

Temporal Patterns of Glyphosate Leaching at a Loamy Agricultural Field in Denmark



Trine Norgaard (1), P. Moldrup (2), P. Olsen (1), A. Rosenbom (3), and L.W. de Jonge (1)

(1) Dept. of Agroecology, Aarhus University, Blichers Alle 20, P.O. Box 50, DK-8830 Tjele, Denmark.

(2) Dept. of Civil Engineering, Aalborg University, Sohngaardsholmsvej 57, DK-9000 Aalborg, Denmark.

(3) Geological Survey of Denmark and Greenland, Øster Voldgade 10, DK-1300 Copenhagen K, Denmark.



Introduction

Due to intensified glyphosate use during the last 20 years, glyphosate and its degradation product, AMPA, are found extensively in drainage water in concentrations exceeding the EU threshold limit of $0.1 \mu\text{g L}^{-1}$ (Stone and Wilson, 2006). Due to the sorption properties of glyphosate there is still doubt about how this is possible and which threats this poses to groundwater reservoirs.

Objectives

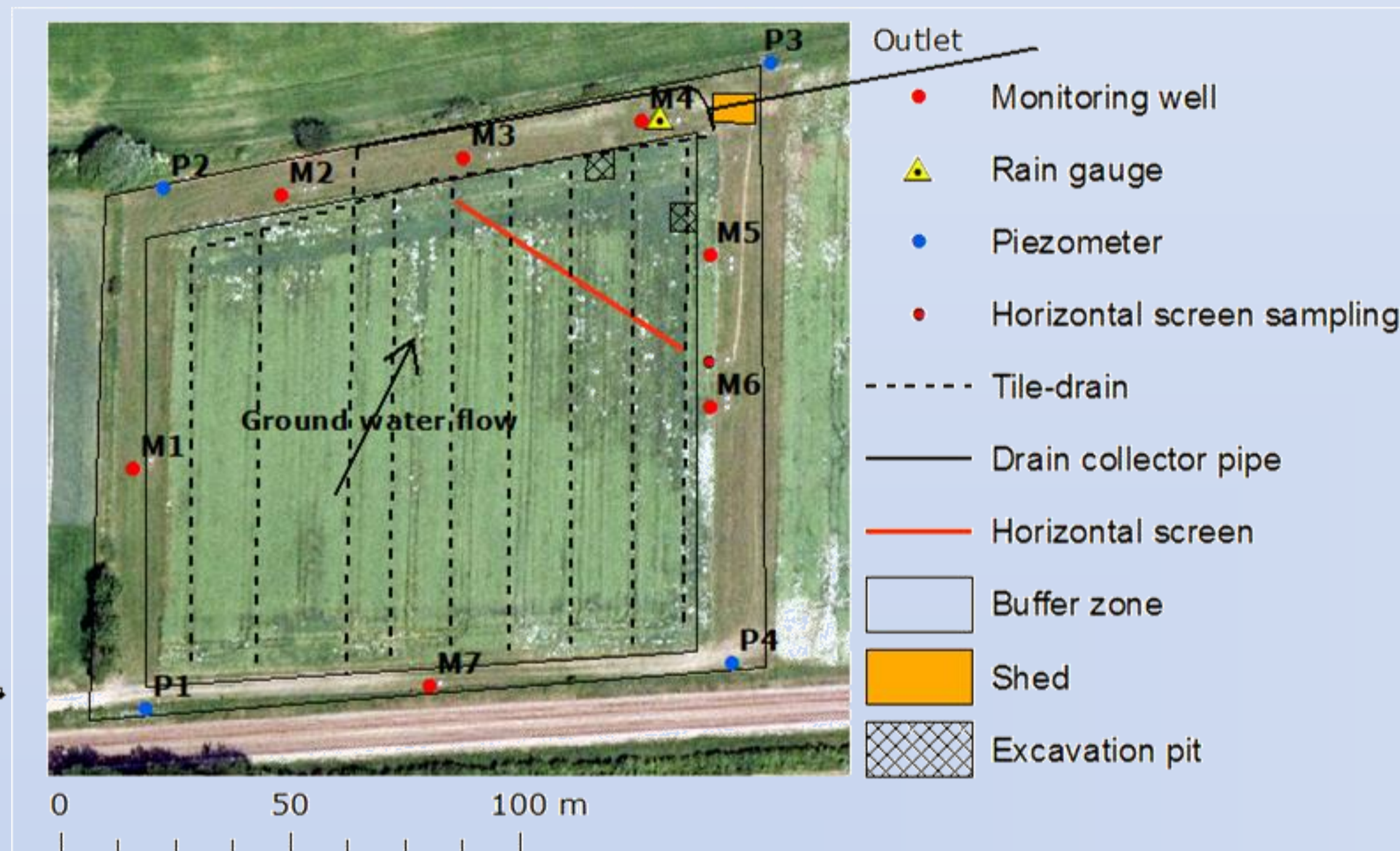
- Presentation of a unique 12-yr data series of glyphosate and AMPA leaching results from a shallow tile-drain system under a loamy soil
- To study the effect of five main drivers: precipitation, drain water runoff, soil water content, management, and particle leaching

