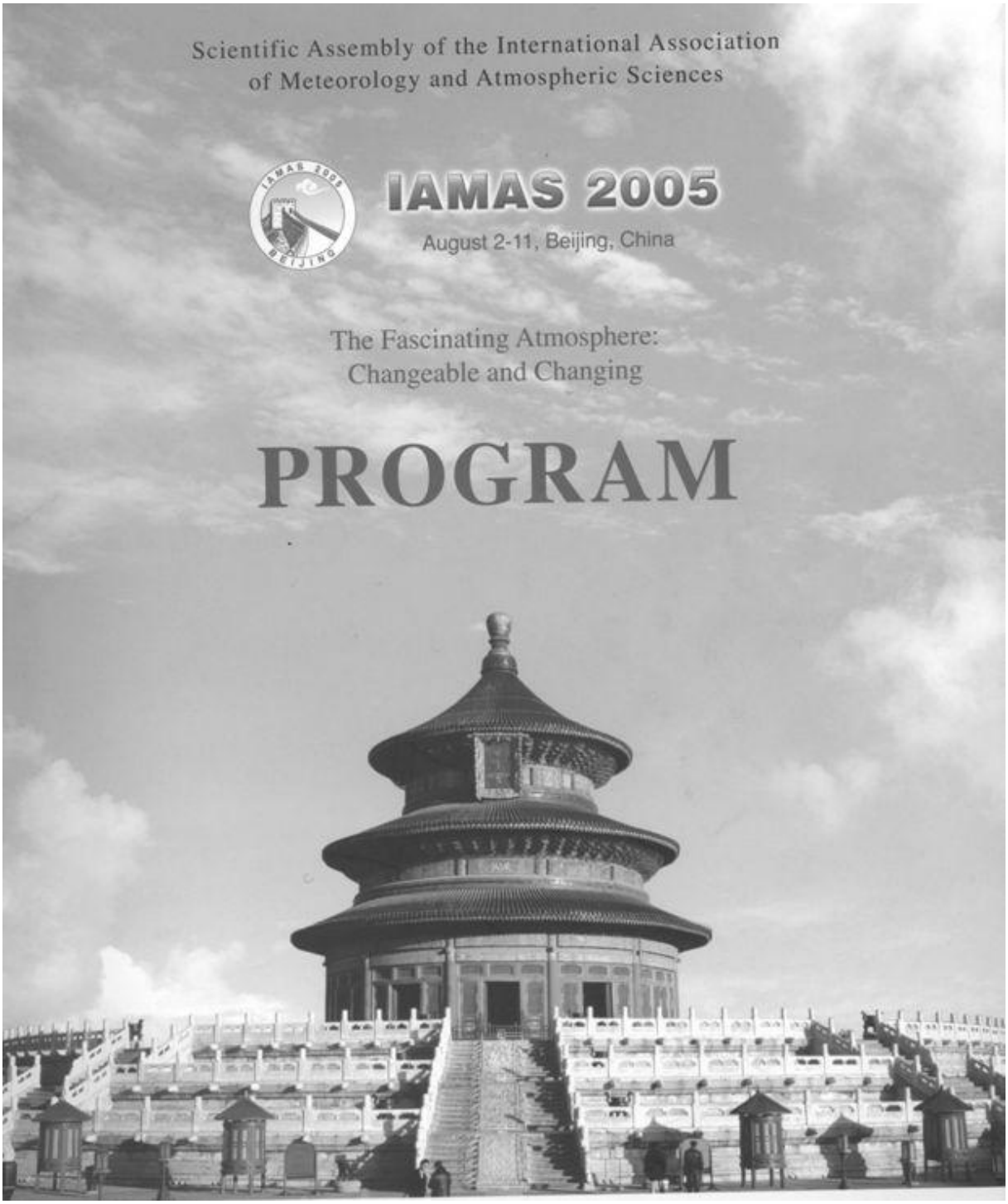
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A CASE STUDY ON THE AIR POLLUTION ACCORDING TO THE SOME SYNOPTIC SITUATIONS IN ISTANBUL

