

ARMENIA

OBSERVATIONAL ACTIVITIES

Column measurements of ozone and other gases/variables relevant to ozone loss

The GAW regional station #410 Amberd carries out the measurements of total ozone. The station is equipped by Dobson spectrophotometer D-044.

The begun in 1990 measurements of total ozone on the local network ozone-observing station Arabkir in city Yerevan are continued. The station is equipped by filter ozonometer M-124.

The results of carried out in Armenia during 1991-2007 measurements of total ozone are presented on Fig. 1.

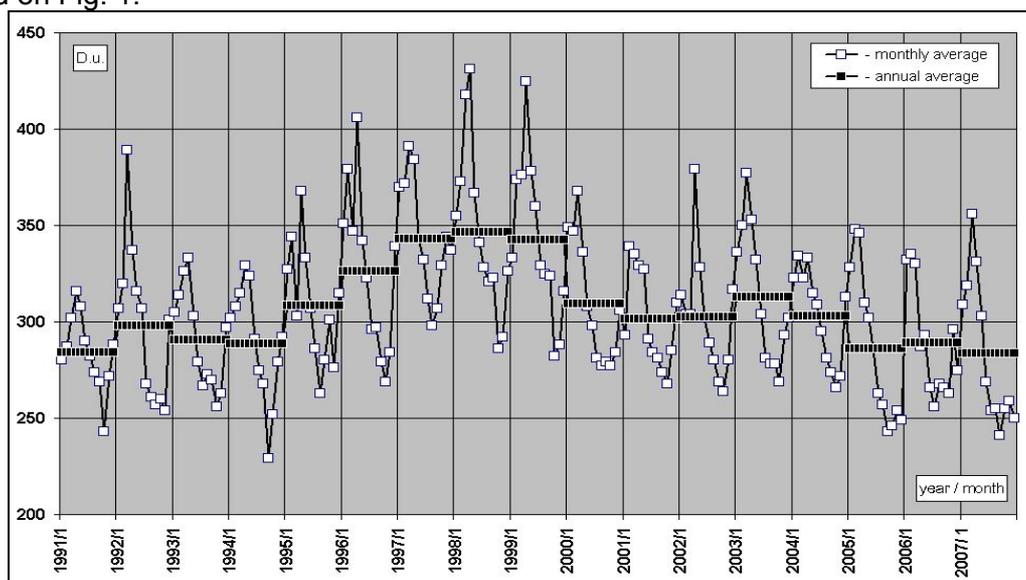


Figure 1: Dynamics of changes of total ozone in Armenia during 1991-2007.

Profile measurements of ozone and other gases/variables relevant to ozone loss - not made.

UV measurements - not made.

Calibration activities - the calibration of Dobson spectrophotometer D-044 in European RDCC in Hohenpeissenberg was executed in 2004.

RESULTS FROM OBSERVATIONS AND ANALYSIS

The results of measurements total ozone at Dobson-station Amberd showed, that after 1999 the general tendency to its decrease to a level 1993-94 was observed.

The study of connection between changes of total ozone and the morbidity of population by skin cancer begun in [1] was continued.

THEORY, MODELLING, AND OTHER RESEARCH

Using the results of long-term actinometric observations, carried out on a network of weather stations of Armenia during 25 years (from 1980 till 2004), are investigated the climatic distributions of direct, diffused, reflected and total solar irradiation on the territory of Armenia, also the seasonal changes of transparency, absorption and dispersion in conditions of atmosphere of Armenia.

Using the climatic parameters of seasonal changes of total ozone above Armenia, carried out during 1990-2006, solar extraterrestrial spectrum in the wavelength range from 280nm to 100mkm, coefficients of UV absorption by ozone, and the electronic map of surface with horizontal step of 300 m, is constructed the computer model of solar radiation transfer in atmosphere and of its distribution on the territory according to parameters of relief and albedo of surface.

In particular, are defined the climatic parameters of distributions of the hourly, daily, monthly and annual sums of UVR (also separately for UV-A and UV-B,C), UV Indexes and the times in order to receive of 1 MED (for 4 skin types) in various regions of country in various time of day, using erythemal CIE spectra of McKinlay and Diffey and Practical Guide "Global Solar UV Index".

Some results of simulation of the climatic regime of ultraviolet irradiation in region of mountain Aragats and Ararat Valley are presented below by color maps (Fig.2 – Fig.5).

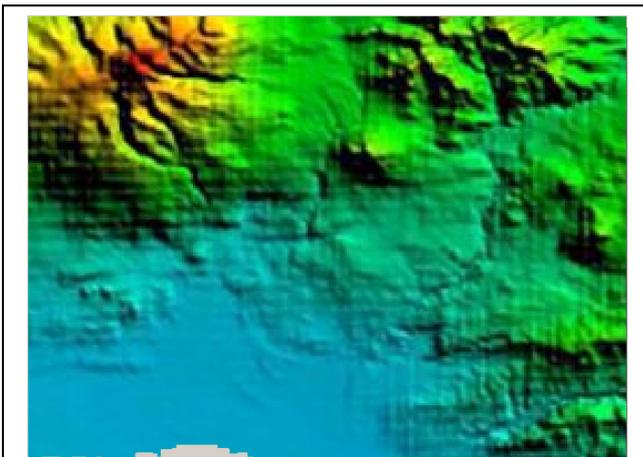


Figure 2: Map of region; range of heights: 829 – 3787 m above sea level.

