

# THE CORRELATION BETWEEN AIR POLLUTION AND TEMPERATURE INVERSION IN SARAJEVO VALLEY (Row 1975-2005)

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## 1.ABSTRACT

Sarajevo valley is surrounded by high Olympic Mountains: Bjelasnica, Igman, Jahorina, etc. Therefore, one of the main climate characteristics of Sarajevo's field is temperature inversion. It has influence in temperature gradient, in appearance fog, in air pollution, even it effects to middle temperature of the mounts, especially during winter period.

Last fifteen years had made possible a unique experiment: during the war, and after the war, causes of air pollution suddenly stop working, so the presence of smog was important reduced. It made possible researching of the opposite influence: relations between air pollution and climate parameters mentioned before in the line. In this work used data of the meteorological station: Bjelave (630 meters), Butmir (518 meters), N.Sarajevo (535 meters) and Bjelasnica (2067 meters) over row 1975-2005.

The results of experiment showed the existence of high correlation between air pollution and temperature inversion (annual values - period April -March). Decrease of air pollution was followed by appropriate decrease of number of days with inversion and number of days with fog.

Graph 1 shows annual arithmetic means of concentration sulphur dioxide and black smoke during the period: 1974/75 – 2005/06, measured on station Sarajevo - Bjelave.

Graph 2 shows annual number of day with temperature inversion in Sarajevo valley, during the period: 1974/75 – 2005/06, measured on station Sarajevo – Bjelave, and Sarajevo – Butmir.

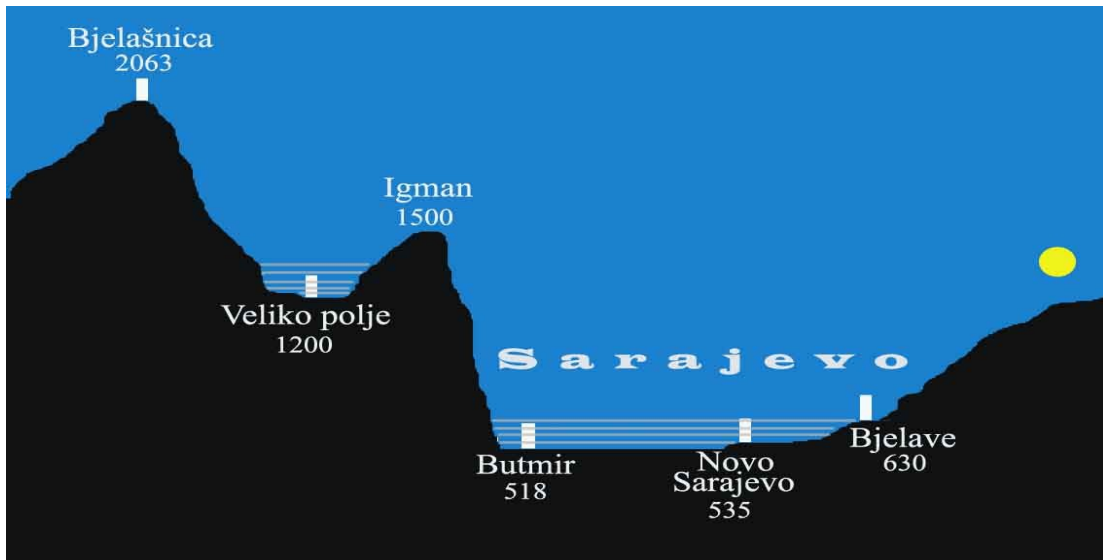
Visual correlation between these two graphs is obvious. Statistical correlation of these values is 0,65, until year 2000. It is relatively high correlation, considering the fact that two different physical dimensions are compared.

