

Impact of Air Quality on Human Health in Germany: Variability of the Aggregate Risk

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According to the World Health Organisation (WHO) air pollution is now the world's largest single environmental health risk. Also in Europe a large part of the population lives in areas, mainly cities and agglomerations, where the thresholds for air pollutants of the European Air Quality Directive are still exceeded. There is broad evidence that the exposure to multiple air pollutants can result in chronic and acute health issues (WHO, 2013; Maynard, 2004). In particular people at risk, e.g., suffering from cardio-vascular or respiratory diseases, children or the elderly are potentially affected by environmental conditions.

The Aggregate Risk Index (ARI) represents an algorithm to estimate the impact of short-term multiple exposure to the air pollutants NO₂, SO₂, O₃ and particulate matter on human health (Sicard et al., 2011). In particular, the ARI enables the valuation of risks to human health, i.e. mortality and morbidity, depending on multiple and additive air pollutants' concentrations for different pathologies and age classes. In order to quantify the health risks in their spatial and temporal variability an integrated use of satellite- and non-satellite-based observations as well as numerical air quality models is essential. The ARI has been demonstrated and evaluated in several Copernicus downstream service activities (Erbertseder, 2012).

We will present first results on the spatial and temporal variability of the Aggregate Risk over Germany for various cardio-vascular as well as respiratory diseases and three age classes (<15, 15-65, >65 years). The study is based on reanalysis data from the European Air Quality Model Ensemble as part of the Copernicus Atmospheric Monitoring Service (CAMS). The ARI is derived from hourly reanalysis data covering the period from 2010 to 2017. Times series of the ARI are analyzed by means of a statistical component model. The results enable an integrated assessment of the atmospheric composition and the related health risk for several health end points from short-term exposure.

Acknowledgements

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References

Copernicus Atmosphere Monitoring Service (CAMS), Regional Air Quality, <http://www.regional.atmosphere.copernicus.eu/>