O 50. INDOOR AMBIENT PARTICLE MEASUREMENT OF SOME CAFES IN BOSNA-HESEK DISTRICT OF KONYA CITY, TURKEY

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ABSTRACT: Recently, increasing social activities the welfare levels and people spend a large part of their time outside of places such as cafes, restaurants and tea gardens. Nowadays, these places like have increased around university regions. People who visit such places are increasing day by day. This has brought some environmental problems with them. The weather is also a very pollutant affecting environmental conditions. These pollutants have negative effect on human health especially respiratory system. In this study, internal ambient particulate matter levels were measured at different point places and at different time periods in some cafe around the Selcuk University Campus. Internal air quality is evaluated and its effects on human health are examined.

Keywords: Cafe, indoor air quality, particle measurement, air pollution, ambient air

1. INTRODUCTION

Air pollution is a very important environmental health problem and has affected all countries of the world. Millions of people died every year due to air pollution problem. Air pollution can be defined as the rise of pollutants in the atmosphere in the form of dust, gas, smoke, odour, water vapour to harmful amounts to human beings and other living things. In addition to this, weather conditions that endanger the human health and life of living organisms as a result of the intense amounts of gaseous or particulate substances, especially fuel residues that arise from various chemical processes are also included in this definition [1-4]. One of the most important causes of air pollution has been the increase in the use of fossil fuels as a result of the rapidly increasing world population, industrialization, urbanization and consequently increasing energy demand. The increase in the use of fossil fuels also leads to ever-increasing changes in atmospheric composition. People breathe the air around them without a choice. If the air is polluted, particles and contaminants in the air are also inhaled. These pollutants damage people's lungs, heart and other organs. In the past, deaths have occurred in many countries due to air pollution. For example, 63 people died in Belgium in 1930, 20 people in Pennsylvania in 1948 and more than 4,000 people in London in 1952 due to air pollution. Long-term inhalation of low-concentration air pollutants is also considered dangerous to human health [4-6]. Children are more active: the liver, lungs and other organs are at the stage of development and are at greater risk. Air pollutants, for example carbon monoxide (CO), Sulphur dioxide (SO_2), nitrogen oxides (NOx), volatile organic carbon (VOC), ozone (O_3), heavy metals, respirable particulate matter chemical composition, reaction properties, diffusion properties of short and long range are different. Although many natural physical activities (volcanoes, fires) emit different pollutants into the atmosphere, anthropogenic activities (human activities) have been identified as the main cause of environmental air pollution [7-9].

1.1. Ambient Air Pollution

Indoor air; housing, office, shopping and living centres, interiors of transportation vehicles (buses, trains, airplanes, ships, *etc*.) and buildings, in buildings such as schools. Indoor air pollution is the appearance of respirable substances harmful to health in these environments. Breathable substances can be observed in the form of dust, gas, steam. The concentration and diversity of these substances vary according to the characteristics of the environment, building construction and indoor materials, the behaviour of individuals living, and many environmental factors [10-14].

For example, in an elementary school, due to the active activities of the students, particulate matter ratios will be observed in classrooms and corridors, while the release of some volatile organic compounds from equipment such as copiers and printing machines used in a stationery environment can

be observed. The energy saving policies in the countries and consequently the indoor air circulation to the minimum level, insufficient ventilation, insulated windows with non-opening windows and air conditioners are used have created important problems in indoor air quality. The effect of indoor air quality on human performance is a known fact. For human comfort and productivity, the breathing air must contain 30-50% relative humidity and the working environment should be at 19-20 ° C. The quality of the indoor environment, physical particulate matter, carbon monoxide (CO), carbon dioxide (CO_2), temperature, nitrogen oxides (NOx), oxygen (O_2) content, Sulphur oxides (SOx), volatile organic compounds (VOCs), various microorganisms and allergens such as physical and the presence of biological agents. The incidence of these pollutants and the exposure to various pollutants increase the incidence of various diseases by breathing this air for a long time. Said pollutants may be released from internal sources or may be characterized as secondary pollutants produced by external penetrations or photochemical reactions in the internal environment [15-18].