Hüseyin TOROS[1], Ali DENİZ[1], Faruk TURGUT[2], İlyas AKHİSAR[3] and Ramazan ÖZÇELIK[4]

[1]Istanbul Technical University, Faculty of Aeronautics and Astronautics, Department of Meteorology, 34469 Maslak, Istanbul, Turkey
[2]Istanbul University, Istanbul Medical Faculty, Capa, Fatih, Istanbul, Turkey
[3]Marmara University, Goztepe Campus 34722 Kadikoy, Istanbul, Turkey
[4]Istanbul Metropolitan Municipalities, Environmental Protection Agency, Aksaray, Istanbul, Turkey

ABSTRACT

Air pollution is one of the most important problems in big cities. Because of the poor cool quality coal usage in heating system before 1995 there was dense air pollution in Istanbul which was then the most populated city in Turkey. During the period of 1990-1995 there had been serious health problems in Istanbul due to air pollution. Accordingly, Metropolitan Municipalities changed their policies and encouraged people to use natural gas everywhere in Istanbul. As a result of serious control on quality of the coal and the encouragement of the natural gas, usage significant decrease has been observed in air pollution reduction of Istanbul. The average of daily SO_2 concentration dropped down to 20 $\mu g/m^3$ from its high values before 1995 and this is less than the world standards even in the winter season.

Besides all the improvements, air pollution is still an important problem at some parts of the city due to some meteorological conditions. One of the higher air pollution periods was 11-13 January 2005, due to unusual meteorological conditions during this period, which is investigated from the air pollution point of view and its effect on the human health.

Keyword: Air pollution, health, meteorological condition.

INTRODUCTION

Clean air is the most needed element of the ecosystem; many diseases occurs due to changes in the air. Ibn Sina (Avicenna) said that the change of environment cures the patients of many diseases. He also has emphasized the need of open and clean airy houses with proper ventilation, play grounds and gardens in the cities so that every one has plenty of fresh air and a proper ecological balance is maintained, (Ibn Sina, 1993).

There are both natural and anthropogenic sources for air pollution but most of the pollution started to originate from human activities after 1800s. Hence atmospheric pollution started to become a major problem with the industrial revolution in the 1800s as a result of coal burning for heating. The quality of the air has improved dramatically over the past years. Environmental components play a very important role in the health conditions of human beings. Improvement of air quality implies protection of human health. During the second half of the 20th century, there occurred episodes of air pollution which were harmful to human health and the environment because of the high pollutant levels in the atmosphere. The industrial revolution led to urban population increase as more people started to work in factories and other industrial places in major cities. Consequently air pollution was identified as a major health hazard in the modernizing countries of the Industrial Revolution in towards the end of the nineteenth century. The industrial expansion and urbanization led to the

increased consumption of coal and fuel oil both in domestic as well as manufacturing settings mainly as a result of combustion processes. The largest source of pollution in most urban areas is motor vehicles, heating and to a lesser extent the industry. There are many sources of pollution, both indoor and outdoor which can affect health. Traffic-generated pollutants include carbon monoxide, nitrogen oxides, volatile organic compounds and particulates. Heating systems and other home appliances using coal, fuel oil, gas or wood can produce several combustion products of which the most dangerous are carbon monoxide (CO) sulfur dioxides (SO_2) and nitrogen dioxide (NO_2). Fuel burning stoves, furnaces, fireplaces, heaters, water heaters and dryers are all combustion appliances. Pollution levels vary over time and place. Variations occur throughout the day and over seasons depending on weather conditions and emission sources.