However, correlation of these values until year 2006, is lower, about 0,36. This fact can be explained by using fig 1 and fig 2, and also graph 3. In last few years decrease of upper limit of inversion layer is obvious. Before the war, upper limit was about 900 meters, and after the war it is occasionally below the level of Bjelave station (about 600 meters). Latest measuring are taken at the another place of Sarajevo valley. (Station New Sarajevo – 535 m AMSL). Those results point out increase of air pollution at lover layer of Sarajevo's valley (graph 3 - parallel measurements for station Bjelave and New Sarajevo). It is caused by increase of traffic. In the year 2002, 120 thousand cars were registered in Sarajevo (mostly older than fifteen years). That explains increasing black smoke (soot) concentration in lower layer of atmosphere.

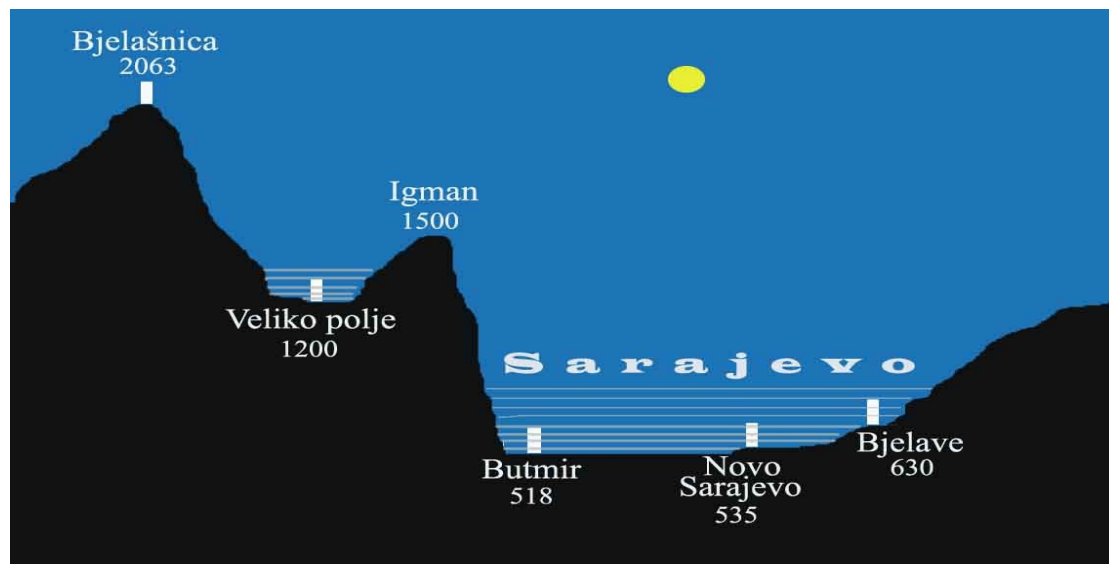
Lower correlation mentioned before is therefore result of decrease of upper limit of inversion layer below the Bjelave station.

Because of the lack of adequate measurements on different spots, and especially aerosol measurements, this article is not adequate for analyses of the causes of this issue. Also, part of the solution could be related with climatic changes.

