

DUST POLLUTION IMPACT ON THE ENVIRONMENT AND HUMAN

The article describes The impact of dust pollution is assessed regionally and globally, as it negatively affects human health, animals and plants, and contributes to climate change. Dust pollutants spread most quickly in the atmospheric air. The process is influenced by meteorological, topographic and technological factors.

Key words: pollution, dust, air

An important group of air pollutants are dusts, i.e. mineral solid particles. After getting into the air, dusts remain in a suspended state, where they form aerosols (solid particles smaller than 50 μm) [2].

They consist of a gaseous dispersion phase and a liquid or solid dispersed phase. Pollutants are subject to many physical and chemical reactions. Physical settlements include dry settlements and leaching due to precipitation. The chemical reactions, on the other hand, include those in which new compounds are formed, the so-called secondary pollutants (main components of PM_{2.5} dust). Danger related to dust occurs when heavy metals and reagents are adsorbed on their surface [4].

The chemical composition of dusts varies and depends on many factors (e.g. geographic location). It may contain ingredients such as: sea salt (from the seas), minerals (from weathering rocks), elemental and organic carbon, primary bioaerosols (viruses, bacteria, mosses), secondary and organic aerosols (oxygenated and hydrocarbon aerosols), aerosols secondary, inorganic, elements (e.g. heavy metals).

Factors influencing the spread of dust in the air

Among the various elements of the environment, such as soil, water, air, the spread of dust pollutants is the fastest in the atmospheric air. The process is influenced by meteorological, topographic and technological factors [2, 4].

Examples of meteorological factors are wind speed and direction. The weaker the wind, the more difficult the process of self-cleaning of the atmosphere. The factor dependent on the wind speed is diffusion, i.e. the unconditional propagation of pollutants as a result of chaotic collisions with air molecules. Another example is the vertical temperature gradient, i.e. the change in temperature with altitude. This process influences the vertical exchange of atmospheric components. An important factor is also the thickness of the lower troposphere, the so-called boundary layer. Only a small part of the impurities penetrates higher. The amount of pollution is also influenced by precipitation, which washes it from the atmosphere. Precipitation may also cause chemical reactions of pollutants with raindrops [4].

Topographic factors include the topography, which favors the accumulation of pollutants in the atmospheric air. The city of Krakow, which is located in a basin, serves as an example. This results in poor ventilation, and also favors the formation of the phenomenon of temperature inversion [5].

The second factor is that the wind speed is disturbed by obstacles such as hills, slopes, buildings and trees. It is worth noting that some plants are able to absorb dust particles from the air. The best way to reduce pollution is to create strips of stands that separate especially dust-generating areas [1].

The technological factors include the concentration, temperature, speed and type of the pollutants introduced. The parameters of the emitter, such as its height and location, are also important [2].

The impact of dust pollution is assumed regionally and globally, as it has a negative impact on human health, animals and plants, and contributes to climate change [3].

Most often, on the regional background, there is an increase in the concentration of dust suspended in the atmospheric air from anthropogenic sources (point, area and mobile), which pose a threat to health and life for local residents and the natural environment. Their impact depends on the size of the grains (the most dangerous are dusts with a diameter of less than 5 μm) and their composition, especially resulting from chemical reactions (secondary pollution). Dust facilitates the condensation of water vapor in the air. Under the conditions of temperature inversion, mainly in winter, with their high concentration along with sulfur dioxide and carbon monoxides, sulfur smog may form [2]. Sulfur smog is highly toxic, it affects the respiratory tract and the circulatory system. It can contribute to chronic disease and premature death [1].

References

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