EDITORIAL

AIRQ HARMO20 Special Issue—PREFACE

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The series of International Conferences on Harmonisation within Atmospheric Dispersion Modelling for Regulatory Purposes (HARMO Conferences) is a main activity of the International Initiative on this topic, started in 1991.[1]

Originally born as a European initiative for regulatory purposes, the Harmo Initiative and its conference series have developed in an open intercontinental forum. The final goal is the improvement of dispersion models for regulatory purposes and for real-time applications, addressing latest scientific findings and meeting specific demands of society and regulators. 'Harmonisation' is motivated by the goal of employing the best available meteorological and air quality sciences in a consensual way to best serve the needs of the society and citizens.

While dispersion modelling is a tool to assess current and/or future impacts of air pollution sources on the environment and human health, fundamental research is continuously needed for improving the models capability and reliability. Studying dispersion requires multi-facet approaches, namely reliable meteorological forecast at high resolution able to capture the effects of complex terrain, vegetative canopies, built environments with its characteristics. It also requires the derivation and proof of robust parametrizations of the atmospheric boundary layer and exchange processes. It must include a reasonable description of a variety of sources such as those associated to transport, industries, accidental releases, deliberate and natural releases. It requires efficient numerical approaches in order to run fast simulations and to deliver multiple scenarios. In addition, real time data assimilation, the evaluation of model performance and the presentation of results to public and managers are now disciplines of their own.

Obviously, a large variety of models of increasing complexity exist, covering different space and time scales and different areas of applicability. The success of the Harmo Conferences shows their usefulness in allowing scientists to focus on one or several topics, to work together and come up with improved and harmonised solutions. These conferences also help users to select a fit-for-purpose dispersion model producing reliable results and to assess the uncertainties and errors associated with the model results.

The Harmo Conferences are directed towards scientists, model developers, model users, environmental protection agencies, and environmental legislation experts. This series of conferences has a recognized specificity because it focuses on common tools and methodologies in a broad interdisciplinary field. These conferences are a natural forum for discussing air quality modelling in relation to the European Union air quality directives, they also are a good platform for broader international cooperation.

The Harmo Conference participants represent the international scientific community. They maintain the Harmo initiative, form committees and organize conferences on a voluntary basis. In this way each participant is directly involved in the process of bridging knowledge to broad public and governing authorities in order to secure sustainable and higher quality of life in Europe and worldwide.

The 20th International conference on Harmonisation within atmospheric dispersion modelling for regulatory purposes (HARMO20) was organized by the Institute of Physics, University of Tartu. Due to COVID-related restrictions, the conference was held online from 14 to 18 June 2021.

HARMO20 received 160 contributions, covering all main topics in dispersion modelling context:

- *Model evaluation and quality assurance – model validation, model intercomparisons, model uncertainties and model sensitivities.*
- *Environmental impact assessment: Air pollution management and decision support systems.*
- *Use of modelling in support of EU air quality directives, including FAIRMODE activities.*

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[1] Extensive scientific, practical and historical information can be found at the web site of the Harmo Initiative: www.harmo.org

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- *Parametrization of Physical Processes and Mathematical Problems in Meteorology and Air Quality Modelling.*
- *Urban Scale and Street Canyon Modelling: Meteorology, Air Quality and Passive Control Systems.*
- *Use of modelling in health and exposure assessments.*
- *Inverse dispersion modelling and source identification.*
- *Modelling air dispersion and exposure to accidental releases.*
- *Highlights of past work. Session devoted to reviews and to prominent scientists and 'golden papers' of the past, which have still relevance and should not be forgotten.*
- *Special Session—CORONA Virus Covid-19: effects of lockdown on air quality, possible connections with air pollution*

This first edition of Harmo Conferences Special Issue in *Air Quality, Atmosphere and Health* (AIRQ) journal is a collection of selected papers carefully revised and extended from research contributions originally presented at HARMO20 and having gone through the peer-review process according to the journal standards. For reasons linked to the current Publisher configuration of AIRQ Issues, the HARMO20 papers have been published in the following Volumes: Pineda Rojas, A.L., Borge, R. & Kropff, E. Characterisation of errors in an urban scale atmospheric dispersion model through clustering of performance metrics. *Air Qual Atmos Health* (2022). Published online 16 January 2022. https://doi.org/10.1007/s11869-021-01145-0

O'Neill, J., Seaton, M., Johnson, K. et al. Modelling the influence of road elevation on pollutant dispersion. *Air Qual Atmos Health* (2022). Published online 21 April 2022. https://doi.org/10.1007/s11869-022-01198-9

Hanfland, R., Pattantyús-Ábrahám, M., Richter, C. et al. The Lagrangian Atmospheric Radionuclide Transport Model (ARTM) — development, description and sensitivity analysis. *Air Qual Atmos Health* (2022). Published online 11 July 2022. https://doi.org/10.1007/s11869-022-01188-x

Santiago, J.L., Rivas, E., Buccolieri, R. et al. Indoor-outdoor pollutant concentration modelling: a comprehensive urban air quality and exposure assessment. *Air Qual Atmos Health* **15**, 1583–1608 (2022). https://doi.org/10.1007/s11869-022-01204-0

Oettl, D., Ferrero, E., Moshammer, H. et al. Recent developments in odour modelling and assessment in five provinces in Austria. *Air Qual Atmos Health* **15**, 1647–1657 (2022). https://doi.org/10.1007/s11869-022-01207-x

Fragkou, E., Tsegas, G., Karagkounis, A. et al. Quantifying the impact of a smart farming system application on local-scale air quality of smallhold farms in Greece. *Air Qual Atmos Health* **16**, 1–14 (2023). https://doi.org/10.1007/s11869-022-01269-x

Luts, A., Kaasik, M., Hõrrak, U. et al. Links between the concentrations of gaseous pollutants measured in different regions of Estonia. *Air Qual Atmos Health* **16**, 25–36 (2023). https://doi.org/10.1007/s11869-022-01261-5

San Jose, R., Perez-Camanyo, J.L. High-resolution impacts of green areas on air quality in Madrid. *Air Qual Atmos Health* **16,** 37–48 (2023). https://doi.org/10.1007/s11869-022-01263-3

Ferrero, E., Alessandrini, S., Meech, S. et al. Comparison of two turbulence parameterisations for the simulation of the concentration variance dispersion. *Air Qual Atmos Health* **16**, 49–60 (2023). https://doi.org/10.1007/s11869-022-01268-y

Marongiu, A., Angelino, E., Malvestiti, G. et al. Emission estimates and air quality simulation on Lombardy during lockdown. *Air Qual Atmos Health* **16**, 61–75 (2023). https://doi.org/10.1007/s11869-022-01265-1

The HARMO Conference series will continue its long tradition in future, ready to take on board new scientific challenges, with a focus on harmonisation to better support policy makers.

On behalf of the HARMO Initiative Steering Committee, the Guest Editors.

Silvia Trini Castelli, Philippe Thunis, Marko Kaasik.