2. MATERIALS AND METHODS

The measurements were performed at nine different points of each café in the vicinity of Studio Selcuk, at five different time periods of the day. Internal particulate matter measurements were made at the centre of the cafes. PCE - PC01 Particle Counter was used for particulate matter measurements. The device is capable of measuring and recording solid and liquid substances suspended in air in atmospheric environment and breathable by human. The device can measure existing particles directly in the air without the need for an air pump. The device could save the data obtained from the measurement points to its own memory. It also has video and photo capture capabilities. The device can store up to 5000 data. It gives the measurement results in ppm. The instrument has a green, yellow, red colour scale and can give a warning when it reaches high concentrations.

3. RESULTS

This research was conducted in 5 different cafes operating in Bosna-Hesek district of Konya city centre, Turkey. Particle matter measurements were done at nine different points of each café. Measurements were performed at 5 different time period which are 08:00, 12:00, 16:00, 19:00 and 23:00. Particle matter of 2.5µm and 10µm were measured and distribution maps were prepared by Surfer-08 packet program. Each café is namely numbered **1, 2, 3, 4, 5**.

Café-1: In all measurements in this study, the lowest value for 2.5µ was 6579 mg / m³ at 16:00 and the highest value was 62811 mg / m³ at 19:00 and the lowest value was measured at 16:00 for 10µ. 184 mg / m³, and the highest value were measured as 1527 mg / m³ at 19:00.

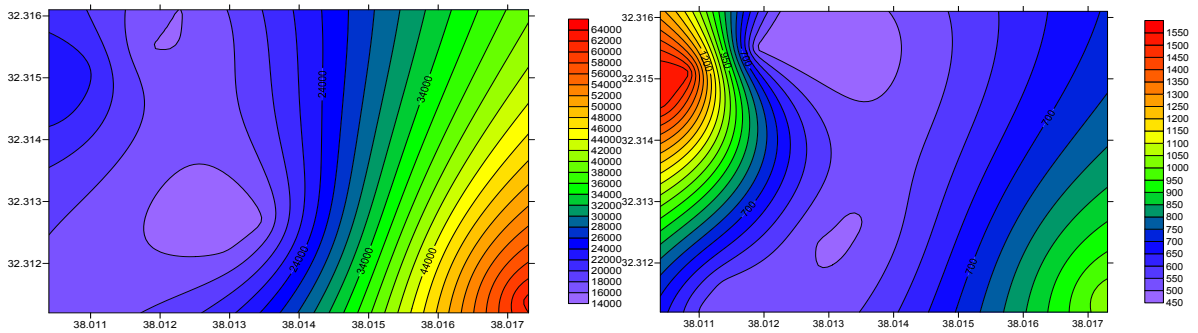

Figure 1. Distribution maps for 2.5µ and 10µ particulate matter of measurement on 01.04.2019 at 19:00 in Café-1

