

Scenario selection for Germany based on SDLM with GeoPELMO DE (S2P01)

Protect groundwater from plant protection products. Spatially districuted leaching modelling to identify agricultural areas with high risk for leaching (Project-No. FKZ 3716 67 409 0)

Wolfram König, Stephan Marahrens, Anne Osterwald, Judith Klein, Michael Klein, Kai Thomas, Stephan Hannappel

Objective and method

The work was conducted to identify agricultural areas in Germany with high risk for pesticide leaching by using the method of spatially distributed leaching modelling (SDLM).

A new versions of GeoPELMO DE was developed and two modelling approaches were tested, the FOCUS leaching approach based on matrix flow (FOCUS L) and an extended approach including runoff, macropore flow and drainage (FOCUS L+R+M+D).

Finding (see presentation S2013)

Nationwide predicted leachate concentrations are often more conservative than the currently used national approach based on the FOCUS groundwater scenario Hamburg. This finding is consequently observed across the two tested modelling approaches.

Scenario selection

As a consequence, alternative scenarios were selected from two model versions of GeoPELMO DE (FOCUS L and FOCUS L+R+M+D). They were tested on 11 active substances and 34 metabolites with different properties (Fig. 1) to analyse whether they represent a targeted $80 \pm 5^{\text{th}}$ spatial percentiles of nationwide climate-soil conditions.

As an example, the predicted environmental concentrations from the two scenarios Hohwacht (Fig. 2) and Burgwald-B. (Fig. 3) are compared as percentiles with the nationwide concentrations from GeoPELMO DE, version FOCUS L+R+M+D.

In general, some scenarios represent a rather narrow percentile range around the 80th spatial percentile, while others represent a very broad range of percentiles. The results are more heterogeneous for metabolites in general, and when additional processes such as runoff, macropore flow and drainage were included in the modelling.