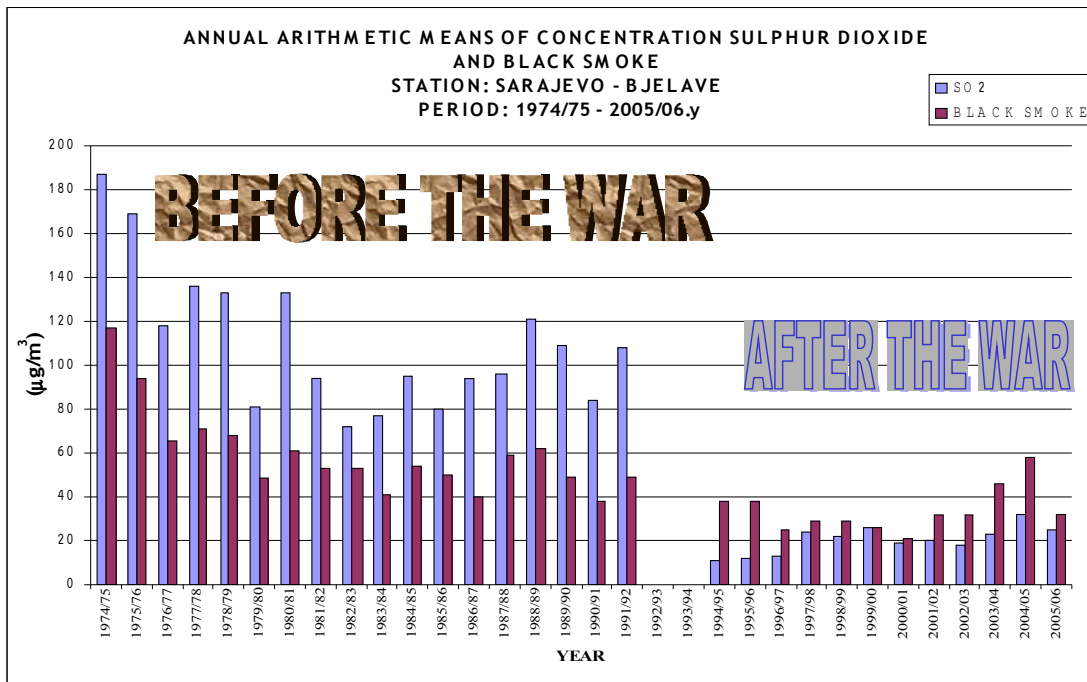
Answers should be sought with the help of complex model of temperature inversion and air pollution. It is important to notice that structure of particles of pollution before and after the war is different. Before the war it was industry, and today it is traffic. That fact significantly changes physical conditions and input parameters of the model.



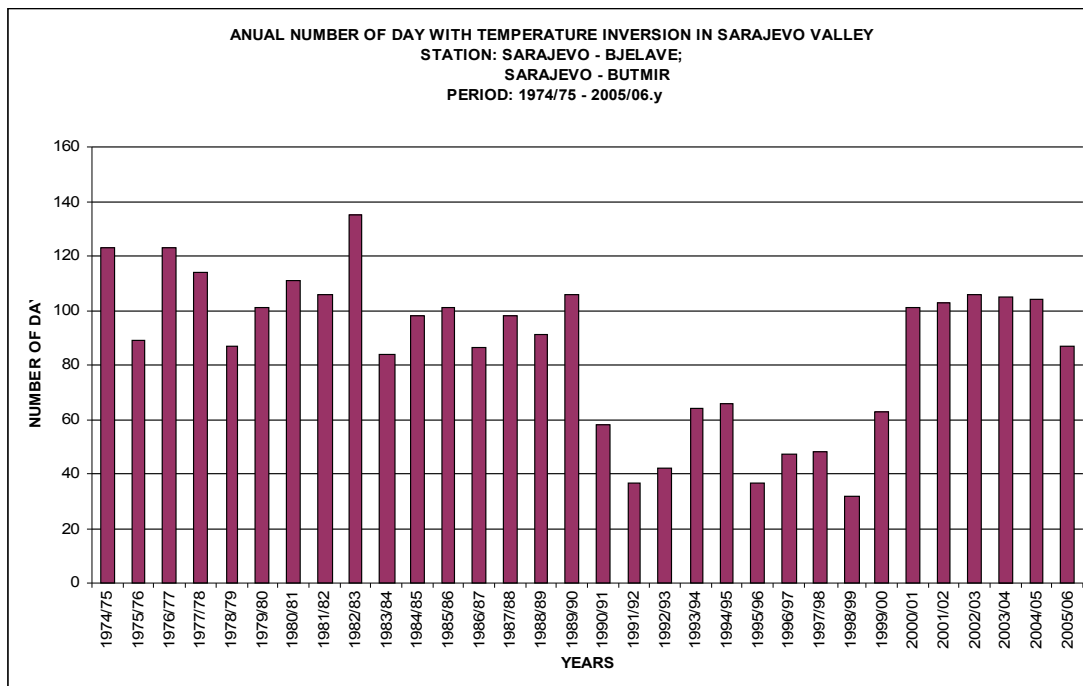
**Figure 1.** Sarajevo valley – level of inversion early in the morning