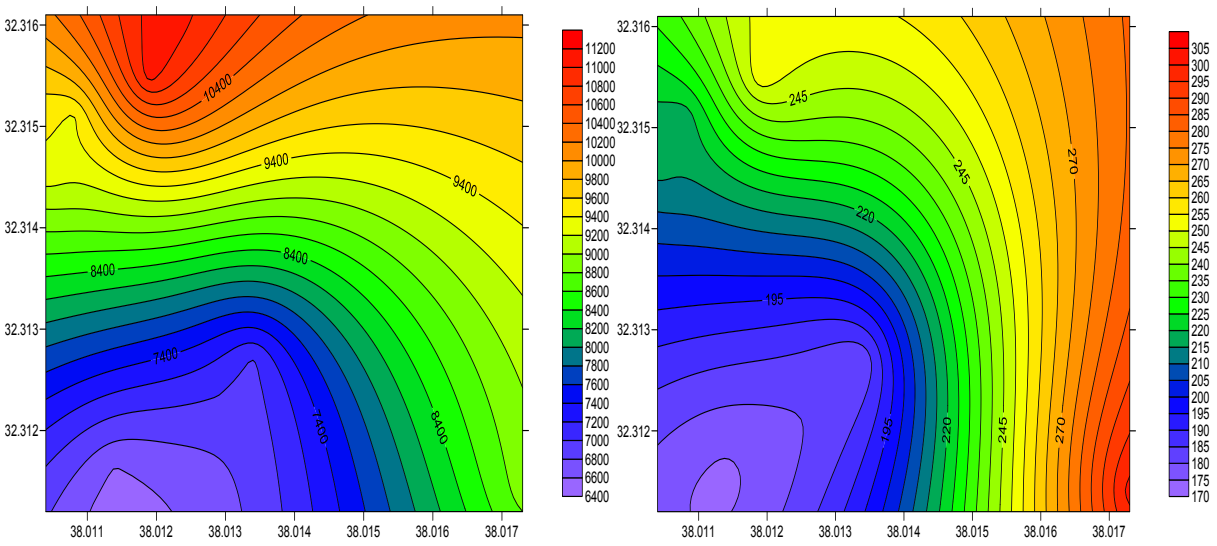

Figure 2. Distribution maps for 2.5µm and 10µm particulate matter of measurements on 01.04.2019 at 16:00

Café 2: In all measurements in this study, the lowest value for 2.5µ is 10108 mg / m³ at 12:00 and the highest value is 18282 mg / m³ at 16:00, the lowest value is measured at 23:00 for 10µ. 166 mg / m³, the highest value was measured at 19:00 was 559 mg / m³.

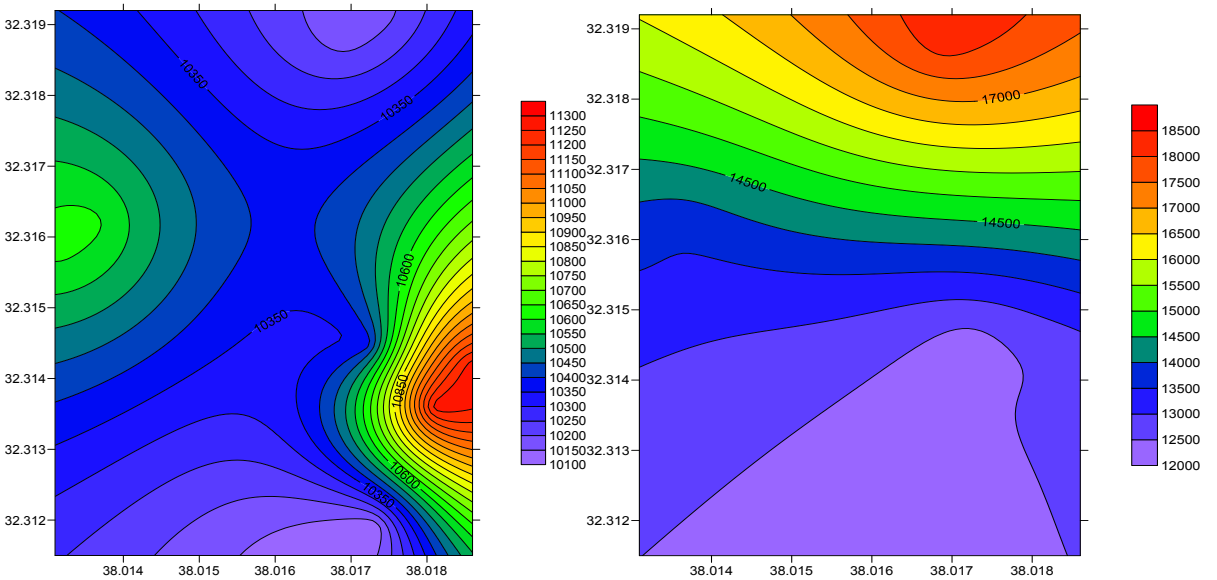

Figure 3. Distribution maps for 2.5µm particulate matter of measurements on 01.04.2019 at 12:00 and 16:00