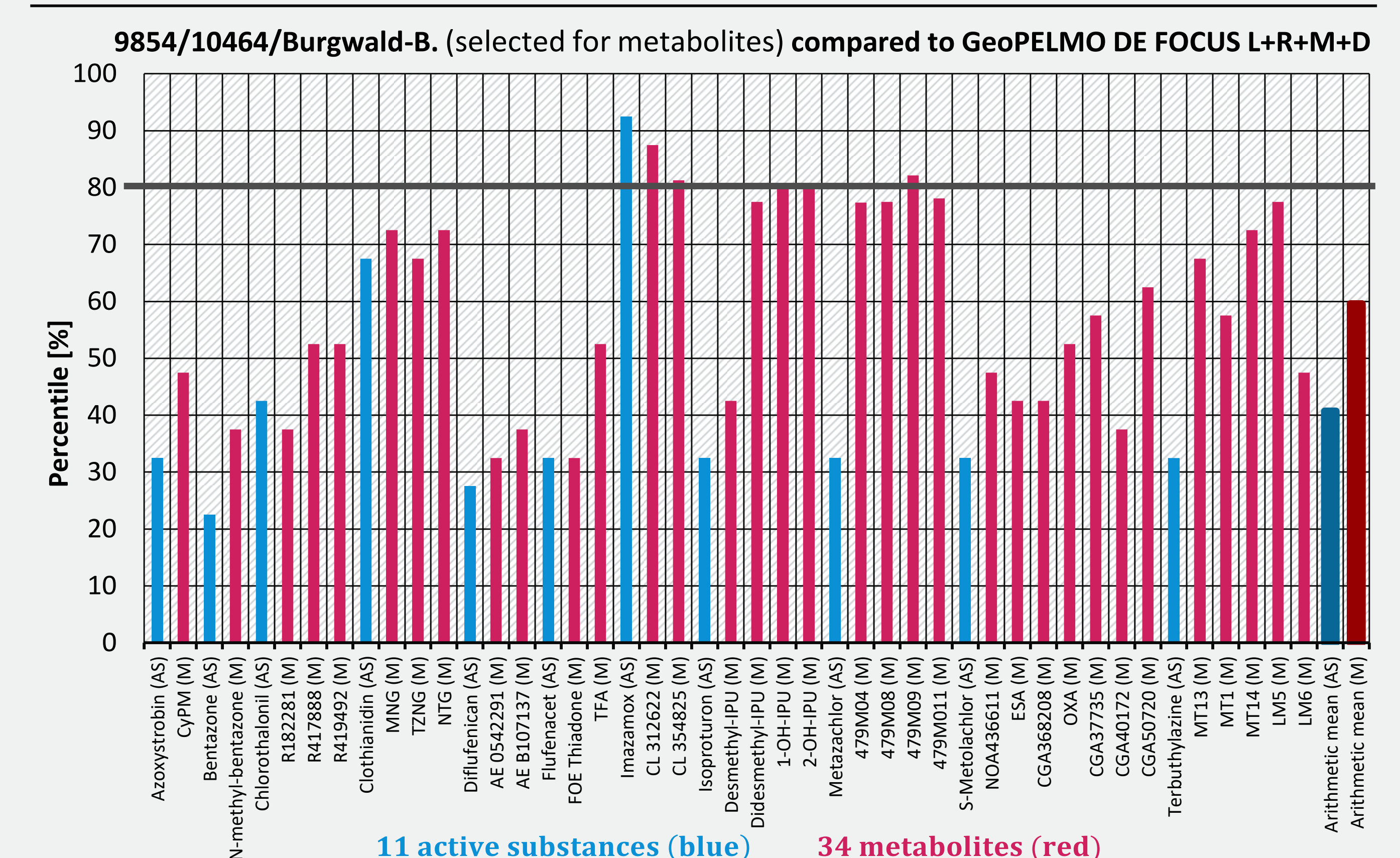
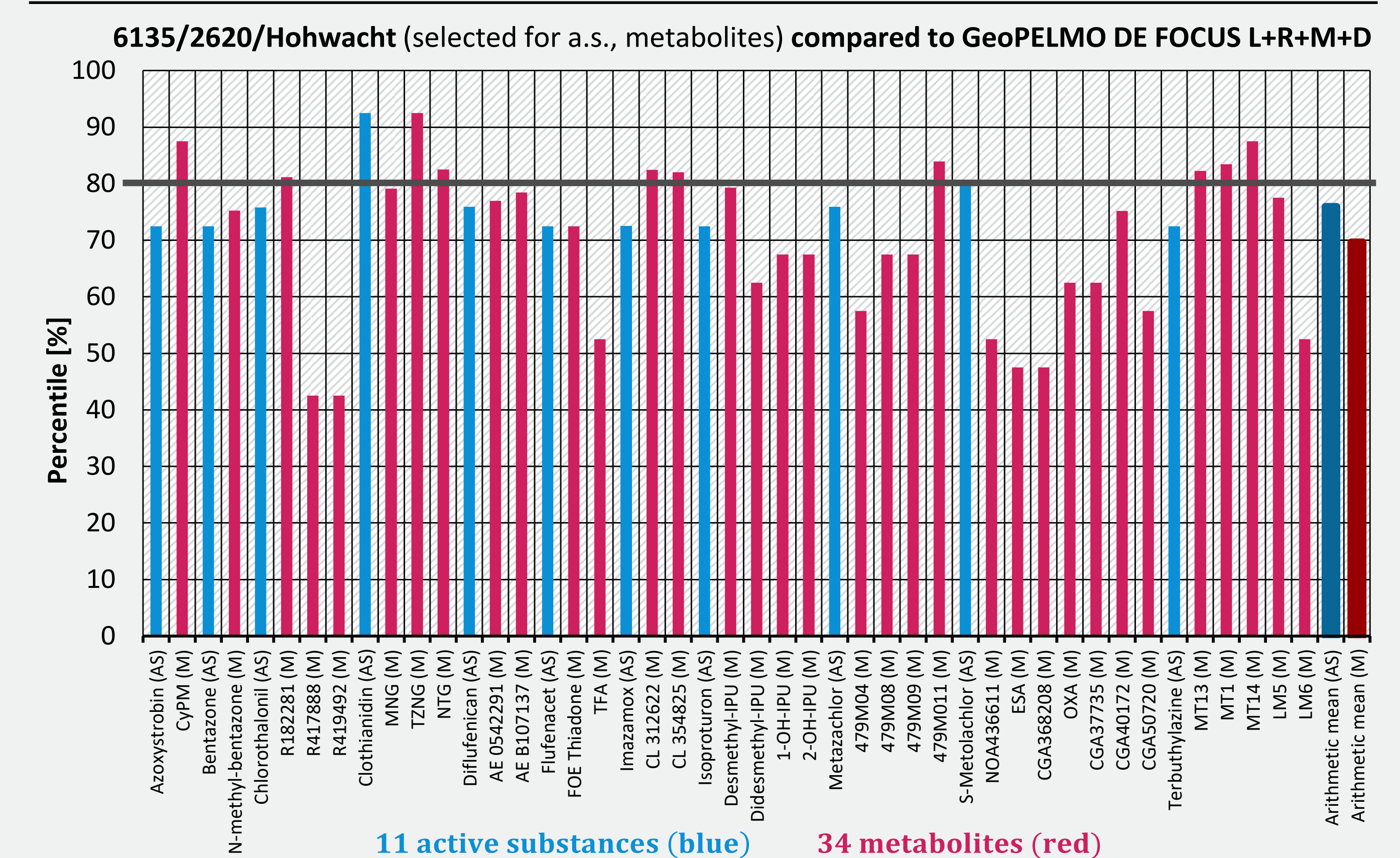
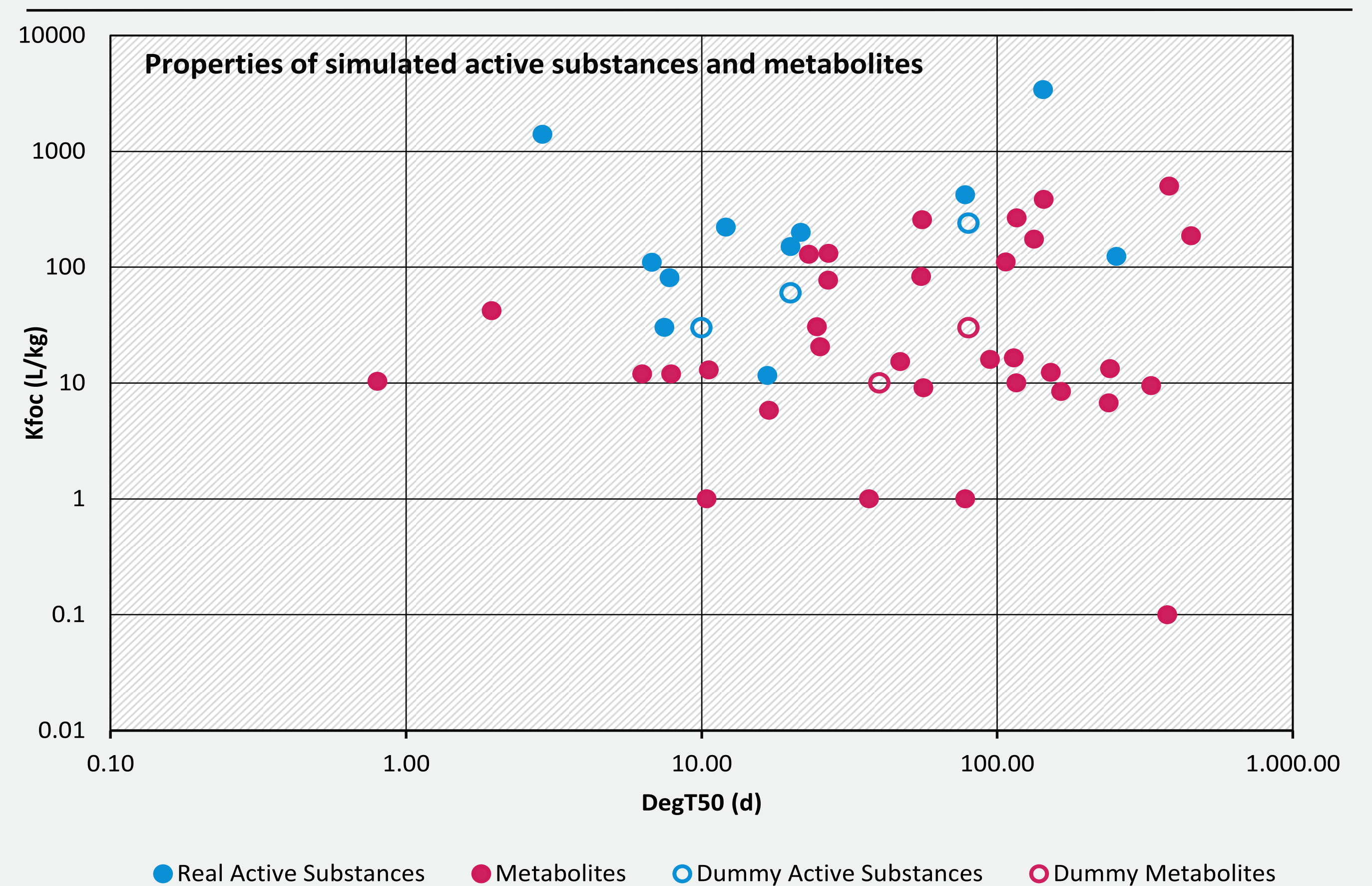
Discussion

The results raise the question whether only spatial models are able to equally predict an accurate temporal and spatial percentile for all active substances and metabolites from numerous pesticide use situations?

Individual climate-soil-combinations can serve as an approximation, although in specific cases it must always be expected that there may be deviations from the results of a geo-version of the model. This also applies to the assessment of various metabolites in one degradation scheme. It remains therefore difficult to recommend the use of individual scenarios for different substance properties, crops or PPP application patterns. Uncertainties factors may be required.

Reference

M. Klein, J. Klein, S. Hannappel, K. Thomas, S. Seifert, M. Trapp:
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Contact:

Umweltbundesamt, Postfach 14 06, 06813 Dessau-Roßlau

Wolfram König, Regulator

wolfram.koenig@uba.de,

<https://www.umweltbundesamt.de>