# GEORGIA

## Routine Program

Monitoring of total ozone (TO), surface ozone (SO) and stratospheric aerosol (SA) is being conducted in Georgia by the following organizations:

1. Hydrometeorological Service of Georgia (HS).
2. Abastumani Astrophysical Observatory of Academy of Science of Georgia (AAO).
3. M.Nodia Institute of Geophysics of Academy of Science of Georgia (IG).

All organizations take part in monitoring and research activities using the following instruments:

| Name of the station | Organization | Instrument | Since (year) | Last calibration | Parameter |
|---|---|---|---|---|---|
| Tbilisi (41°41'N,44°57'E,450 m asl) | HS | M-124 | 1964 | 1997 | TO, Both Instruments were broken in 2001 |
| Abastumani (41°45'N,42°50'E,1600 m asl) | AAO | M-124 | 1957 | 1994 | TO |
| Abastumani (41°45'N,42°50'E,1600 m asl) | AAO | Twilight sounding method | 1940 | Permanent | SA |
| Tbilisi (41°41'N,44°57'E,450 m asl) | IG | OMG-200 | 1980 | Permanent | SO |
| Telavi (41°48'N,45°30'E,600 m asl) | IG | OMG-200 | 1980 | Permanent | SO |

The total ozone data of Tbilisi station are regularly (every day) sent to the Main Aerological Observatory near Moscow, where all analogous information received from the countries of the Commonwealth of Independet States is collected. Twice a year the daily total ozone values are sent to the Main Geophysical Observatory in St. Peterburg. These data after quality control in MGO are sent to the WMO World Ozone and UV Data Centre (WO3UDC) in Toronto.

## Note

1**.** The photometric measurements of twilight sky brightness in different narrow intervals of the visible spectrum have been carried out in Abastumani Astrophysical Observatory, South Caucasus since 1940. The method is described in Rozenberg (1966). Such measurements allow to determine aerosol loading in the stratosphere and mesosphere as a function of height. The database covers periods of high aerosol loading in the stratosphere after strong volcanic eruptions such as Fuego, St. Helens, El Chichon and Pinatubo. Prominent mesospheric aerosol enhancements caused by intensive meteor showers, such as Leonids, have also been registered.
A significant improvement of the measurements may be achieved by using a spectrometer based on CCD linear detector instead of the photometer equipped with a photomultiplier and interference filters which is currently in use. An access to databases of lidar and satellite measurements of atmospheric aerosol loading would be also very useful.
Rozenberg, G.V.: 1966, *Twilight.* Plenum Press, New York, 1-380.

2. Using standard actinometrical observations for eight Georgian locations (Tbilisi,1928-1991;Telavi,Tsalka – 1457 m, Anaseuli – 158 m, Senaki – 40 m, Sokhumi – 116 m,-in the mid. 1950 – 1991; Jwari Pass – 2396 m, 1973 – 1985;Kazbegi – 3656 m,1955-1964), the Atmospheric Aerosol Optical Depth was established (Institute of Geography and Institute of Geophysics of

Academy of Science of Georgia). In 1991 actinomertical observations were stopped because the instruments were not tested.

**Research Programme:**

-Time variations of the total ozone and the surface ozone in several regions of Georgia and their dependence on the atmospheric processes;
-Trends and decline of the total ozone;
-Increasing of surface ozone in Georgia and conditions for appearance of photochemical smog;
-Effect of ozone on local climate;
-Ozone, aerosols and ecosystem;
-Total ozone and solar activity;
-Vertical aerosol distribution in the stratosphere and middle atmosphere by the twilight sounding method;
-Effect of ozone and atmospheric aerosol on the direct and diffuse solar radiation including ultraviolet radiation.

**Future Plans:**

-Monitor regularly total ozone, ozone vertical distribution, surface ozone, tropospheric and stratospheric aerosols, atmospheric aerosol optical depth;
-To continue research programme;
-Laboratory modelling interaction ozone with small atmospheric admixtures (aerosols, gases);
-Laboratory modelling interaction UV radiation with ozone, cloudiness, aerosols and gases.

**Publication of Results:**

The results of the research works are published in the form of one monograph and in more than one hundred various articles. The most recent ones are:

J.Kharchilava, K.Tavartkiladze, M.Lokapishvili,V.Amiranashvili – On the total ozone variation in Georgia, Journ. of Georgian Geophys. Soc.,Iss.(B),Atmosphere,Ocean and Cosmic Rays, vol.2, 1997, pp.39-49.
J.Kharchilava, K.Tavartkiladze, M.Lokapishvili,V.Amiranashvili-The variability and distribution of the total atmospheric ozone in Georgia, Bull. of the Georgian Acad. of Sci.,157,No 1,1998, pp.53-55.
I.Mateshvili,G.Mateshvili.N.Mateshvili – Measurement of the vertical aerosol distribution in the middle atmosphere by the twilight sounding method, Journ. of Aerosol. Sci.,Pergamon,vol.29, No 10,1998, pp.1189-1198.
O.Benashvili,J.Lominadze,T.Toroshelidze – Investigation of the stratosphere ozone long-term trend in day-time and twilight, Bull. of the Georgian Acad. of Sci.,160,No 3,1999, pp.468-470
A.Amiranashvili,V.Amiranashvili,K.Tavartkiladze – Dynamics of the aerosol pollution of the armosphere in Georgia in 1956-1990, Journ. of Aerosol. Sci.,Pergamon,vol.30, Suppl. 1,1999, pp.s667-s668.
I.Martin,T.Toroshelidze,W.Alves,M.Mello,A.Gusev,G.Pugacheva –Solar cycle and global long term variations of stratospheric ozone, Adv.Space Res.,Pergamon,vol.24,No 5,1999,pp.665-669.
J.Kharchilava, K.Tavartkiladze – The peculiarities of the vertical distribution of ozone in Georgia, Bull. of the Georgian Acad. of Sci.,162,No 1,2000, pp.77-79
O.Lomaya,K.Mchedlishvili,G.Chkhaidze,J.Kharchilava,Z.Khvedelidze –Investigation of the ozone relationship with some meteorological factors, Bull. of the Georgian Acad. of Sci.,162,No 2,2000, pp.259-261.
A.Amiranashvili,V.Amiranashvili,T.Gzirishvili,G.Gunia,L.Intskirveli,J.Kharchilava –Variations of the weight concentrations of dust,nitrogen oxides,sulphur dioxide and ozone in the surface air in Tbilisi, Proc. 15th Int. conf. on nucleation and atmospheric aerosols,Rolla,Missouri,6-1 August 2000, pp.793-795.
A.Amiranashvili,V.Amiranashvili,K.Tavartkiladze – Aerosol pollution of the atmosphere and its influence on the direct solar radiation in some regions of Georgia, Proc. 15th Int. conf. on nucleation and atmospheric aerosols,Rolla,Missouri,6-1 August 2000, pp.605-607.

**Need of Support:**

-We need urgently financial support by WMO for the reparation of two ozone instruments M-124 and calibration of four ozone instruments M-124;
-We need financial support by WMO to purchase two or three UV-B solar radiation instruments;
-Financial support for periodic calibration of standard actinometrical instruments;
-In the future it is necessary to have a standard Dobson or Brewer spectrophotometers and more modern surface ozone instruments.

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