Air pollution contributes to lung disease, including respiratory tract infections, asthma, and lung cancer. The harmful effect of air pollution usually comes as a result of international air pollution episodes in which large numbers of people died, most notably, for example, in the Meuse Valley in Belgium in 1930, in Donora, Pennsylvania in 1948, and in London that approximately 4000 people had died as a direct result of the smog during the first three weeks of December 1952. These polluted periods led to formation of committees on air pollution and governments tried to decrease the emission of pollutant to improve air quality. Today academic and research institutions, policy makers, government agencies try to decrease air pollution and its environmental effects. There are a lot of study on air pollution which is harmful to ecosystem human health and atmosphere in Turkey (Akkoyunlu and Ertürk, 2002; Hauck et al., 2004; Issever et al., 2005).

Istanbul is one of the biggest cities of the world that air quality continues to improve throughout and the air pollution observed to decrease in the city after 2000 as a result of the usage of natural gas and high quality coal for heating. However still clean air is never possible because of some meteorological conditions, (Incecik, 1996; Sen, 1998).

DATA AND METHODOLOGY

In this study, hourly air pollution (SO_2, TSPM, CO, NO, NOx, NO_2, THC, CH_4, nMHC), atmospheric pressure data in one of the big hospitals in Istanbul are analyzed. Atmospheric pressure values are obtained from ENKA weather station and air pollution values from Istanbul Metropolitan Municipality station in Besiktas. The number of patients applied to the hospital complaining from air pollution effects are obtained from Istanbul Medical Faculty during week days. All data values are divided by their maximum for standardize. Air pollution values belong to 14 pm records, which reflect the most possible harmful effect on the human health.

RESULT AND DISCUSSION

The meteorological conditions have an important effect on air pollution levels. For example, windy weather causes pollution to be dispersed while still weather allows pollution to build up. During high pressure systems, the air is usually still which allows pollution levels to build up. In contrast, during low pressure systems the weather is often wet and windy, causing pollutants to be dispersed or washed out of the atmosphere by precipitation, (Deniz et al., 1997).

During the analysis period, both the daily maximum and minimum of the atmospheric pressure exceeded 1020 mb. During 8-11 January, 2005 both parameters are seen to increase above 1025 mb, (Fig. 1).