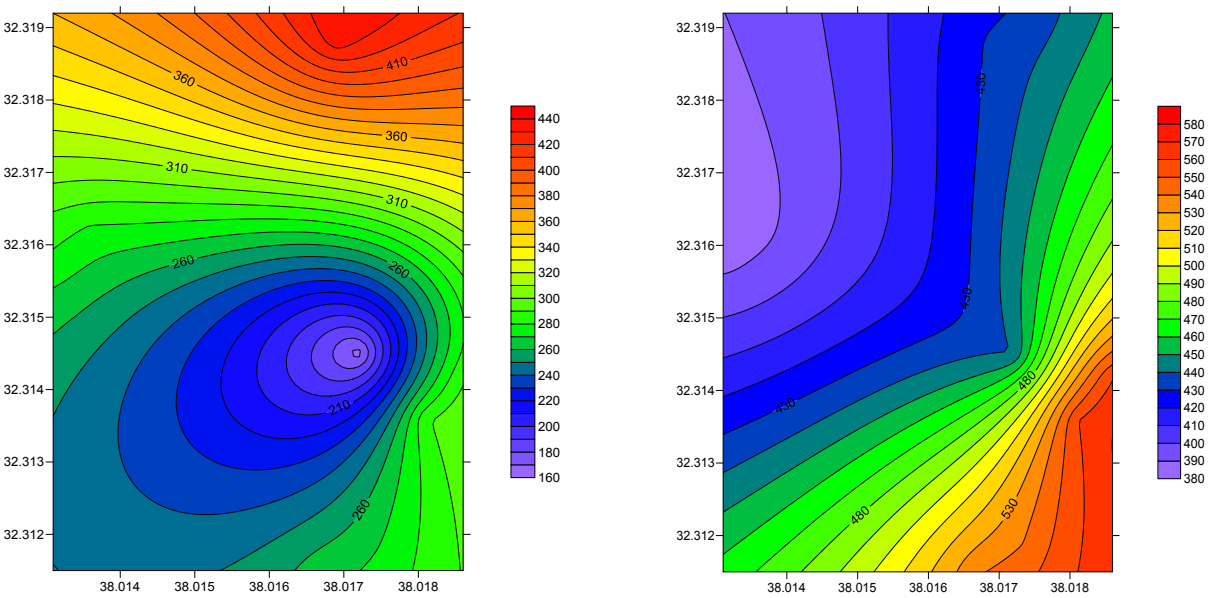

Figure 4. Distribution maps for 10µm particulate matter of measurements on 01.04.2019 at 19:00 and 23:00

Café 3: In all measurements in this study,, the lowest value for 2.5µ is 9493 mg / m³ at 23:00 and the highest value is 1919 at 92194 mg / m³, the lowest value for 10µ is at 23:00. 233 mg / m³, the highest value was measured at 19:00 was 2744 mg / m³.

