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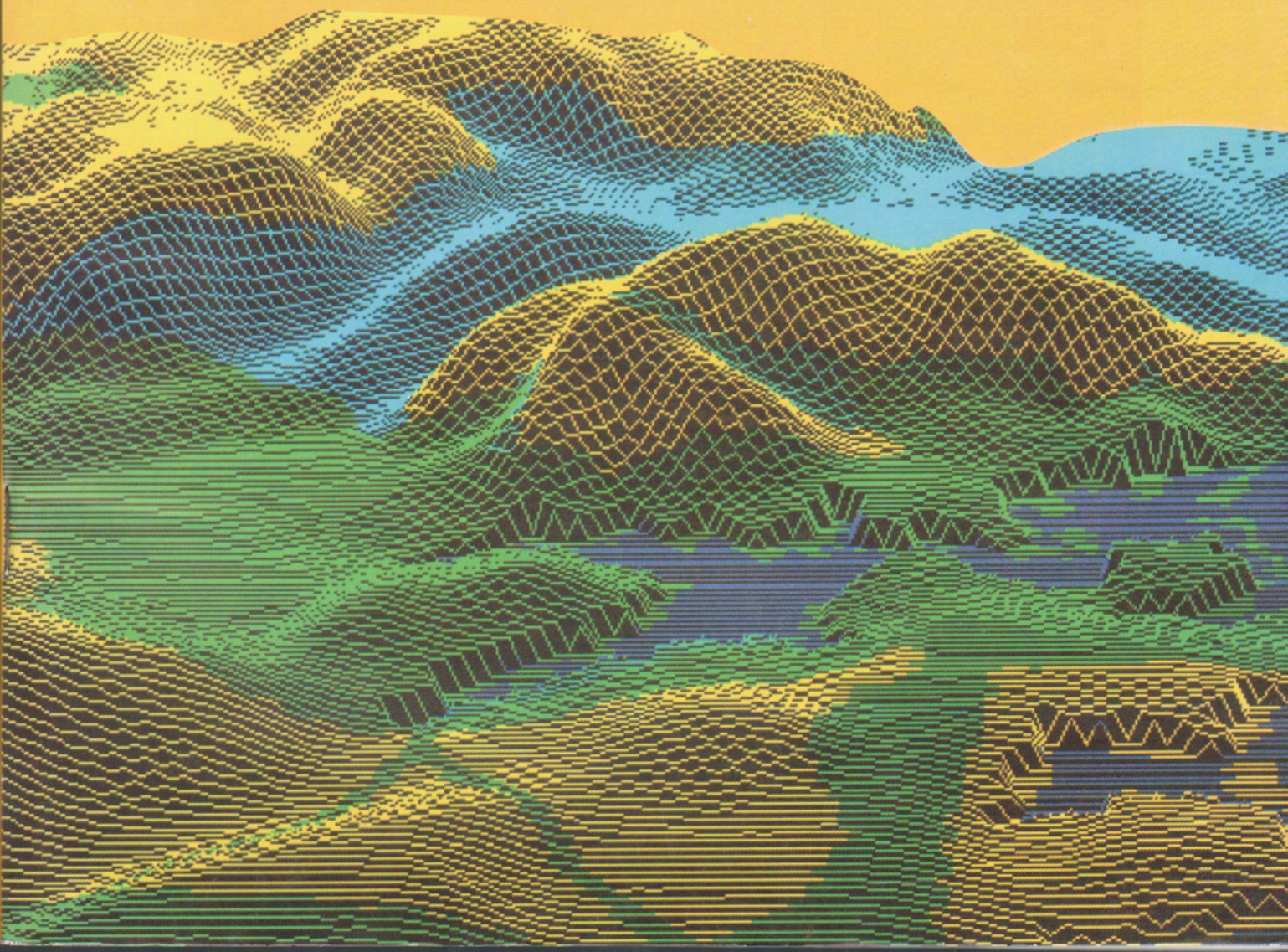

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WERTZ, W. (1991): Dynamic Fire Simulation for Training and Prediction. GIS World, Vol. 4, no. 3, pp. 78-81.

WISLOCKI, A.P., BENTLEY, S. P. (1991): Expert system for Landslide Hazard and Risk assessment. Computers and Structures, Vol. 40, no. 1, p. 169-172.

