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Forecasting residual herbicide concentrations in soil

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High concentrations of herbicides remaining in soil at the time of planting can adversely impact agricultural production and lead to off-site impacts in streams and groundwater. Being able to forecast the likelihood of residual concentrations at specific times in the future offers the potential to improve environmental and economic outcomes. Here we develop a solution for the full transient probability density function for herbicide concentrations in soil as a function of rainfall variability. Quasi-analytical solutions that account for rainfall seasonality are also demonstrated. In addition, new rapid and relatively cost-effective bioassays to quantify herbicide concentrations in near real-time, offers opportunities for data assimilation approaches to improve forecast risks.