such a load there would be plugged for a long time. Trees thanks to leaves and stalks exchange have high ability for regeneration. More over they produce oxygen in photosynthesis. They are indispensable for human lives. Let us not demolish them with our own actions. They are to be indispensable for future generations not less than for ours.

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Diversification of atmosphere dustiness and acidification of fall waters on the area of Silesian Upland

Аналізується рівень атмосферної забрудненості і окислення опадів регіону гірної Сілезії і деградаційний вплив цих факторів на антропогенну ситуацію в регіоні. Для аналізу використовується гідрометричний метод дослідження. Автори роблять висновки швидкого зростання рівня забрудненості і окислення водних опадів за останні 10 років і вважають терміновою необхідністю розпочаток гідрогеохімічних процесів для попередження розвитку цих явищ.

Measurements of fall of dust are of common practice in the whole world both in industrial and municipal centres. To determine dust fall is to collect dust falling in air to sedimentary vessels and then quantity of dust is determined with gravimetric methods. In selected points of investigated area, sedimentary vessels (there had been used Weck's jars up to Jan 15th, 1998, which then were replaced by plastic containers) are placed in special outriggers at the height of 3 – 3,5 m on the first day of calendar month. Exposition time lasts one month. Currently there are 787 measuring points of dust fall within the borders of Silesian Voivodship (Province).

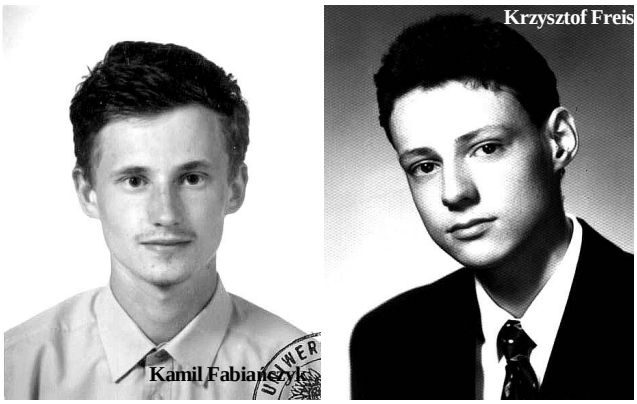
Phase composition of atmospheric dusts comes from the measurements. There were determined main components that prevails in dust (from several to dozen of percentage of volume in reference to each phase) and appliance components met rarely. Quartz, calcium sulphates (bassanite, gypsum), aluminosilicate phases with different content of K, Fe, Ca, Ti, Mg are included to main components. The following of main components are soot, fly-ash, graphite, iron oxides (hematite, magnetite, wűstyt) and calcite (Jabłońska, 1999).

Dust fall was a very serious problem especially of seventies when measurement values were over 500 g/m^2 annually. Here and there they even crossed the threshold of 2000 g / m^2 annually (Fig. 1). These concerned mostly the centre of Upper Silesian Industrial Region. In residual parts of USIR (GOP) the average fall was within the range from 250 g / m^2 annually to 500 g / m^2 annually. In the first half of eighties investigation provided in Katowice showed that results exceeded allowable limits in the prevailing area of the region. The map of dust fall in Katowice province showed improvement of aerosanitary in the second half of eighties. In spite of the situation having been continuously the worst in USIR (GOP), especially in its centre values did not exceed 850 g / m^2 annually. The basic improvement occurred in nineties (especially in their second half) when top level of values received equalled only 200 g / m^2 annually and was adequate to compulsory standards. The average maximal values of dust fall equalled:

in period of 1970 – 1979 – 1779 g / m^2 annually
in period of 1980 – 1989 – 945 g / m^2 annually
in period of 1990 – 1998 – 372 g / m^2 annually

In analysis of dust concentration there were used the results of measurements performed in 31 measurement stations in general.

The beginning of eighties characterizes with high level of suspended dust in the whole voivodship



(province). Especially high values exceeding standards 10 or even 15 times were observed in the stations in the centre of USIR (GOP) so that in cities of "hermetic and compact" building, weakly aired, what favoured the concentration and stagnation of pollution. In second half of eighties the average level of suspended dust felt down however some stations noted its growth. Only just at the beginning of nineties the tendency to fall down was obvious.

Phases distinguished in atmospheric dust of USIR (GOP) testify prevailing supremacy of molecules of anthropogenic origin. Nowadays significant participation in dust pollution of atmospheres in USIR (GOP) have hearths households and small housing estate boiler rooms and coking plants (Jabłońska, 1999).

One of the basic factors formatting the quality of air is rainfall. Dissolved impurities removed from falls on surface of ground and easily percolate particular phases of hydrogeochemical circulation. Taking into consideration the quantity and quality of transferred substance and the range of influence, falling waters may, on the one hand, be a very good ratio of estimation of pollution degree in atmosphere, on the second hand they take significant role in the degradation of remaining elements of environment.

The greatest part in the process of acidifying is imputed on gas compounds. to which belong first of all: sulphur dioxides (SO_2), nitrogen oxides (NO_X), carbon dioxides (CO_2) and ozone (O_3). Alkalization and at the same time weakening the process of fall acidifying is caused by calcium compounds (Ca) entering in composition of emitted dusts and ammonium (NH_4). All mentioned substances get into the atmosphere in result of: fuels combustion, emission from industrial plants, photochemical and natural processes.

Meteorological conditions, especially direction and speed of wind, height and intensity of fall and thermal stratification of atmosphere have, beside the volume of impurities emission, great importance in final formation of chemical composition of fall waters at given areas.