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GREGOR MENDEL AND URBAN ENVIRONMENT

Jan MUNZAR

Abstract

The article is a contribution to historical monitoring of environmental changes. It also brings some new information about deterioration of air in urban areas in the 60s of the 19th century on the example of Brno. The data have been excerpted from two meteorological publications by Gregor MENDEL, founder of genetics (1822-1884), of which the first deserves attention due to presented documentation on urban heat island including a discussion about its causes and introduction of a term "Rauchnebel" - German predecessor to the English term of smog. The second article presents interpretation of local differences in surface ozone concentrations detected by Schoenbein method both on the basis of differences in air pollution rate in the centre and in the outskirts of the town, and with regard to annual course of wind velocities (aeration).

Shrnutí

Gregor Mendel a životní prostředí měst

Článek je příspěvkem k historickému monitoringu environmentálních změn. Přináší některé nové informace o znehodnocování ovzduší měst v 60. letech 19. století na příkladu Brna. Jsou excerpovány ze dvou meteorologických publikací zakladatele genetiky Gregora Mendla (1822-1884). V první stojí za pozornost dokumentace městského ostrova tepla, diskuze o jeho příčinách a zavedení pojmu "Rauchnebel" - německého předchůdce anglického pojmu smog. Ve druhém článku jsou lokální rozdíly v koncentracích přízemního ozónu, zjištěné Schönbeinovou metodou, interpretovány jak na základě rozdílů ve znečištění ovzduší v centru a na okraji města, tak s přihlédnutím k ročnímu chodu rychlosti větru (provětrávání).

Key words: urban environment, air pollution, urban heat island, 19th century, Gregor MENDEL, Brno, Czech Republic

1. Introduction

Attempts at historical monitoring of environmental changes should include information about gradual deterioration of air in towns and industrial agglomerations from the period prior to instrumental measurements. The basic idea can be provided for example by individual, non-systematic records spread in various historical sources of written nature (Munzar 1994 a,b).

It is not generally known that the issue of urban environment was dealt with in a pioneer way by founder of genetics and natural scientist Gregor MENDEL who lived and worked in Brno and whose 110th death anniversary was commemorated in January 1994. Two of his meteorological works namely concern problems of climate in Brno, particularly its temperature peculiarities (in contemporary terminology of urban heat island) and air pollution in connection with measuring surface ozone values.

2. Heat island in the town of Brno

In January 1863, three years before publishing his famous work on experiments with crossing pea plants, Gregor MENDEL presented a work written in German language "Notes to graphical and tabelar survey of meteorological situation in Brno" (Mendel 1863) at a meeting of Society for Natural Sciences in Brno. It was his first publication in meteorology, and at the same time it was the first newly concepted assessment of climate in Brno based on average annual course of temperatures and air pressure values, cloudiness, atmospheric precipitations and wind direction or velocity. However, MENDEL also reported of an experimentally found fact that temperature values in the town centre are higher than in the outskirts: "*Air temperature was monitored in Pekařská Street /Grosse Baeckergasse/ by means of special instruments made by firm Kappeller to these purposes. Experiments which were recently made in the inner town and in one of neighbourhoods in the outskirts have brought a certain evidence that average annual air temperature values increase considerably towards the centre of the town. The observed temperature difference appears to be larger in summer and winter than in spring and autumn, showing very markedly particularly during days with clear sky and calm air. We will not tackle causes to these temperature differences in details here. However, we should remark that on hot and bright summer days, considerable increase of temperature is being caused by sun-heated paving, walls and roofs made of stone or covered with tiles. In winter time, the warm air is leaking through doors and windows and along with hot smoke rising from chimneys and smoky fog (orig. Rauchnebel) contributes to temperature reductions. The studies made in Pekařská Street are very close to values of average temperature found in Brno. It is to be presumed that the average air temperature of inner town is by several tenths of a degree (RÉAUMUR) higher, with genuine temperature of open surroundings being lower by the same value. Precise calculation of the difference will be made possible only on the basis of further observations.*" (Mendel 1863).

