

Chapter  
**3**

# FUNDAMENTALS OF AIR POLLUTANTS DISPERSION MODELING

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## Air Pollutants

Air pollutants (AP) are usually defined as any substances emitted into the ambient air or arising secondarily in the atmosphere which have a detrimental effect on human and animal life and health, the environment, the Earth's climate system, or tangible assets. The detrimental effects can occur not only by the AP themselves, but also as a result of physical or chemical transformations of AP or by their interaction with another substances. Chemical substances that cause odor nuisance are considered as AP too<sup>(1)</sup>.

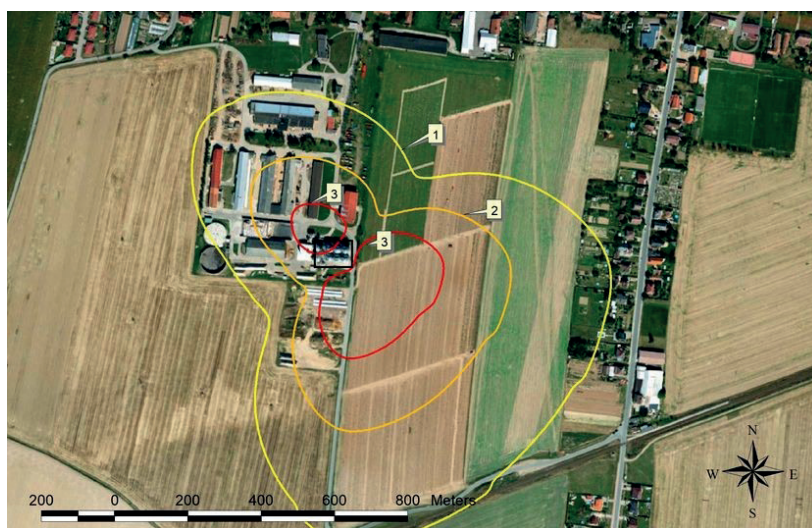
AP may be in the form of gas, aerosol or particulate matter and they can get into the atmosphere from both natural and anthropogenic sources<sup>(2,3)</sup>. AP emitted from natural sources are a permanent part of the Earth's atmosphere and their occurrence is not significantly influenced by human activities. Most of air pollutants are of natural origin, it is stated that these emissions account for about 90% of the total amount of all AP released into the atmosphere<sup>(2)</sup>.

Despite this, emissions of anthropogenic origin are a major problem. The reason is that emissions from natural sources are predominantly dispersed in large areas or come from such huge heat sources that they are transported to higher atmosphere layers and therefore their ground concentrations are globally insignificant. As this case e. g. volcanic eruptions are referred<sup>(2)</sup>, which cause the release of both solid pollutants and gaseous compounds such as sulfur oxides, carbon oxides, nitrogen oxides, methane, hydrogen chloride, hydrogen fluoride, etc<sup>(3)</sup>.

However, it is worth mentioning that a volcanic eruption can have a significant impact too. An example is the Icelandic volcano Eyjafjallajökull that emitted a large dust cloud during its eruption in 2010, which led to the disruption of air

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**Figure 2.** A demonstration of dispersion modeling output (the model was based on a statistical approach). The isolines 1, 2 and 3 correspond to different AP concentrations(13).

**Keywords:** Air Pollutants, dispersion, modeling.

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