Environmental Science: Atmospheres

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Best Papers from 2021 published in the *Environmental Science* journals of the Royal Society of Chemistry

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As we (PN, ND, KM, PV) acknowledge the best papers published by the *Environmental Science* family of journals in 2021, we are struck by our good fortune in being able to pursue scientific research and share the best of it with the world. Scientific research focuses on uncovering the truth, but with the inherent limitations of imperfect measurements made by imperfect human researchers. This uncertainty brings a sense of humility to our scientific endeavors, which is enhanced when our research is focused on important topics such as the environment, human health, and the provision of new tools for policy makers. This is a privilege and one that we at *Environmental Science: Atmospheres* (ESA), *Environmental Science: Nano* (ESN), *Environmental Science: Processes & Impacts* (ESPI), and *Environmental Science: Water Research & Technology* (ESWRT) are helping (albeit slowly) democratize through optional double-anonymised submission, fair and transparent reviews, responsive Editorial Boards, and the publication of research from across the spectrum of focus areas and researcher demographics.

In 2021 we published 39, 283, 153, and 186 papers in ESA, ESN, ESPI and ESWRT respectively that covered areas ranging from the effect of aerosols on climate, to nanoplastics, to indoor air pollutants and their sources. We are excited that next year, publications from our newest Open Access companion journal *Environmental Science: Advances* (https://www.rsc.org/journals-books-databases/about-journals/environmental-science-advances/) will be included in the *Environmental Science* best papers round up.

During the first months of 2022, we enlisted our Advisory Boards, Editorial Boards, and Associate Editors to choose the very best papers published in our journals in 2021. Their selection provides examples of the compelling research published in the *Environmental Science* family of journals and of the research that we are privileged to bring to you each month. From this list, we, the Editors-in-Chief of ESA, ESN, ESPI and ESWRT, selected the overall Best Paper from our portfolio of papers published in 2021.

We are so excited to highlight this top paper, one that highlights the power of a diverse group of researchers, coming from wastewater utilities, consulting firms, and academic and government laboratories, and their pursuit of "the truth" with respect to understanding methodological limitations to facilitate the protection of human health. We are also thrilled to spotlight all the best papers from the *Environmental Science* family of journals.[1–12] These papers collectively highlight our privilege to advance science, its application, and its diversity.

Overall Best Paper

Pecson, Darby, Haas, Amha, Bartolo, Danielson, Dearborn, Di Giovanni, Ferguson, Fevig, Gaddis, Gray, Lukasik, Mull, Olivas, Olivieri, Qu and SARS-CoV-2 Interlaboratory Consortium, **Reproducibility and sensitivity of 36 methods to quantify the SARS-CoV-2 genetic signal in raw wastewater: findings from an interlaboratory methods evaluation in the U.S.**, *Environ. Sci.: Water Res. Technol.*, 2021, **7**, 504–520, https://doi.org/10.1039/D0EW00946F

In this Open Access paper, Pecson and colleagues performed a detailed assessment of the methods used to test for SARS-CoV-2, the virus responsible for the global COVID-19 pandemic, genetic material in wastewater. This research determined the variability between methods used at 32 different laboratories across the United States, including commercial, academic, government, and wastewater utility laboratories. The research was carefully

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performed, and rather than seeking to identify and try to institute a single method for all of the laboratories to utilize, the research instead used split samples to determine how well different methods were able to identify trends in SARS-CoV-2 data over time and determine the prevalence of infection within a given community. The research included the quality control and assurance required to help government officials and public health experts understand how "good" this kind of data was across the country and whether it could be relied upon for identifying, for example, when new surges of infection were beginning in a given community. Perhaps the most useful aspect of the paper is the Discussion, where the limitations of this highly impactful study were identified. Importantly, it was noted that there is not a need for a single complex method to generate useful SARS-CoV-2 data, thus opening the door to larger quantities of data to be obtained and used by governments in understanding the spread of new variants. Nevertheless, the variety of methods used were not able to provide accurate absolute quantification of viral particles, instead pointing to the need to monitor trends at a particular location using a given method, as opposed to trying to quantify numbers of cases and comparing numbers across locations. Finally, the authors provide suggestions for improving data quality moving forward and for future work regarding the selection of the best methods for enhanced sensitivity or use in resource-constrained communities, particularly as this type of wastewater surveillance expands. This paper is impactful and paves the way for future efforts linking rigorous methodological research to the protection of human health.

Journal Best Papers

In addition to our overall Best Paper, we are so proud to introduce you to the overall selection of Best Papers and Best Reviews from ESA, ESN, ESPI and ESWRT.