Even with the Brno scientist coming back to this topic no more in any of his other publications, it can be stated that apart from the experimentally found fact about higher average air temperature values in the town centre in contrast to those of non-influenced surroundings (outskirts) causes to this phenomenon were explained in a correct way. This was the first work which tackled the issue of urban heat island on the territory of the former Austrian Monarchy. Up to now, the first publication about anthropogenic impacts on air temperature in the town centre was considered to be a work by Austrian meteorologist Julius von Hann, which was published nearly a quarter of the century later (Hann 1885).

Mendel's mentioning the "smoky fog" in town, in other words smog, also deserves attention. Nevertheless, the word smog as it is used today (from English words *smoke* and *fog*) was first used by English physical practician Harold A. Des Veaux (Heidorn 1978) as late as in 1905, which is some forty years later.

3. Ozone and air pollution in Brno

The survey of meteorological observations made in Moravia and Silesia in 1863 (Mendel 1864) includes a passage which is devoted to air content of surface ozone, detected by Schoenbein method. Tables bring data on monthly averages in ozone concentrations at following four stations: Těšín (Teschen), Kroměříž (Kremsier), Brno (Brünn) and Jihlava (Iglau).

It follows out from Mendel's comments that the first attempts at measuring ozone values in Brno were made as early as in 1858. As at air temperature measurements, it was a synoptical (synchronous) measuring in two localities: Staré Brno (Altbrünn) and Dornych (the ehen suburb of Dornrössel), in order to evaluate the affect of different aspects. Ozone concentration differences between the two monitoring sites appeared to be surprisingly great - reaching even 6 or 7 degrees of the Schoenbein scale. They were explained both by the existing air pollution and by wind status. MENDEL claims: "*For these mutually nearly antithetical results in terms of maxima and minima, a rather simple solution can be found at hand when using data from the more precise research made by Schoenbein, Kletzinsky and others. It has namely been proved that air pollutants of different kinds, which occur in towns at all times, split and bind atmospheric ozone with their action being more pronounced with time length. This is the reason why the air flowing above the town is always lacking ozone in its lower layers when leaving the town and is not lacking it when entering the town area, the ozone losses being greater with slower flow of air. It is therefore understandable why northern and north-western winds*

in Dornych suburb where they leave the town can exhibit only a weak reaction on ozone paper slips while south-eastern winds arriving from open surroundings can show full effect. The observation site at Staré Brno can speak of exactly opposite results due to its position. As it is shown in the table, distribution of monthly average values in Brno was rather strange in the course of the year. The lowest ozone content was observed in late autumn and in winter, ie. in the time when the town was covered with mist and industrial smoke (Dunstnebel) for more days under weak wind. On the other hand, the nearly double maximum values were recorded in summer months with considerably more rapid exchange of air" (Mendel 1864).

For our present time, historical origin of the used method of measuring surface ozone is not important. What is considered important is the fact that the quoted passage links up with the older one on "smog" in Brno from 1863, thus being another contribution to historical monitoring of environmental changes. Let us add that the famous episodes with persistent smog in London began to appear approximately ten years later (Heidorn 1978).

References

HANN, J.v. (1885): Über den Temperaturunterschied zwischen Stadt und Land. Zeitschrift der österr. Gesellschaft für Meteorologie, 20, p. 457-462.

HEIDORN, K.C. (1978): A chronology of important events in the history of air pollution meteorology to 1970. Bulletin of the American Meteorological Society, 59, p. 1591.

MENDEL, G. (1863): Bemerkungen zu den graphisch-tabellarischen Uebersicht der meteorologischen Verhältnisse von Brünn. Verhandlungen des Naturforschenden Vereines in Brünn, 1, 1862, Abhandlungen, p. 246-249.

MENDEL, G. (1864): Meteorologische Beobachtungen aus Mähren und Schlesien für das Jahr 1863. Verhandlungen des naturforschenden Vereines in Brünn, 2, 1863, Abhandlungen, p. 99-121.

MUNZAR, J. (1994 a): K počátkům antropogenních vlivů na podnebí Prahy a Brna. Sborník České geografické společnosti, 99, No. 1, p. 14-19.

MUNZAR, J. (1994 b): Deterioration of urban environment in Czech Republic in the 19th century: air pollution as a case study. Paper on the meeting of IGU Commission on Historical Monitoring of Environmental Changes, 18-21 August 1994, Příhrazy, Czech Republic.

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