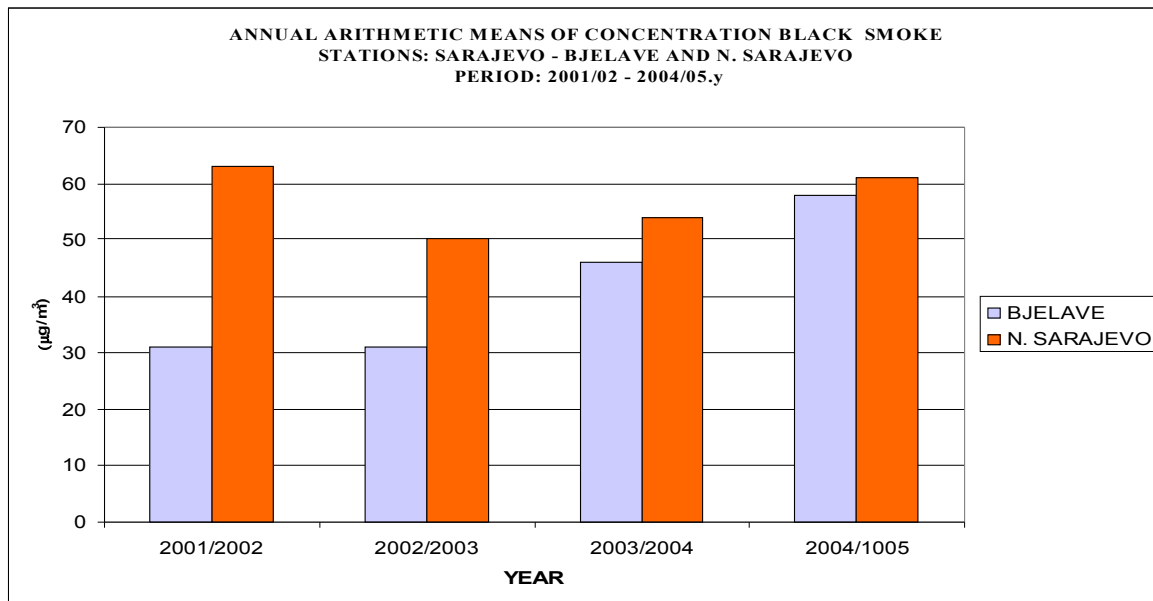
**Figure 2.** Sarajevo valley – level of inversion early afternoon



**Graph 1**



**Graph 2**



**Graph 3**

## REFERENCES

- Z. Majstorovic, M. Tais, M. Voloder, M. Mulalic, The influence of air pollution on micro climate Sarajevo's valley, 18<sup>th</sup> International Conference on Carpathian Meteorology, Belgrad (Mountain influence on weather), October 2002.
- M. Tais, S. Fazlagic, S. Muharemagic, Concentration SO<sub>2</sub> and black soot in some urban centers in BiH and their change with meteorological condition, Proceedings of Meteorological conference, Ohrid 1978.
- O. G. Sutton (1953) Micrometeorology, New York–Toronto–London
- F. A. Berry, E. Bollay, N.R. Beers (1953) Handbook of meteorology, New York–London
- Marc Morell, Climate changes, January 2001.
- Ž. Majstorovic, A. Toromanovic, S. Halilovic, Trends of climate changes considered over years 1894-1993 and 1894-2003 in Sarajevo, BALWOIS Conference, Ohrid 2004.
- H. Pašić, J. Arifović, V. Miljanović: Type's of weather and air pollution in Sarajevo, Consultation conference of climatologists of Yugoslavia, Stambolčić, 1974.
- Dinko Tuhtar, Air and water pollution (book), Sarajevo, 1990.