

Information on the relationship between air pollution and the spread of COVID-19

In the last few days, the national media in Italy hosted a discussion on an **alleged association between airborne particulate pollution (PM) and the spread of COVID-19**. This hypothesis had a wide echo on the media and social networks and aroused a lot of interest, placing attention on a relevant scientific issue on which many researchers in Italy and abroad are currently working.

The Italian Aerosol Society (IAS), founded in 2008 and member of the European Aerosol Assembly (EAA), includes among its members about 150 experts on atmospheric particulate matter coming from the academy, research bodies, regional and provincial agencies for the environmental protection as well as from the private sector. IAS intends to express an opinion on the current knowledge about the interaction between PM pollution and the spread of COVID-19. **This knowledge is still very limited and this requires the utmost caution in interpreting the available data.**

It is well known that exposure to high PM concentrations induces susceptibility to some chronic respiratory and cardiovascular diseases and that this condition can worsen the health conditions of the infected subjects. High PM concentrations are frequently observed in northern Italy, especially in the Po valley, during the winter period. Nevertheless, no effect of greater susceptibility to contagion to COVID-19 due to exposure to atmospheric aerosol has been demonstrated so far.

It has been hypothesized that atmospheric particulate matter can act as a "carrier" substrate for the transport of the virus, resulting into an increased rate of infection. However, the carrier hypothesis is not supported by the knowledge currently available, just as the life span of the virus on the surfaces and the factors that influence it are not yet fully understood. It is possible that specific meteorological conditions, characterizing northern Italy in late winter, such as low temperatures and high relative humidity, may create an environment that favours the survival of the virus. These conditions, which generally coincide with a situation of intense atmospheric stability, is also normally accompanied by secondary aerosol formation and by an increase of PM concentration at surface level. **The covariance between conditions of reduced atmospheric circulation, formation of secondary aerosol, accumulation of PM near the ground and spread of the virus must not, however, be mistaken for a cause-effect relationship.** In the case of complex systems, such as the one we are dealing with, the interpretation of simple correlations (i.e. that between two time series) does not necessarily indicate a cause-effect relationship.

Similarly, great caution should be exercised, for example, in comparing data and trends from different geographical areas of the country and in mixing situations where there is an outbreak with situations where the outbreak is not present and where different policies have been enforced for containment of the spread of COVID-19 at different times. **The monitoring period available for the epidemiological investigation is still too limited to draw scientifically solid conclusions** in relation to the many factors that influence the growth rate of the infection.

The President, the Steering Committee of the IAS and all the signatory Members are unanimous in evaluating as partial and premature the claim of a causal relationship between the number of PM threshold exceedances and the contagions from COVID-19, and in believing that **a possible effect of PM pollution on COVID-19 infection remains - in the current state of knowledge - a hypothesis that must be carefully evaluated with extensive and in-depth investigations.** Consequently, in the signatories' opinion, **the proposal for restrictive measures to contain pollution as a means of combating contagion is, in the current state of knowledge, unjustified,** even if there is no doubt



that the reduction of anthropogenic emissions, if maintained for a long period, have beneficial effects on air quality and climate and therefore on public health.

We take this opportunity to underline the importance of respecting the distances between people as a priority and, in general, the rules included in the Decrees and Ordinances.

The opinions reported here are to be considered personal to the signatories and do not represent the official positions of the bodies in which they are working.

Bologna (Italy), 20/03/2020

- Daniele Contini, Istituto di Scienze dell'Atmosfera e del Clima del CNR and President of IAS
- Cinzia Perrino, Istituto sull'Inquinamento Atmosferico del CNR and Vice-President of IAS
- Andrea Gambaro, Università Ca' Foscari di Venezia and member of the Steering Committee of IAS
- Maria Chiara Pietrogrande, Università degli Studi di Ferrara and member of the Steering Committee of IAS
- Stefano Decesari, Istituto di Scienze dell'Atmosfera e del Clima del CNR and member of the Steering Committee of IAS
- Cristina Colombi, Arpa Lombardia and member of the Steering Committee of IAS
- Silvia Canepari, Università degli studi di Roma "La Sapienza" and member of the Steering Committee of IAS
- Manuel Dall'Osto, Institute of Marine Sciences of CSIC (Spain) and member IAS
- Daniela Cesari, Istituto di Scienze dell'Atmosfera e del Clima del CNR and coordinator of the Working Group "PMx sampling and analysis techniques for air quality assessment" of IAS
- Luca Ferrero, Università degli Studi di Milano-Bicocca, coordinator of the Working Group "Atmospheric aerosol: properties, processes and atmospheric changes " of IAS
- Elena Barbaro, Istituto di Scienze Polari del CNR and coordinator of the Working Group "Aerosols in polar and remote areas" of IAS.
- Adriana Pietrodangelo, Istituto sull'Inquinamento Atmosferico del CNR and coordinator of the Working Group "Sources and environmental impact of aerosols" of IAS
- Mauro Maria Grossa, Arpa Piemonte and member IAS
- Marianna Conte, Istituto di Scienze dell'Atmosfera e del Clima del CNR and member IAS
- Maria Rachele Guascito, Università del Salento and member IAS
- Eleonora Conca, Università degli Studi di Torino and member IAS
- Ezio Bolzacchini, Università degli Studi di Milano-Bicocca and member IAS
- Giulia Pavese, Istituto di Metodologie per l'Analisi Ambientale del CNR and member IAS
- Erika Brattich, Alma Mater Studiorum Università di Bologna and member IAS
- Rosaria Erika Pileci, Paul Scherrer Institute (Switzerland) and member IAS