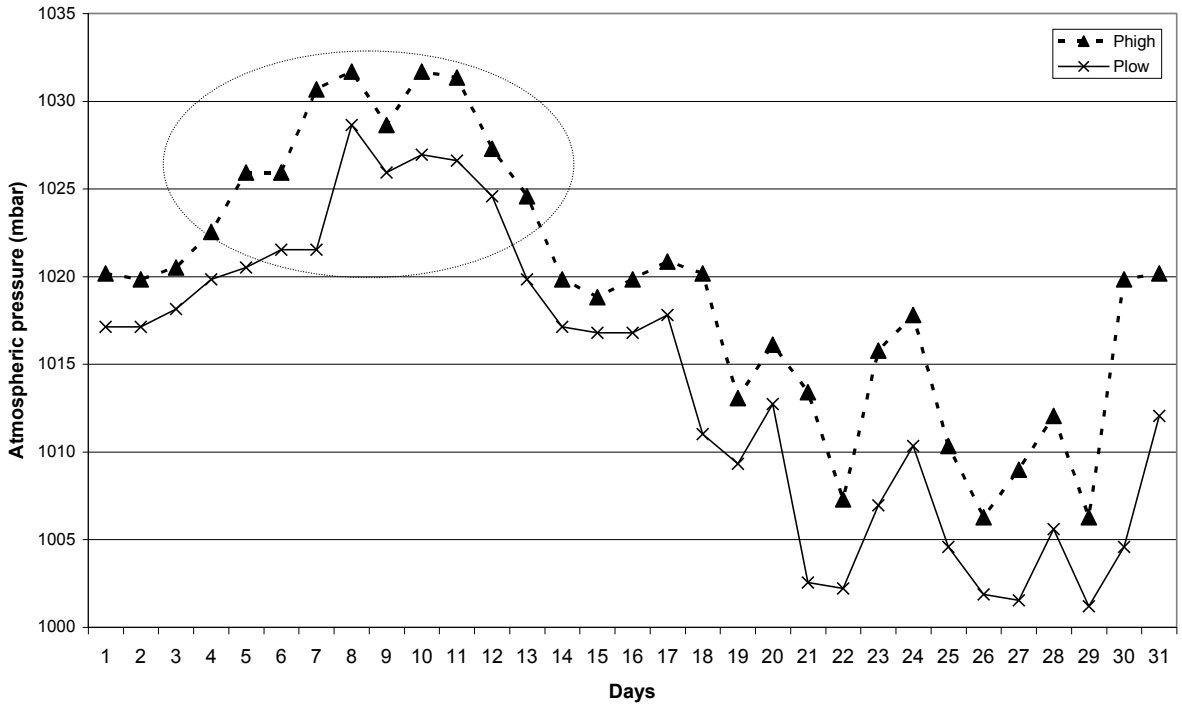

Figure 1. Changing of daily maxima and minima atmospheric pressure in the study period.

This high pressure system led to increase in air pollution concentration and increased infliction on human health. Figure 2 shows the number of patients affected by the air pollution on 11-13 January, 2005.

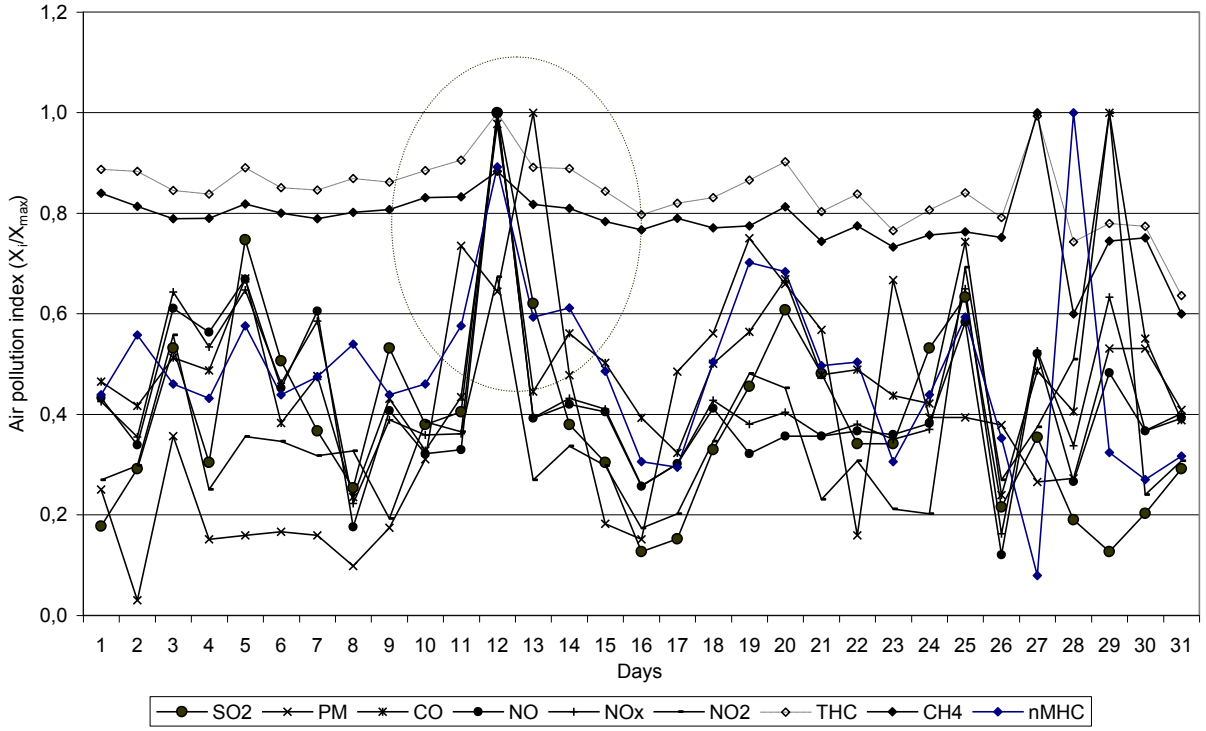

Figure 2. Hourly values of air pollution at 14 pm in the study period.