The Danish Pesticide Leaching Assessment Programme - PLAP

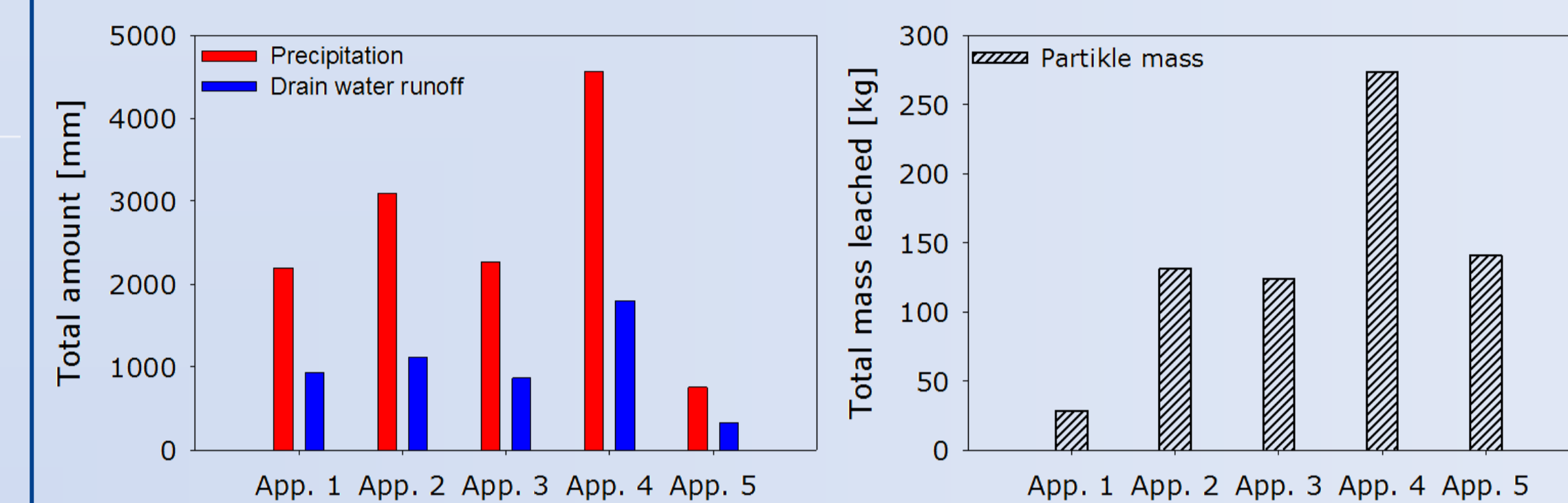
- Conventional farming of agricultural field scale areas
- Continuous pesticide monitoring of drainage and groundwater since October 2000

