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**Corona lockdown:  
The local air quality is always a result of emissions, chemical processes and  
the transport of particulate matter**

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In many cases, the COVID-19 pandemic has been taken as an opportunity to identify the impact of reduced atmospheric pollutant emissions during the lockdown and whether air quality accordingly changed as well.

In depth discussions in the media haven't found a connection between less emissions and better air quality. As a matter of fact, poor air quality could not have been proved by car traffic emissions. This is rather a fictitious debate driven by interests as could be seen most recently in a debate in the German Bundestag on 18 June 2020, where not only lobby associations and political parties were involved, but also self-proclaimed experts. <sup>(1 2 3 4 5 6 7)</sup>

The Leibniz Institute for Tropospheric Research due to its scientific expertise in the fields of Chemistry and Physics of the Atmosphere, remote sensing and the atmospheric modelling takes a stand on air pollution at times of SARS-CoV-2:

- (1) In general, problems of air quality in Germany, Europe and worldwide are real and a major threat for human health, ecosystem integrity as well as climate. <sup>(8 9 10)</sup>
- (2) Particulate matter and nitrogen oxides are key components of air pollution in Germany. For its emission the transport sector is largely responsible through exhaust gases as direct engine emission as well as through articles not directly stemming from the engine such as brake and tyre wear. <sup>(11 12 13 14)</sup>
- (3) Due to overlapping effects the situation of the local air pollution has not significantly improved in times of the Corona lockdown: On the one hand, some of the local emissions - but not all of them - had declined in the course of the lockdown (see also point (4)). On the other hand, the long-range atmospheric transport had brought polluted air masses to Germany specifically during the lockdown. For instance, forest and land fire in Eastern Europe during the dry and warm high-pressure weather conditions in March and April had led to the ingress of smoke particulates in Central Europe. As a result, the local reduction of the emissions had been offset or even

overcompensated. All things considered, long-range transport can lead to higher or lower local loads. Also, the impact of marine or arctic air masses, meaning clear air masses can reduce the regional air pollution. Meteorological influences are constantly possible when describing the relation between emissions and immissions; they are further considered when assessing the local air quality. <sup>(15 16 17 18 19 20 21 22 23 24 25 26)</sup>

- (4) The Corona lockdown had reduced emissions of some major sources such as the private transport, others in turn had not been affected at all. Wood heating, energy production, animal husbandry as well as agriculture and especially the treatment of the heavily desiccated soil in spring played a further role and substantially contributed to the regional and local exposure. <sup>(27 28 29 30 31 32)</sup>
- (5) Despite major achievements in air quality improvement in both Germany and the EU within the last 65 years the process of improving the air quality is far from being completed and have not yet come to a desirable end. <sup>(33 34 35 36 37 38 39)</sup>
- (6) Germany is a leader in combating air pollution in synergy with science, political committees and the economy. Its expert knowledge in the fields of air pollution control and atmospheric research not only had established an internationally renowned economic sector, but also an important economic asset including lots of job positions in environmental technology. <sup>(40 41)</sup>
- (7) To effectively protect sensitive groups in our society drastic economic and political measures have been taken in this Corona crisis. For the time after the crisis, considerations on how an even better health care of the society could be achieved are decisive. These policies should economically and ecologically be balanced, in order to serve as a model for other parts of the world. <sup>(42 43)</sup>

## Conclusion:

Reduced emissions had not automatically led to lower received emissions in times of the COVID-19 lockdown as the pollutant concentration within the air had been affected by diverse complex factors. Given the little decreasing air pollution in a relatively short timeframe criticising the whole concept of air pollution control and its thresholds is not relevant for and found on a solid scientific basis.

When it comes to the effects of changed emissions interacting with other factors during the lockdown specifically, TROPOS elaborated a larger multidisciplinary study. Bringing together data from particulate matter of diverse both national and international measuring stations in urban and rural areas with emission values and the description of the atmospheric transport, the causes for increased or reduced local air pollution are to be scientifically proven. The investigations are integrated within a study on atmospheric changes during and after the COVID-19 lockdown through the European Research Infrastructure for the observation of Aerosol, Clouds and Trace Gases (ACTRIS) where Germany is contributing through TROPOS.

Poor air quality can seriously damage human health and be dangerous especially for humans with underlying medical conditions. Not only can pollutants result in a premature death (mortality), but also cause health restrictions (morbidity). This loss of good health is not negligible. The Corona crisis had led to some reducing emissions in the short term, particularly driven by reduced traffic. However, more efforts at a local, national as well as international level in the medium and long term are needed to not only maintain the level of preventive health care of the population, but to also further improve it.

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