Within the investigated area the aerosanitary conditions are formed mostly by local emission of gas and dust impurities, which come from hearts of individual households, industrial and house estates' boiler rooms, service and production plants, means of transportation, and impurities from areas near by.

The schedule of average annual values of pH reaction within fall waters in each measurement points shows high variability within the analysed time.

The countinouosly changing number, and at the same time proportion, in emission of acidifying and alkalizating impurities into the atmosphere is the main reason of such a diversification in respect of time and space of fall waters acidification. This concerns mostly the visible fall at the turn of eighties and nineties of dusts (neutralizing sulphur dioxides and nitrogen oxides in part) and holding emission of acidifying compound at the high level. However in the first half of nineties the situation might have been taken as temporary because of quickly changing economic conditioning, but the low variability of pH reaction in the second half of nineties was the indication of a certain hydrochemical stability of the atmosphere.

The analysis of dustiness of the atmosphere showed visible fall, both in case of dust fall and of concentration of suspended dust on the whole investigated area.

Results introduced confirm the significant degree of acidification of fall waters on the area of Silesian & Cracow's Upland having been kept at the same level for a few years. Obtained results confirm the time and spatial diversification of acidifying and pollution of fall waters on the area of Silesian &Cracow's Upland have strict connection with the quantity and quality of impurities contained in air and with domination of one of two processes of water treatment at the given point.

Progressive growth of acidifying of fall waters in the course of the last 10 years signals the need to start a series of hydrogeochemical processes and this phenomenon further trivializing may contribute to irreversible results within remaining units of the environment.

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Post	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
Sosnowiec	5,2	5,0	4,6	4,6	4,5	4,4	4,3	4,0	4,2	4,1
Ojcyw (NP)	5,0	4,8	5,0	4,5	4,6	4,7	3,7	3,9	4,2	4,1
Wodzisław Śl.	4,5	4,1	4,2	4,6	4,7	4,6	4,5	4,4	4,6	4,5

The average values of pH reactions of atmospheric falls in each investigative points in 1989–1998

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Variability of air temperature and precipitation in Katowice between 1931 and 1996 in relation to urban development

Аналізується вплив швидкого розвитку процесу урбанізації, що відбувається в останні десятиріччя в Польщі, на атмосферу на прикладі даних м.Катовіце та м.Александровіце. Акцентується увага на вирішенні проблем так званого "теплового анклава" температури та зменшення природньо притаманного даним регіонам рівня опадів у роки швидкої індустріалізації.

The aim of this paper is an attempt to answer the question whether or not the rapid urban growth affected the course of changes in air temperature and precipitation in a period 1931 – 1996 being analysed. Changes in climate (on a local scale) resulting from great urbanisation growth have been more and more often mentioned recently. It has been demonstrated that the rapid development of cities resulted in changes of thermal conditions over big urban areas and contributed to creation (where proper atmospheric conditions occurred) of the so-called urban warmth enclave. In order to explain some aspects of variability of precipitation and air temperature in relation to urban changes, comparative researches have been performed of the data recorded in Katowice and Aleksandrowice – a station representing urban conditions.

Synoptic station Katowice – Muchowiec is located in the centre of Upper-Silesian Industrial Region (Gyrnośląski Okręg Przemysłowy) at the altitude of 285.4m above sea level. It operates in the airfield at the south-western border of the city and, although it is not subject to city's direct influence, an assumption can be made (based on the fact that GOP can be treated as one big city as far as distribution of dense structure of buildings is concerned (Kruczała, 1972)), that it represents the climate of an urbanised area. Aleksandrowice is situated a few kilometres south-west of the centre of Bielsko Biała. Despite the neighbourhood of that industrial centre, the station in Aleksandrowice represents rural conditions as it is situated on a swell (399m alt.) about 40m above the level of the city, within the airfield outside the urbanised terrain.

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Lengths of periods used in this paper reflect availability of sources. Data included herein is taken from Climatic Atlas of Poland (Atlas Klimatyczny Polski), Meteorological Year-Books (Roczniki Meteorologiczne) and Precipitation Year-Books (Roczniki Opadowe 1930-1937; 1954-1981), database of IMGW (Institute of Meteorology and Water Management) (1966-1996) as well as archive materials of IMGW in Krakyw (data from the period 1992-1996).

The matter of long-term variability of precipitation was described by analyses of seasonal and yearly total rates of precipitation. The values were averaged by the method of ten-year consecutive averages and variability factors were calculated for them.

The matter of long-term variability of air temperature was presented basing on the analyses of: yearly averages (Tśr) and seasonal averages of air temperatures during the period 1931-1996 as well as yearly average maximal (Tmax) and minimal (Tmin) temperatures. It was possible to gain the full set of data only in case of monthly average temperatures, although those for periods 1939-1943 and 1945-1946 were reconstructed by the authors of Climatic Atlas of Poland (Atlas Klimatyczny Polski, 1971).

Yearly amounts of precipitation

In a long-period course of yearly amounts of precipitation there was a long-lasting wet phase during 1958 – 1981, with a peak in 1974 – 1977. The wet phase in Aleksandrowice also began in 1958, but it lasted shorter, i.e. until 1977. In 1960s and 1970s precipitation surplus was recorded all over Poland (Kożuchowski, 1984; Przedpełska, 1988). Small amounts of precipitation occurred in both analysed stations at the beginning of the analysed period (1951-1957). Next period of reduced precipitation began in 1980 in Katowice and in 1978 in Aleksandrowice. A beginning of a wet phase has been observed in the considered stations since 1994.

Summer precipitation

Long-term variability of summer precipitation reflected the variability of yearly amounts, with only minute deviations.