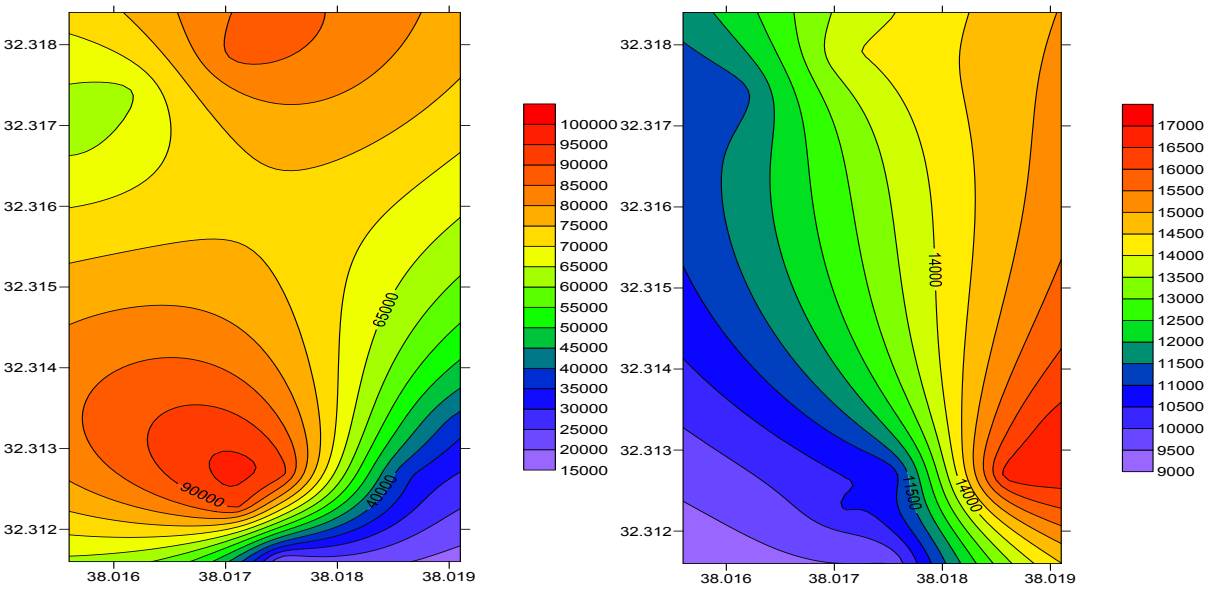

Figure 5. Distribution maps for 2.5µm particulate matter of measurements on 01.04.2019 at 19:00 and 23:00

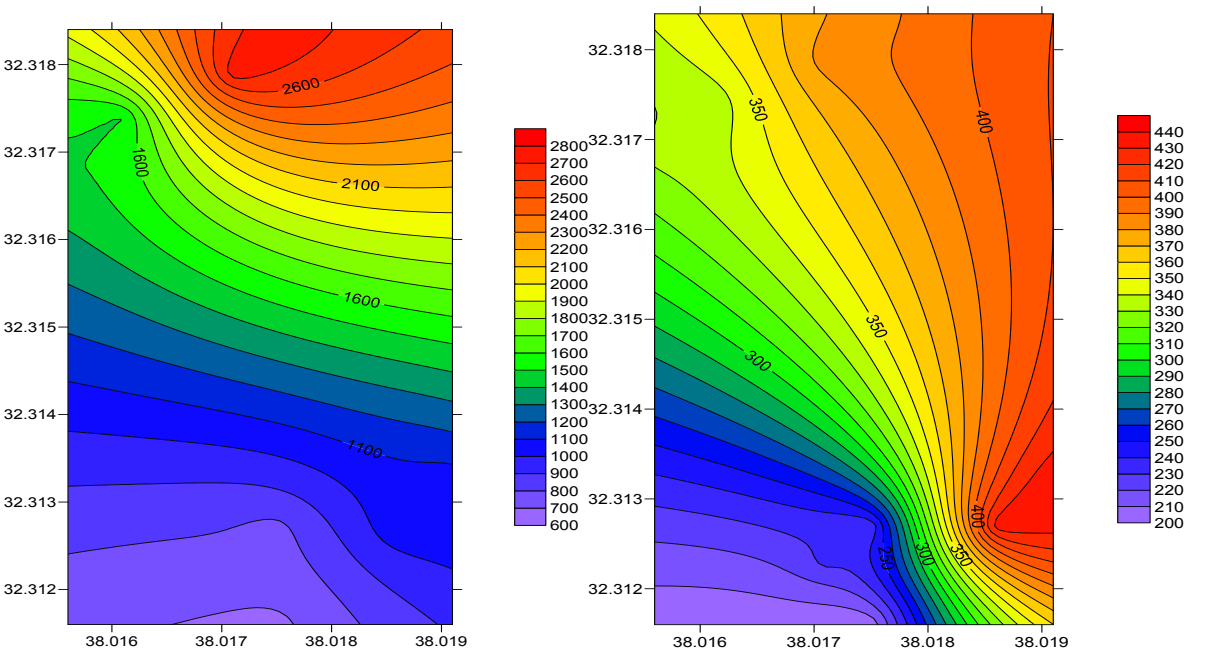

Figure 6. Distribution maps for 10 µm particulate matter of measurements on 01.04.2019 at 19:00 and 23:00

Café 4: In all studies, the lowest value for 2.5µ was 1034 mg / m³ at 08:00 and the highest value was 48752 mg / m³ at 19:00 and the lowest value was measured at 23:00 for 10µ. 166 mg / m³, the highest value was measured at 19:00 was 1047 mg / m³.

