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## Recent trends on the Bayesian approach for simultaneous recognition of contaminant sources in groundwater resources

Jürgen Mahlknecht<sup>1</sup>, Juan Antonio Torres-Martinez<sup>1</sup>, and Abrahan Mora<sup>2</sup>

<sup>1</sup>Escuela de Ingeniería y Ciencias, Tecnológico de Monterrey, Campus Monterrey, Eugenio Garza Sada 2501, Monterrey 64149, Nuevo Leon, Mexico

<sup>2</sup>Escuela de Ingeniería y Ciencias, Tecnológico de Monterrey, Campus Puebla, Atlixcayotl 5718, Puebla de Zaragoza 72453, Puebla, Mexico

Understanding diffusive pollution plays a key role in providing an appropriate management plan for protecting water resources. Controlling the diffusive contamination in water is hindered by a wide range of source-mixing processes. Accurate source apportionment is required for controlling harmful pollutants in water. Environmental tracers can be used for the source apportionment of pollutants. They inevitably exhibit diverse uncertainties stemming from measurement errors, spatiotemporal variability of sources, biochemical transformation, and dynamic mixing. To reflect the uncertainties involved in source apportionment, a statistical approach, the Bayesian mixing model has been actively adopted. Our contribution presents different recent cases regarding the application of the Bayesian mixing approach to track pollution sources and transformations in agricultural, urban and coastal aquifer environments using multiple isotope approaches (nitrate, sulfate and boron isotopes). The results demonstrate that current Bayesian mixing model studies are mostly limited to understanding the spatiotemporal diversity of water contamination, which is similar to previous deterministic calculations. Considering the nature of these models, which is capable of printing estimation uncertainty, the course of future research should focus on improving the precision of the current designs of source apportionment analysis.