# TURKEY

**OZONE AND ULTRAVIOLE RADIATION OBSERVATIONS IN TURKEY**

**Ozone Observations**

Ozone measurements have been made by an ozonesonde instrument at Ankara, Turkey since early 1994 by the Turkish State Meteorological Service. Ankara is located at 32° 53' (E) Longitude and 39° 57' (N) Latitude with an altitude of 891 m. Ankara is capital of Turkey and situated in the mid-northern part of the Central Anatolia Region. Ozone observations have been operated in every one or two weeks or sometimes a month since beginning. Therefore, daily measurements are not available. Total ozone column is detected with this operation. It is possible to find vertical ozone distribution, vertical ozone profile, in this way. Up to now, total 246 balloon have been launched and 222 daily total ozone column data have been obtained. The 24 observations could not be performed due to the different reasons such early exploding of the balloon.

The measured ozone data is sent to the 'World Ozone and Ultraviolet Radiation Data Centre' (WOUDC) in order to be archived and published. The station number of Ankara is 348 in WOUDC.

The quality of the ozone data obtained from ozonsonde instrument has been evaluated taking into account the Total Ozone Mapping Spectrometer (TOMS) data obtained aboard the Earth Probe Satellite. A preliminary comparison study was made by using the Ankara's data and the TOMS' data. Total 86 TOMS' ozone data for Ankara location was obtained from the NASA Goddard Space Centre, and a correlation was found between the TOMS and the Ankara's ozonsonde data. The rather, high correlation coefficient of 0.89 was detected in this study. This result is statistically significant and shows that there is a good agreement between these data set. At the same study, relative errors of the ozonsonde data were computed based on the TOMS data is reliable. The mean relative error was found as 2.4 percent. All results showed that ozone measurements in Turkey are reliable.

The ozone time series of  Ankara was also analysed statistically and looked for trend at the evaluation studies of the Turkey's ozone data. Any significant trend was detected, no clear decrease or increase. The extreme values in ozone time series were found as 232 DU and 450 DU. The mean total ozone column was computed as 315 DU. This values were very close to the values of documents of WMO and UNEP (The changing ozone layer, Rumen D. Bojkov,1995).

On the other hand, we have some doubt for our ozonsonde instrument. So, ozonsonde includes 2 part, transmitter and ozonsonde. Before every observation it is necessary to calibrate ozonsonde part of instrument with an ozonizer/test unit. However, maintenance of the current ozonizer/test unit has never been done since beginning.

**Ozone Forecast**

Turkish State Meteorological Service (TSMS) has given its attention to the ozone forecast for the last one year. Some ozone forecasting models have been evaluated in the Research Department of TSMS. It has been decided to use a statistical regression model originally given by Long et al.( Bull. Am. Met. Soc. Vol.77, 1996). This model uses geopotential height and temperature together for standard pressure levels (500, 100 and 50 hPa) in forecasting total ozone column. Firstly data set including daily ozone, upper atmospheric radiosonde data covering 500 and 100 hPa geopotential heights and 50 hPa temperature measurements obtained. TOMS ozone data was used in that study because of daily ozone data is not available in TSMS. Therefore, estimated ozone data have been obtained only for the period of January 2000 – March 2001.

Estimated and measured ozone data for each day have been compared. It has been found that this model can estimate total ozone column with an about 9 percent relative error. Although estimated data series exhibit an agreement with measured data, some discernible deviations are detected. It has been computed that the 11 percent of estimated data showed excess deviations. All results show that model could be used to forecast total ozone column.

On the other hand a new study has been started to improve ozone forecasting model. In this study the relationships between ozone and upper air meteorological parameters for Ankara, Turkey have been investigated. It was seen that geopotential height of 500 and 100 hpa levels and the temperature thickness of 300 and 200 hpa levels have rather high statistical significant relationship with the ozone. The regression model has been designed with these new parameters. It was seen that the early results of the new upgraded model have better results statistically. The studies on this model have been going on.

**UV-B Observations**

The B band of the ultraviolet radiation has been measured with an UV-B recorder named Model 501 in two one location, Ankara and Antalya (located on southern coast of Turkey and at 54 m. Altitude, 30° 44' (E) Longitude and 36° 42' (N) Latitude).

The UV-B observations were started on 3 January 1997 at Ankara, and on 21 May 1997 at Antalya. There is any problem on the UV-B time series of Ankara. However, time series of Antalya has some gaps and missing data. Uv-B recorder hasn't work in Antalya from August 2003. But this year we are planning to establish new instrument.

UV-B data have never been evaluated climatologically and statistically because of the very short time series.

Although, this year has been started Uv-Index forecasting in Ankara by using Canadian Empirical Model.

**PLANNED STUDIES**

Planned studies for the period of 2005 – 2008 are as follows:

- To have more strong ozone and UV-B network in Turkey with three Spectrometers and twenty UV-B recorders;
- To detect troposferik ozone profile;
- To detect stratospheric ozone profil;
- To product daily ozone forecast routinely;
- To make UV index forecast routineliy;
- To analyse time series of the ozone and the UV-B;
- To evaluate effects of the changes in the ozone and UV-B time series on the climate.

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