The effects of pollution can be due to acid rain, smog, temperature inversions, etc. Air pollution can cause respiratory diseases, asthma, chronic obstructive pulmonary disease, cardiovascular disease, lung-cancer.

Figure 3 shows the different types of health problems versus number of patient index seen during the event period recorded in Istanbul Medical Faculty in Istanbul. Dotted lines

show the patients with breathing problems, solid lines with crosses gives department of internal medicine and lines with square are for department of emergency . Unfortunately, the Legislative Laws are not enough to control the air pollution; people must be educated all over the world.

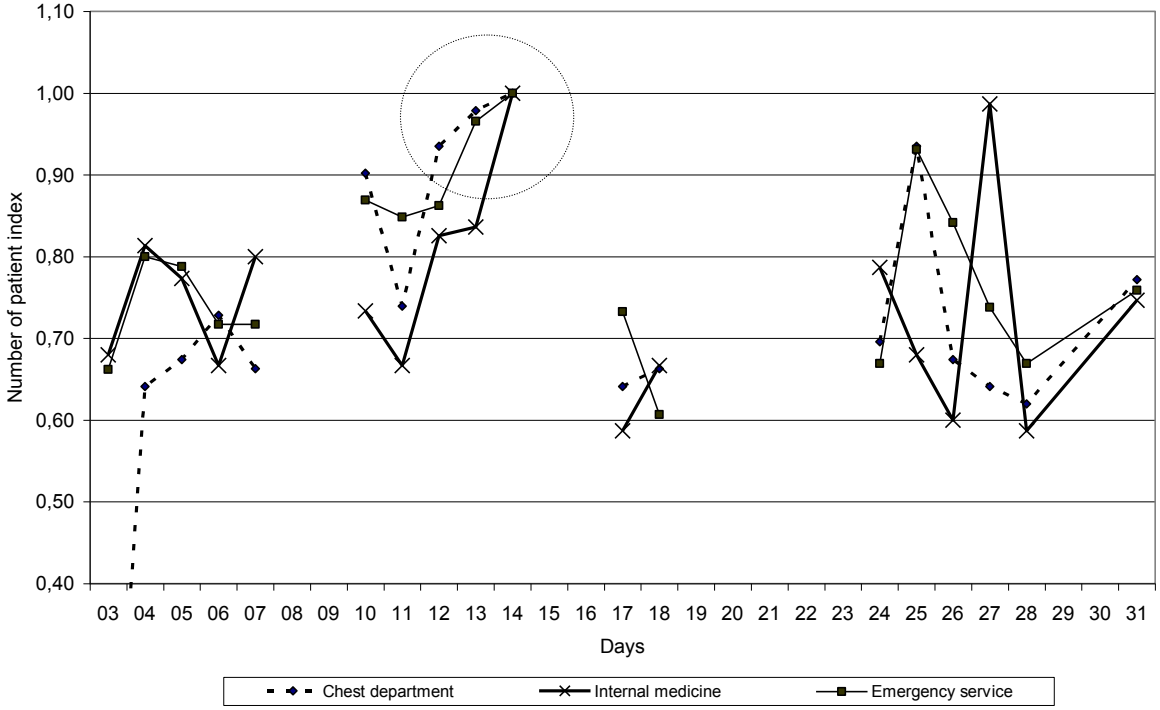

Figure 3. Number of daily applied patient to the hospital.

The studies of decreasing air pollution do not guaranty a healthy life. We are living a high risk all the time. But it is more dangerous for highly populated cities.

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