# PFAS, can AI solve the forever problem?

Silvia Lacorte, Spanish National Research Council

Per- and polyfluoroalkyl substances (PFAS) are persistent and bioaccumulative pollutants posing serious risks to ecosystems and human health. PFAS possess an amphiphilic structure, exceptionally strong carbon–fluorine bonds, high resistance to metabolic and thermal degradation, and are chemically inert [1]. Nowadays, PFAS have become ubiquitous across all environmental compartments - including water, soil, sediment, air, wildlife and humans – [2] and their distribution, partitioning, fate, and degradability remain poorly understood and challenging to determine [3]. Regulations are being implemented to control their production, use, discharges and maximum concentrations in several environmental matrices, but the main problem persist more than 10,000 distinct compounds threat ecosystems and biota.
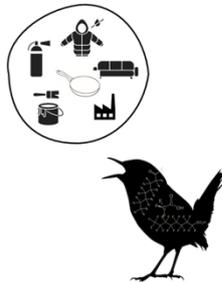
Research is speeding to minimize this overall pollution. What are the main research challenges?

- New and faster analytical methods including real time measurement, sensors and machine learning methods to identify PFAS pollution patterns.
- Effective and meaningful monitoring programs to determine PFAS in the global environment and the interactions among compartments
- Technological development, design of biocatalysts and material science to capture and eliminate PFAS from water and from point-source pollution sites.
- Define mode of action and toxicological endpoints, evaluate the chronic and low-level exposure, the effects of mixtures, the bioaccumulation potential and effects on wildlife and humans.

Artificial Intelligence (AI) works by learning patterns from existing data and using those patterns to make predictions or decisions, instead of following only hand-written rules. AI models, designs, screens, represents, predicts, optimizes, etc. data and experimental workflows but does not "solve" PFAS contamination. This presentation has the objective to describe the "PFAS problem" by providing environmental and toxicological data and by presenting new technological advances to minimize global PFAS pollution.

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