- Gabriele Curci, Gabriele Curci, Università degli Studi dell'Aquila and member IAS
- Alessandro Bigi, Università degli Studi di Modena e Reggio Emilia and member IAS
- Andrea Tapparo, Università degli Studi di Padova and member IAS
- Francesco di Natale, Università degli Studi di Napoli “Federico II” and member IAS
- Davide Michele Cappelletti, Università degli studi di Perugia and member IAS
- Paolo Prati, Università degli Studi di Genova & INFN and member IAS
- Roberta Vecchi, Università degli Studi di Milano & INFN-Milano and Past-President of IAS
- Sara Valentini, Università degli Studi di Milano & INFN-Milano and member IAS
- Alice Corina Forello, Università degli Studi di Milano & INFN-Milano and member IAS
- Paolo Brotto, CEO at PM_TEN srl and member IAS
- Sandro Fuzzi, Istituto di Scienze dell’Atmosfera e del Clima del CNR and member IAS
- Maria Cristina Facchini, Istituto di Scienze dell’Atmosfera e del Clima del CNR and member IAS
- Rosa Caggiano, Istituto di Metodologie per l'Analisi Ambientale del CNR and member IAS
- Andrea Algieri, Arpa Lombardia and member IAS
- Adelaide Dinoi, Istituto di Scienze dell’Atmosfera e del Clima del CNR and member IAS
- Franco Belosi, Istituto di Scienze dell’Atmosfera e del Clima del CNR and member IAS
- Marco Paglione, Istituto di Scienze dell’Atmosfera e del Clima del CNR and member IAS
- Silvia Becagli, Università degli Studi di Firenze and member IAS
- Federico Bianchi, University of Helsinki (Finland) and member IAS
- Mery Malandrino, Università degli Studi di Torino and member IAS
- Matteo Feltracco, Università Ca' Foscari di Venezia and member IAS
- Franco Lucarelli, Università degli Studi di Firenze and member IAS
- Giulia Calzolai, Istituto Nazionale di Fisica Nucleare and member IAS
- Pierina Ielpo, Istituto di Scienze dell’Atmosfera e del Clima del CNR and member IAS
- Luca Tofful, Istituto sull’Inquinamento Atmosferico del CNR and member IAS
- Eva Merico, Istituto di Scienze dell’Atmosfera e del Clima del CNR and member IAS
- Maurizio Gualtieri, Agenzia nazionale per le nuove tecnologie, l'energia e lo sviluppo economico sostenibile ENEA - SSPT-MET-INAT and member IAS
- Mauro Morichetti, Istituto di Scienze dell’Atmosfera e del Clima del CNR and member IAS
- Vanes Poluzzi, ARPAE Emilia-Romagna member IAS
- Luca Torreggiani, ARPAE Emilia-Romagna and member IAS
- Francesca Marcovecchio, Istituto sull'Inquinamento Atmosferico del CNR and member IAS
- Sara Pittavino, ARPA Valle d'Aosta and member IAS



- Mariarosaria Calvello, Istituto di Metodologie per l'Analisi Ambientale del CNR and member IAS
- Massimo Chiari, Istituto Nazionale di Fisica Nucleare and member IAS
- Maria Agostina Frezzini, Università degli studi di Roma "La Sapienza" and member IAS
- Francesco Esposito, Università degli Studi della Basilicata and member IAS
- Matteo Monticelli, Managing Director POLLUTION Analytical Equipment member IAS
- Carlo Giglioni, Amministratore Con.Tec. Engineering SRL member IAS
- Stefano Alberti, Amministratore Dado Lab SRL member IAS
- Lorenzo Massimi, Università degli studi di Roma "La Sapienza" and member IAS
- Silvia Nava, Università di Firenze & INFN-Firenze and member IAS
- Salvatore Romano, Università del Salento and member IAS
- Maria Giulia Lionetto, Università del Salento and member IAS
- Luca D'Angelo, ARPA Lombardia and member IAS
- Federica Castellani, Università degli studi di Roma "La Sapienza" and member IAS
- Maria Luisa Astolfi, Università degli studi di Roma "La Sapienza" and member IAS
- Antonio Donateo, Istituto di Scienze dell'Atmosfera e del Clima del CNR and member IAS
- Gianluca Pappacogli, Istituto di Scienze dell'Atmosfera e del Clima del CNR and member IAS
- Guido Pirovano, Ricerca sul Sistema Energetico (RSE SpA) and member IAS
- Chiara Giorio, University of Cambridge (UK) and member IAS