



Contribution ID: 480

Type: **Poster Presentation**

## Groundwater contamination in the north-east of the UK: Exploring and projecting pollution trends using the Environment Agency data archives

*Monday, 30 May 2022 15:10 (1h 10m)*

In England and Wales, groundwater provides around a third of public water sources (British Geological Survey, 1998). However, the intense industrialised past of the country has caused significant pollution in some of its important aquifers. The northeast area of England, where groundwater contribution is estimated to be 20% to public supply per region (British Geological Survey, 2019), stands out as one of the most industrialised areas in England. Indeed, the area hosts a multitude of eventual pollution sources such as metallurgical industries, closed coal mines and agricultural fields.

Since the 1974 Water Act, a particular focus has been put on groundwater quality degradation and the risk of pollution (Downing, 1993). In this context, a water quality archive published by the Environmental Agency of the UK presents a regular record of a wide range of parameters from physicochemical parameters to organic and inorganic pollutants, monitored in millions of sampling points in groundwater and rivers, ponds, or sewage discharges. It is, therefore, a rich source of data to characterise and describe the evolution of different kinds of pollutants across England. However, just a few studies have investigated specific pollution risks based on this dataset and almost all of them are limited to surface water.

To fill this gap, we characterize the present state of pollution in this study and evaluate future quality trends in the groundwater of the northeast of England (Northumbria and Yorkshire). Analysing the two-decade-long open-access part of this dataset can shed light on major pollutants affecting the region's aquifers. Furthermore, hotspots and critical areas will be identified in a tentative way to understand the origins and extent of the contamination deploying spatial statistics.

In order to go beyond traditional analytics consisting of just the description and diagnosis, deep learning algorithms fed with more than 2500 samples per parameter are deployed for predictive analysis. This will in turn allow the generation of new insights concerning the evolution and the fate of pollutants in the areas of interest.

To conclude, this work, on the one hand, updates the state of groundwaters within the northeast of England; on the other hand, it demonstrates the use of machine learning in groundwater management, particularly groundwater quality monitoring.

### Acceptance of the Terms & Conditions

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### MDPI Energies Student Poster Award

Yes, I would like to submit this presentation into the student poster award.

### Country

United Kingdom

## References

Downing, R. A. (1993). Groundwater resources, their development and management in the UK: a historical perspective. *Quarterly Journal of Engineering Geology and Hydrogeology*, 26(4), 335–358. <https://doi.org/10.1144/GSL.QJEGH.1993.026.004.0>

Groundwater Resources in the UK - British Geological Survey. (2019). Retrieved from <https://www.bgs.ac.uk/geology-projects/groundwater-research/groundwater-resources-in-the-uk/>

The UK Groundwater Forum, What is groundwater? - British Geological Survey (1998) [Pdf]. Available at: [http://www.groundwateruk.org/downloads/what\\_is\\_groundwater.pdf](http://www.groundwateruk.org/downloads/what_is_groundwater.pdf)

## Time Block Preference

Time Block A (09:00-12:00 CET)

## Participation

Unsure

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**Session Classification:** Poster

**Track Classification:** (MS15) Machine Learning and Big Data in Porous Media