Environmental Science: Atmospheres

Best Paper: Siegel, Karlsson, Zieger, Baccarini, Schmale, Lawler, Salter, Leck, Ekman, Riipinen and Mohr, **Insights into the molecular composition of semi-volatile aerosols in the summertime central Arctic Ocean using FIGAERO-CIMS**, *Environ. Sci.: Atmos.*, 2021, **1**, 161–175, https://doi.org/10.1039/D0EA00023J

Runner-up Best Paper: Hu, Wang, Wu, Zhou, Feng, Fu, Yang, Ziegler and Zeng, **Aerosol presence reduces the diurnal temperature range: an interval when the COVID-19 pandemic reduced aerosols revealing the effect on climate**, *Environ. Sci.: Atmos.*, 2021, **1**, 208–213, https://doi.org/10.1039/D1EA00021G

Best Review: Lewis, **Optimising air quality co-benefits in a hydrogen economy: a case for hydrogen-specific standards for NO_x emissions**, *Environ. Sci.: Atmos.*, 2021, **1**, 201–207, https://doi.org/10.1039/D1EA00037C

Environmental Science: Nano

Best Paper: Blancho, Davranche, Fumagalli, Ceccone and Gigault, **A reliable procedure to obtain environmentally relevant nanoplastic proxies**, *Environ. Sci.: Nano*, 2021, **8**, 3211–3219, https://doi.org/10.1039/D1EN00395J

Runner-up Best Paper: Henke, Laudadio, Hedlund Orbeck, Tamijani, Hoang, Mason, Murphy, Feng and Hamers, **Reciprocal redox interactions of lithium cobalt oxide nanoparticles with nicotinamide adenine dinucleotide (NADH) and glutathione (GSH): toward a mechanistic understanding of nanoparticle-biological interactions**, *Environ. Sci.: Nano*, 2021, **8**, 1749–1760, https://doi.org/10.1039/D0EN01221A

Best Review: Choudhary, Vellingiri, Thayyil and Philip, **Removal of antibiotics from aqueous solutions by electrocatalytic degradation**, *Environ. Sci.: Nano*, 2021, **8**, 1133–1176, https://doi.org/10.1039/D0EN01276A

Environmental Science: Processes & Impacts

Best Paper: Heeley-Hill, Grange, Ward, Lewis, Owen, Jordan, Hodgson and Adamson, **Frequency of use of household products containing VOCs and indoor atmospheric concentrations in homes**, *Environ. Sci.: Processes Impacts*, 2021, **23**, 699–713, https://doi.org/10.1039/D0EM00504E

Runner-up Best Paper: Boedicker, Emerson, McMeeking, Patel, Vance and Farmer, **Fates and spatial variations of accumulation mode particles in a multi-zone indoor environment during the HOMEChem campaign**, *Environ. Sci.: Processes Impacts*, 2021, **23**, 1029–1039, https://doi.org/10.1039/D1EM00087J

Best Review: Joudan, De Silva and Young, **Insufficient evidence for the existence of natural trifluoroacetic acid**, *Environ. Sci.: Processes Impacts*, 2021, **23**, 1641–1649, https://doi.org/10.1039/D1EM00306B

Environmental Science: Water Research & Technology

Best Paper: Pecson, Darby, Haas, Amha, Bartolo, Danielson, Dearborn, Di Giovanni, Ferguson, Fevig, Gaddis, Gray, Lukasik, Mull, Olivas, Olivieri, Qu and SARS-CoV-2 Interlaboratory Consortium, **Reproducibility and sensitivity of 36 methods to quantify the SARS-CoV-2 genetic signal in raw wastewater: findings from an interlaboratory methods evaluation in the U.S.**, *Environ. Sci.: Water Res. Technol.*, 2021, **7**, 504–520, https://doi.org/10.1039/D0EW00946F

Runner-up Best Paper: Liu, Moustafa, Hassouna and He, **Enhancing the performance of a microbial electrochemical system with carbon-based dynamic membrane as both anode electrode and filtration media**, *Environ. Sci.: Water Res. Technol.*, 2021, **7**, 870–878, https://doi.org/10.1039/D0EW01027H

Best Review: Barbhuiya, Misra and Singh, **Synthesis, fabrication, and mechanism of action of electrically conductive membranes: a review**, *Environ. Sci.: Water Res. Technol.*, 2021, **7**, 671–705, https://doi.org/10.1039/D0EW01070G

We congratulate the authors of each of these papers for their excellent work and take this opportunity to thank them for submitting their work to the *Environmental Science* family of journals. We

extend our thanks to all of our authors for sharing the fruits of their hard labor through our journals as well as to our reviewers whose selfless work underpins every article we publish. We also thank our Advisory Board and Editorial Board members, as well as our Associate Editors, for their efforts in identifying and evaluating the top papers. We will continue to strive to publish the very best environmental science papers and look forward to your submissions.

Paige Novak, Editor-in-Chief
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Peter Vikesland, Editor-in-Chief
Environmental Science: Nano
Kris McNeill, Editor-in-Chief
Environmental Science: Processes & Impacts

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