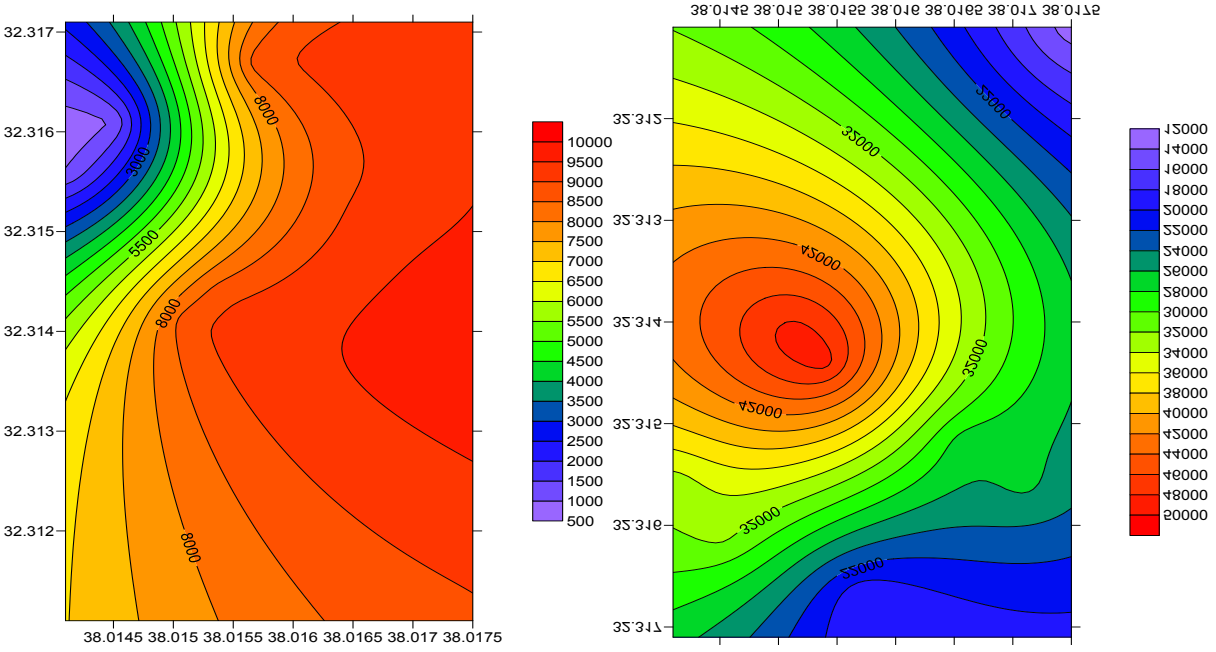

Figure 7. Distribution maps for 2.5µm particulate matter of measurements on 01.04.2019 at 08:00 and 19:00

