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A rainfall based pesticide risk assessment approach

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Current approaches to pesticide risk assessment focus on leaching prediction and are often complex, highly parameterised process based models, with difficult to quantify uncertainty bounds. At the other end of the scale simple leaching indices neglect some of the necessary complexity such as preferential flow and climate variability. Despite the complexity of processes and heterogeneity observed in field soils the empirical evidence suggests that it is the timing and nature of rainfall with respect to pesticide application that is one of the primary controls on pesticide transport. Given this evidence, we develop simple models of fast flow processes (such as surface runoff and preferential flow) and residual surface pesticide and seek the statistical properties of the time to the first fast flow event. In this way we incorporate climate variability, a variety of rapid transport processes as well as chemical properties in a parsimonious manner. The analysis allows us to identify not only the potential risk of particular chemicals but the likely relative significance of the various flow processes responsible for its rapid transport. In addition we can identify temporal variations in risk based upon an analysis of the climate variability.