

## Dr Sam Harrison

Contact Address:	UK Centre for Ecology & Hydrology, Lancaster, LA1 4AP
Profession / Specialisation:	Computational Sciences
Job Title:	Environmental Modeller
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### Professional and Educational Qualifications

PhD (Quantum Nanotechnology)	Department of Physics, Lancaster University	2016
MPhys (Physics)	Department of Physics, Lancaster University	2012

### Summary of Professional Expertise

Dr Harrison is an environmental modeller with a background in quantum physics, specialising in the development of models for the fate, exposure and biouptake of chemicals in the natural environment, with broader interests in the use of integrated modelling and data science to better quantify the impacts of environmental change. He is an Early Career Fellow on NERC's Constructing a Digital Environment Expert Network, and Fellow of the Software Sustainability Institute. His work frequently involves assessing the relevance of models to regulator and stakeholders, giving him good insights into model regulatory needs and other end-user requirements. He is skilled in the creation of graphical user interfaces and data visualisations, and has worked part-time as a freelance application developer for a number of years.

### Employment History

2017 - Present Environmental Modeller at UK Centre for Ecology & Hydrology, Lancaster

### Selected Research Projects and Funding

2023 - 2024	Emissions of intentionally added microplastics. Evaluating and costing the environmental and economic impacts of different risk mitigation options to prevent pollution from intentionally added microplastics. <i>Defra</i> .
2023 - 2024	EMIFACT-MNP: EMission FACTors of Micro and NanoPlastics. <i>PI</i> of international consortium (Europe and US) to develop a model of plastic releases to the environment. <i>European Chemical Industry Council (Cefic)</i> .
2022 - 2026	LTLS-FE: Long Term Large Scale – Freshwater Ecosystems. <i>NERC</i> Freshwater Quality project predicting the impacts of climate scenarios on a broad variety of priority chemicals in UK freshwaters.
2022 - 2024	DEPICTION: DEveloPing an International CollaboraTion to advance community-based, Open and FAIR eNvironmental modelling. Developing software tools for integrated modelling, including case study integrated model of source-to-sea microplastic fate. <i>PI</i> of international consortium. <i>NERC Global Partnerships Seedcorn Fund</i> .
2022 - 2026	ETERNAL: Boosting thE reducTion of the EnviRonmeNtal impact of phArmaceutical products throughout their entire life cycle. <i>Institutional PI and WP lead</i> , coordinator AIMPLAS, Spain. Environmental exposure, fate and risk assessment of pharmaceuticals in the environment to aid the production of green pharmaceuticals. <i>European Commission Horizon Europe</i> .
2021 - 2023	FRAGMENT-MNP: Developing a mechanistic model of Micro and NanoPlastic FRAGmentation in the ENvironment. <i>PI</i> of international consortium to develop a model of plastic fragmentation and provide parameterisation and validation via targeted laboratory and field studies of chemical, mechanical and biological stressors contributing to fragmentation. <i>Cefic</i> .

2021 - 2023	UTOPIA: Development of a mUltimedia uniT world OPen-source model for mIcroplAstic. <i>Institutional PI</i> , coordinator Stockholm University. <i>Cefic</i> .
2020 - 2024	SABYNA: Simple, robust and cost-effective approaches to guide industry in the development of safer nanomaterials and nano-enabled products. Development of a Guidance Platform to support safe-by-design nanomaterial development. <i>European Commission Horizon 2020 (H2020)</i> .
2020 - 2024	ASINA: Anticipating Safety Issues at the Design Stage of NAno Product Development. Technical guidance on safe-by-design nanomaterial design, production and use. Leading environmental exposure modelling work. <i>H2020</i> .
2019 - 2023	NanoSolveIT: Innovative Nanoinformatics models and tools: towards a Solid, verified and Integrated Approach to Predictive (eco)Toxicology. Integration of chained models into a cloud-based nanosafety decision support tool. <i>H2020</i> .
2018 - 2023	UKSCaPE SPEED. Development of a model for long-term spatiotemporal prediction of metal concentrations in topsoils for the UK. Production of historic, current and future metal pollution risk and impact maps. Future projections based on projected change in emissions/additions due to climate, land use and socioeconomic factors. <i>NERC</i> .
2018	Scoping Chemical Exposure Models. Review of stakeholder needs in environmental chemical exposure modelling, developing recommendations for model development to meet user needs. <i>Defra</i> .
2017 - 2019	NanoFASE: Nanomaterial FAte and Speciation in the Environment. Development of a spatiotemporal model for prediction of engineered nanomaterial fate in soils, surface waters and sediments (lead programmer). Application of the model to scenarios of nanomaterial release and prediction of fate and biouptake in the environment. <i>H2020</i> .

## Memberships

- Society of Environmental Toxicology and Chemistry (SETAC)
- Society of Research Software Engineering

## Selected Research Outputs

- M. MacLeod ... **S. Harrison** et al. *Computational models to confront the complex pollution footprint of plastic in the environment*. *Nature Computational Science* 3 486 (2023). DOI: 10.1038/s43588-023-00445-y.
- S. Harrison**. *Predicting the fate of plastic in the environment*. *Nature Water* 1 490 (2023). DOI: 10.1038/s44221-023-00097-2.
- F. Gottschalk ... **S. Harrison** et al. *Predicting accidental release of engineered nanomaterials to the environment*. *Nature Nanotechnology* 18 412 (2023). DOI: 10.1038/s41565-022-01290-2.
- S. Harrison** et al. *NanoFASE model* (2021; version 0.0.4) [Computer software]. <https://github.com/nerc-ceh/nanofase.git>
- N. Cheimarios, **S. Harrison** et al. *NanoSolveIT integration of tools for assessment of human and environmental exposure to nanomaterials*. Book chapter in "Handbook of Functionalized Nanomaterials" (2021). DOI: 10.1016/B978-0-12-822415-1.00001-9
- C. Svendsen ... **S. Harrison** et al. *Key principles and operational practices for improved nanotechnology environmental exposure assessment*. *Nature Nanotechnology* 15 731 (2020). DOI: 10.1038/s41565-020-0742-1
- M. Baccaro, **S. Harrison** et al. *Bioturbation of Ag<sub>2</sub>S-NPs in soil columns by earthworms*. *Environmental Pollution* 252 155 (2019). DOI: 10.1016/j.envpol.2019.05.106
- R. Williams, **S. Harrison** et al. *Models for assessing engineered nanomaterial fate and behaviour in the aquatic environment*. *Current Opinion in Environmental Sustainability* 36 105 (2019). DOI: 10.1016/j.cosust.2018.11.002.
- S. Harrison**, M. Hayne. *Photoelectrolysis Using Type-II Semiconductor Heterojunctions*. *Scientific Reports* 7 11638 (2017). DOI: 10.1038/s41598-017-11971-x