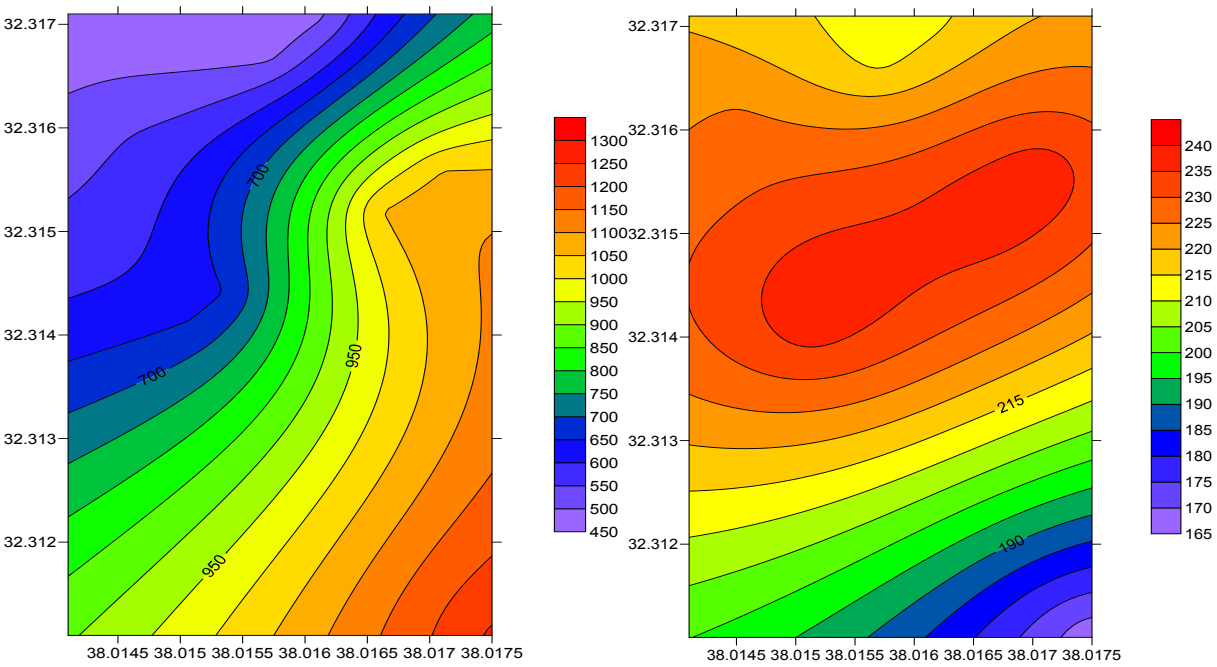

Figure 8. Distribution maps for 2.5 µm particulate matter of measurements on 01.04.2019 at 19:00 and 23:00

Café 5: In all studies, the lowest value for 2.5µ was measured at 23:00 and 8347 mg / m³, and the highest value was measured at 16:00 for 18564 mg / m³. 197 mg / m³, the highest value was measured at 19:00 was 628 mg / m³.