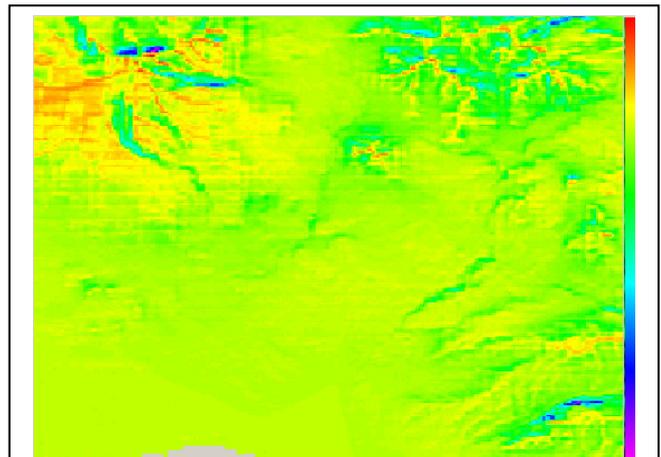


Figure 3: Daily sums of total UVR; June, 22nd; albedo=0.1; range: 0.88 – 1.78 MJ/m².

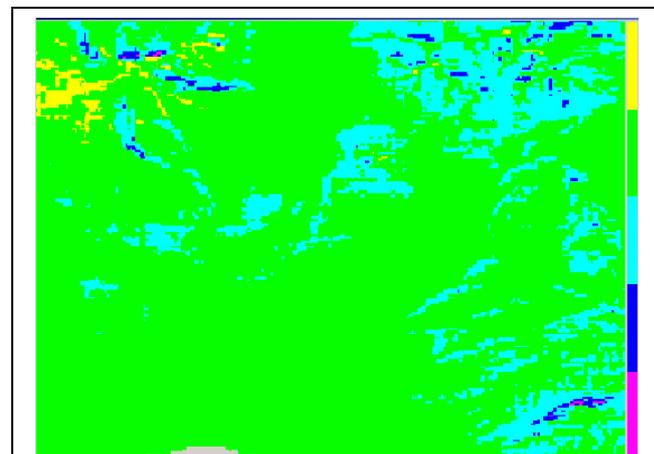


Figure 4: UV Indexes distribution; June, 22nd; albedo = 0.1; range: 6 – 11 .

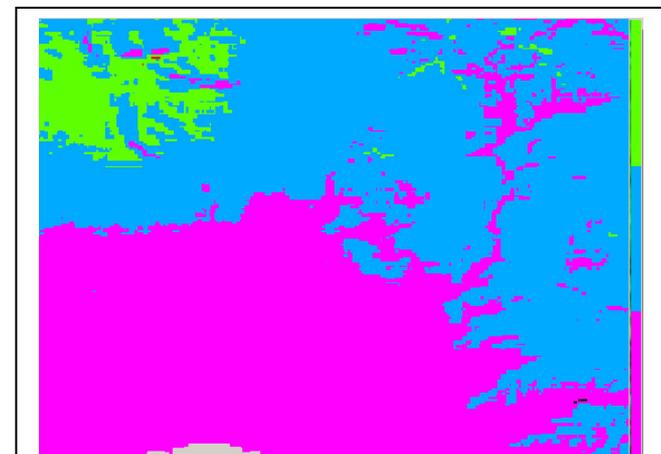


Figure 5: UV Indexes distribution; December, 22nd; albedo = 0.7; range: 1 – 2.5 .

DISSEMINATION OF RESULTS

Data reporting

Monthly results of measurements of total ozone at station Amberd are regularly submitted in the WOUDC.

On the basis of results of measurements of total ozone at stations Amberd and Arabkir is continued the creation of local computer bank.

Are prepared for publication the reference book and CD with atlas of climatic resources of different components of balance of solar radiation and with their decomposition on separate standard spectral intervals: UV, UV-A, UV-BC, visible, IR, photosynthetic, short- and longwave radiation, - in all regions of territory of Armenia.

Information to the public

Using the forecasts of total ozone distribution above northern hemisphere from WMO/GAW ozone mapping program and forecasts of cloudiness with use of the model of solar irradiation are developed the daily maps of forecasts of distribution of UV Indexes on the territory of Armenia. The forecasts of UV indexes for mostly inhabited areas of Armenia, calculated according to "UV Index for Public" (COST-713 Action UVB Forecasting) on the base of daily maps of UV Indexex, are included in the weather forecasts for dissemination to the public via mass media.

Relevant scientific papers

Melkonyan D. (2004) Effect of UV irradiation on skin cancer morbidity in Armenia // Proceeding of the Quadrenial Ozone Symposium "KOS-2004", Vol. II. – s. 1132-1133.

PROJECTS AND COLLABORATION

Execution of Dobson program is being implemented in scientific and methodical collaboration with DWD (Germany) and SOO CHMI (Czech Republic).

At the station Amberd is being created the first level station for EMEP for measurements of concentrations of pollution in precipitations and of solid particles in air, also of SO₂, NO_x and surface ozone.

The model of solar (in particular, UV) irradiation was developed for implementation of national project "Estimation of resources of solar radiation on the territory of Armenia" (2005-2007).

FUTURE PLANS

The results of modeling of a climatic regime of UV irradiation will be used for development of results begun in [1] research of vulnerability of health of the village and urban population to increase of ultraviolet radiation and the influence on vulnerability of height of location. The research was executed on the basis of long-term statistics on morbidity of the population of Armenia by skin cancer and by results of total ozone measurements.

The edition of prepared for publication the reference book and CD with atlas of climatic resources of solar radiation in all regions of territory of Armenia.

NEEDS AND RECOMMENDATIONS

The comparisons of results of the ozone measurements at station Amberd with the satellite data testify to need of new calibration of Dobson spectrophotometer D-044.

The capacities of weather station Amberd allow performing of national and international projects on monitoring of solar radiation, investigations of vertical distribution of ozone with balloon sondes, lidar observations, aerosol transfer and transboundary air pollution in region of South Caucasus.
