

Air Pollution, Aerosols and Climate – past findings, present warnings and future musts

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Air pollution, especially related to the use of fossil fuels is not a modern problem – an assessment and some countermeasures were done in the distant past. In 1308, King Edward I forbids coal burning in London when Parliament was in session and in 1603, King James I orders coal from Scotland to be burned in his household instead the bituminous coal from Durham and Cornwall. In his writing in 1661 about the “*The inconveniencie of the aer and smoak of London*”, John Evelyn wrote about “*constant poison communicated by foul air*”.

These rather local issues changed to much larger scale with the onset of the industrial revolution and continue globally until today. Besides the important issue of a regional negative impact on humans and environment, various air pollutants in gaseous and particulate form contribute also to global climatic problems.

Already in 1859 physicist John Tyndall documented the Earth natural greenhouse effect and suggested that minor alterations in the atmospheric composition could result in climatic changes, and in 1896 Arrhenius predicted that changes in the amount of the carbon dioxide in the atmosphere could substantially alter the Earth’s surface temperature due to the greenhouse effect. These early wise perceptions and also the newest assessments regarding environmental impacts and climate change by the Intergovernmental Panel on Climate Change (IPCC) are still being questioned by some, or accepted, but not really followed by many.

In the meantime, it is a common knowledge that very small particles suspended in the atmosphere, so called aerosols, have a major impact on atmospheric events on the local and global scale. They participate in cloud formation, acidification of precipitation, or radiative transfer through the atmosphere. Prompted by this necessity and demand, the measurement of airborne particles (aerosols, particulate matter (PM)) transformed in the 1970s from a kind of art to a science following the development of various measuring and monitoring methods in the atmosphere.

There is an ever-growing need for information within the context of the atmospheric air pollution regarding not only health and environmental hazards but growing disaster potential due to climate change and global warming. Research on various scales from local to global must address: speciation of air pollutants, understanding of atmospheric transformations, aerosol formation and transport, as well as overall anthropogenic emissions – from industry and agriculture.

As it looks now, our understanding of the interplay of air pollution, aerosols and atmospheric processes had a major advance in the past decade. We are quite able to measure, and at least partially assess air pollution, observe the impact on the local and global scale, model and predict possible future scenarios. However, until now we accomplished only a little for the factual prevention of the air pollution and its global influence. The efforts so far are not enough to slow down or maybe even prevent certain negative impacts of climate change. A step in the right direction might be the Paris Agreement and its handling during the upcoming UN Climate Conference in Katowice, Poland, in the first half of December 2018. Let us all wish for the best possible results. The Earth does not need it but we do.