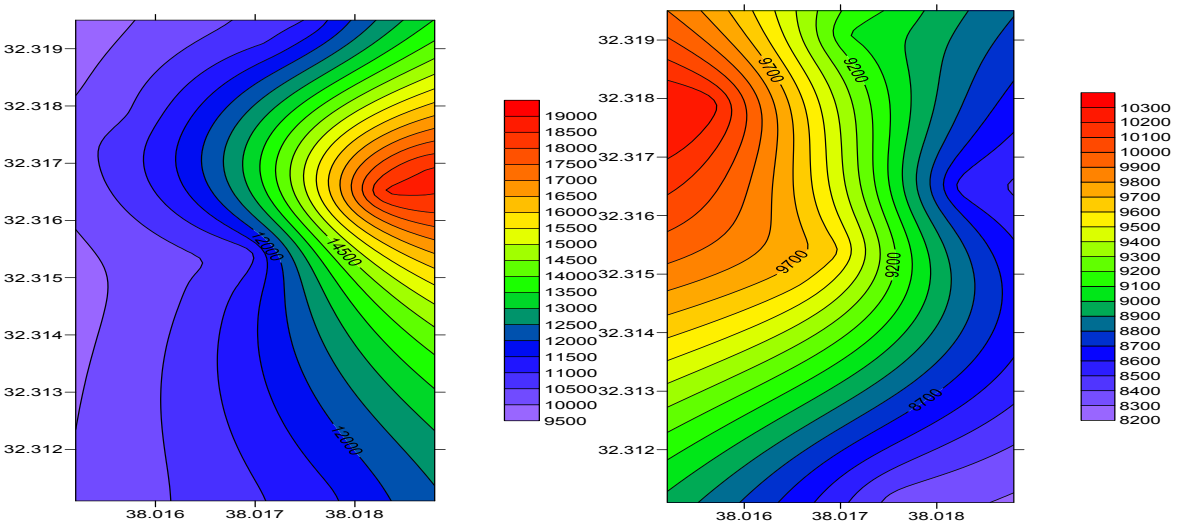

Figure 9. Distribution maps for 2.5µm particulate matter of measurements on 01.04.2019 at 16:00 and 23:00

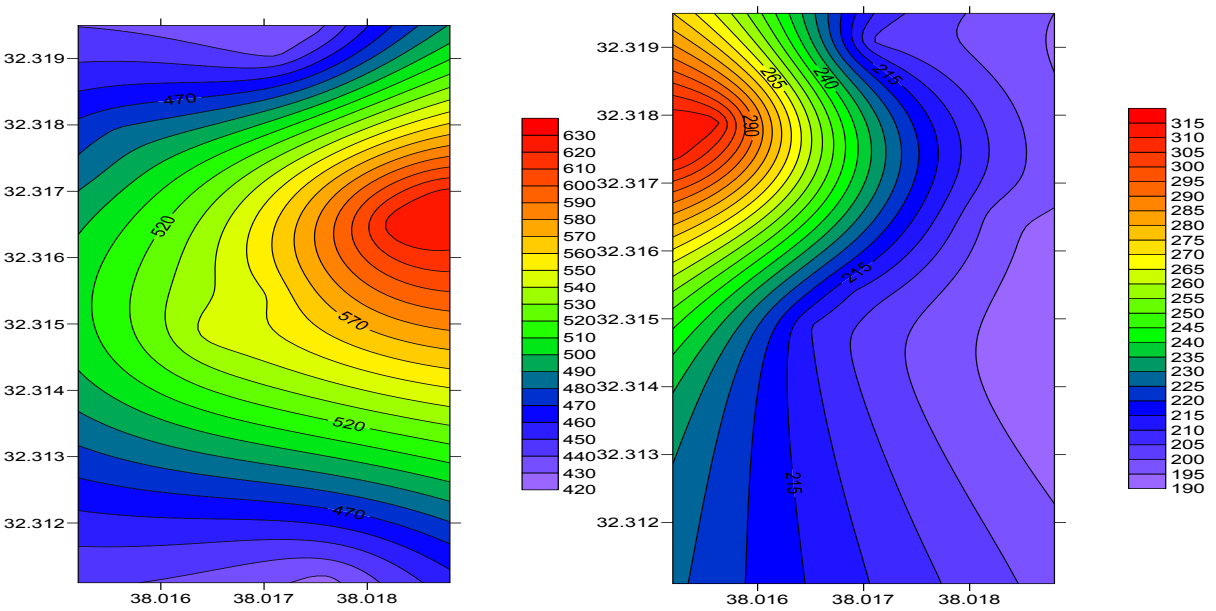

Figure 10. Distribution maps for 10 µm particulate matter of measurements on 01.04.2019 at 19:00 and 23:00

4. RESULTS AND DISCUSSION

Cafes hookahs cigarettes and dusting is a sector seen due to the crowd. The resulting dust adversely affects the health of workers and cafe residents. In the Regulation No. 20635 on Dust Control published in the Official Gazette on September 14, 1990, the required limit value for silica powder PM is 10 mg / m^3. Respirable dust amount should not exceed 5 mg/m^3. According to American OSHA Standards-29 CFR, total dust amount should not exceed 15 mg / m^3. As a result of our measurements, it was observed that the values found were above these limit values. In the measured region, the highest values were observed in the most crowded hours and the lowest values were in the calmest hours. As a solution, the vents can be increased a little. This situation may not cause problems in the short term, but it may cause health problems in the long term. It may be responsible for respiratory infections such as acute and diseases like cancer.

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