\Sigma S'_{uv}$ ) achieves maximum in April and May in 1992-1994, and in June only in 1995. Least values of  $\Sigma S'$  are in November, January in 1992-1994, and - in December only in 1995.

2. The greatest values of diffused UVR is observed in July or May and least values - in December, November or January.

3. The greatest values of global UVR is marked in May, July and June.

Table 1 Monthly and annual mean values of direct UVR  
sum  $\Sigma S^m$  at Ulaanbaatar,  $W/m^2$ , 1992-1995

Year	Months												Annual mean
	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	
1992	63.83	99.00	133.83	232.00	207.33	212.50	193.33	95.17	60.33	16.67	44.50	32.50	1390.99
1993	70.33	88.50	180.00	263.00	340.00	170.50	290.50	223.67	36.83	59.83	93.17	68.83	1885.16
1994	100.33	118.33	244.33	177.00	297.33	265.00	287.67	182.83	176.00	187.50	61.33	59.83	2157.48
1995	117.67	135.0	273.17	283.83	364.00	402.83	395.17	363.00	377.33	271.00	126.67	96.50	3206.17

Table 2. Monthly and annual mean values of global UVR  
Sum at Ulaanbaatar  $W/m^2$ , 1992-1995

Year	Months												Annual mean
	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	
1992	146.7	208.7	338.8	448.3	420.2	389.5	490.0	252.3	183.8	87.5	115.5	90.5	3171.8
1993	145.0	192.7	342.0	456.0	535.3	387.2	341.2	385.7	177.0	188.8	172.3	158.0	3481.2
1994	138.0	205.0	357.5	329.8	499.2	439.2	452.7	349.7	291.2	295.0	129.3	140.3	3626.9
1995	196.7	331.0	484.2	543.2	654.0	675.5	638.7	534.0	533.3	384.0	186.2	154.8	4781.6

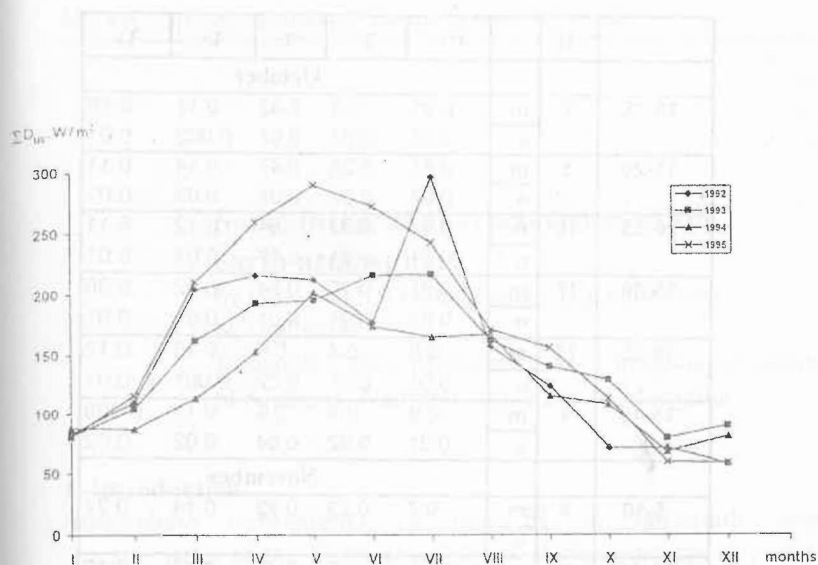


Fig. 1. Monthly mean and annual mean values of diffused UVR sum,  $W/m^2$

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	n		$P_2$	$\tau_1$	$\tau_2$	$\tau_3$	$\tau_4$
<b>October</b>							
10-15	2	m	0.81	0.3	0.43	0.12	0.16
		$\sigma$	0.01	0.03	0.07	0.002	0.01
15-20	5	m	0.81	0.28	0.47	0.14	0.11
		$\sigma$	0.02	0.02	0.05	0.02	0.01
20-25	10	m	0.82	0.33	0.54	0.12	0.11
		$\sigma$	0.01	0.01	0.02	0.01	0.01
25-30	17	m	0.81	0.36	0.54	0.12	0.08
		$\sigma$	0.01	0.01	0.01	0.01	0.01
30-35	19	m	0.8	0.4	0.6	0.16	0.12
		$\sigma$	0.01	0.01	0.02	0.001	0.01
35-40	8	m	0.8	0.4	0.6	0.17	0.098
		$\sigma$	0.01	0.02	0.04	0.02	0.02
<b>November</b>							
5-10	5	m	0.7	0.23	0.22	0.14	0.22
		$\sigma$					
10-15	16	m	0.78	0.3	0.48	0.12	0.16
		$\sigma$	0.01	0.01	0.01	0.01	0.01
15-20	33	m	0.77	0.33	0.54	0.15	0.181
		$\sigma$	0.001	0.01	0.01	0.003	0.01
20-25	34	m	0.77	0.41	0.61	0.19	0.19
		$\sigma$	0.01	0.01	0.01	0.002	0.002
25-30	11	m	0.76	0.4	0.64	0.3	0.18
		$\sigma$					
<b>December</b>							
15-20	4	m	0.73	0.48	0.79	0.19	0.25
		$\sigma$					