Estrup

- 5 glyphosate applications over 12 years

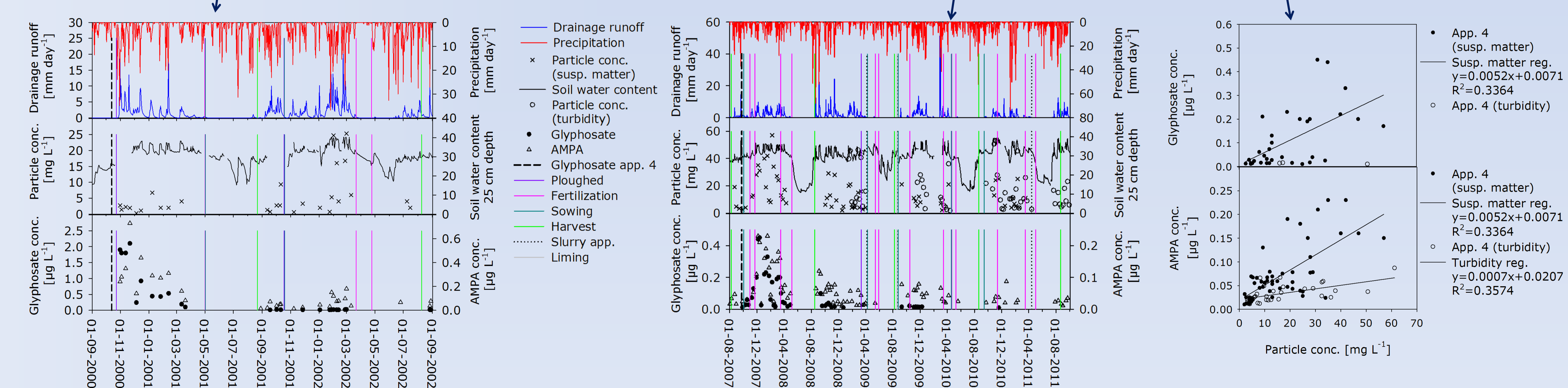
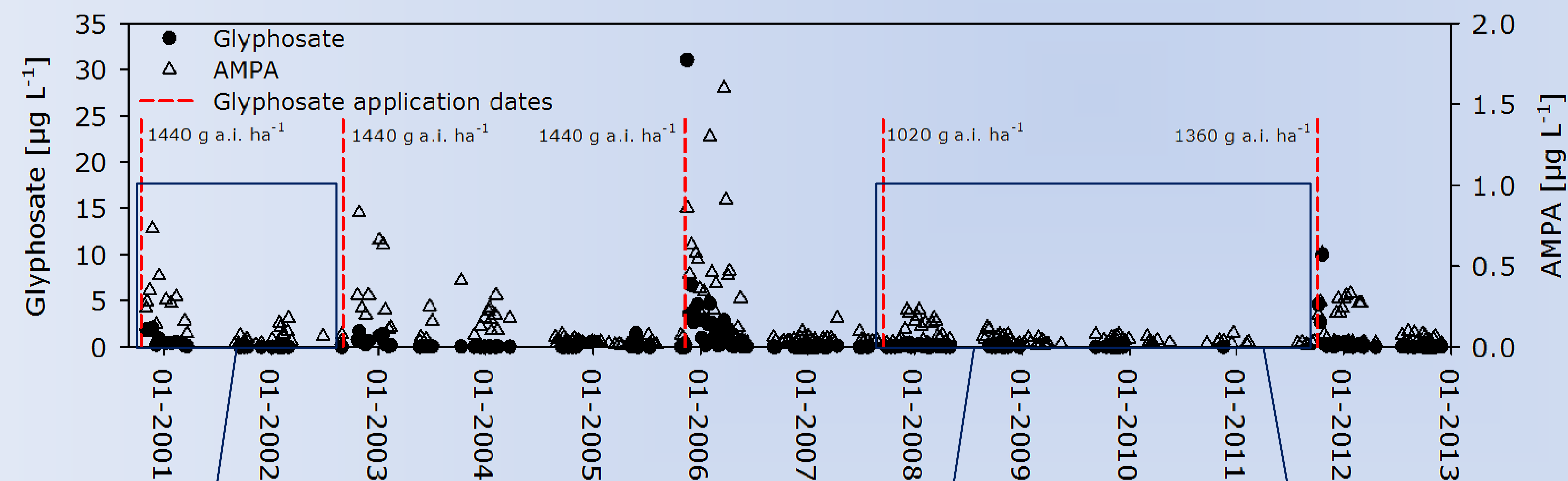


Mass balance results

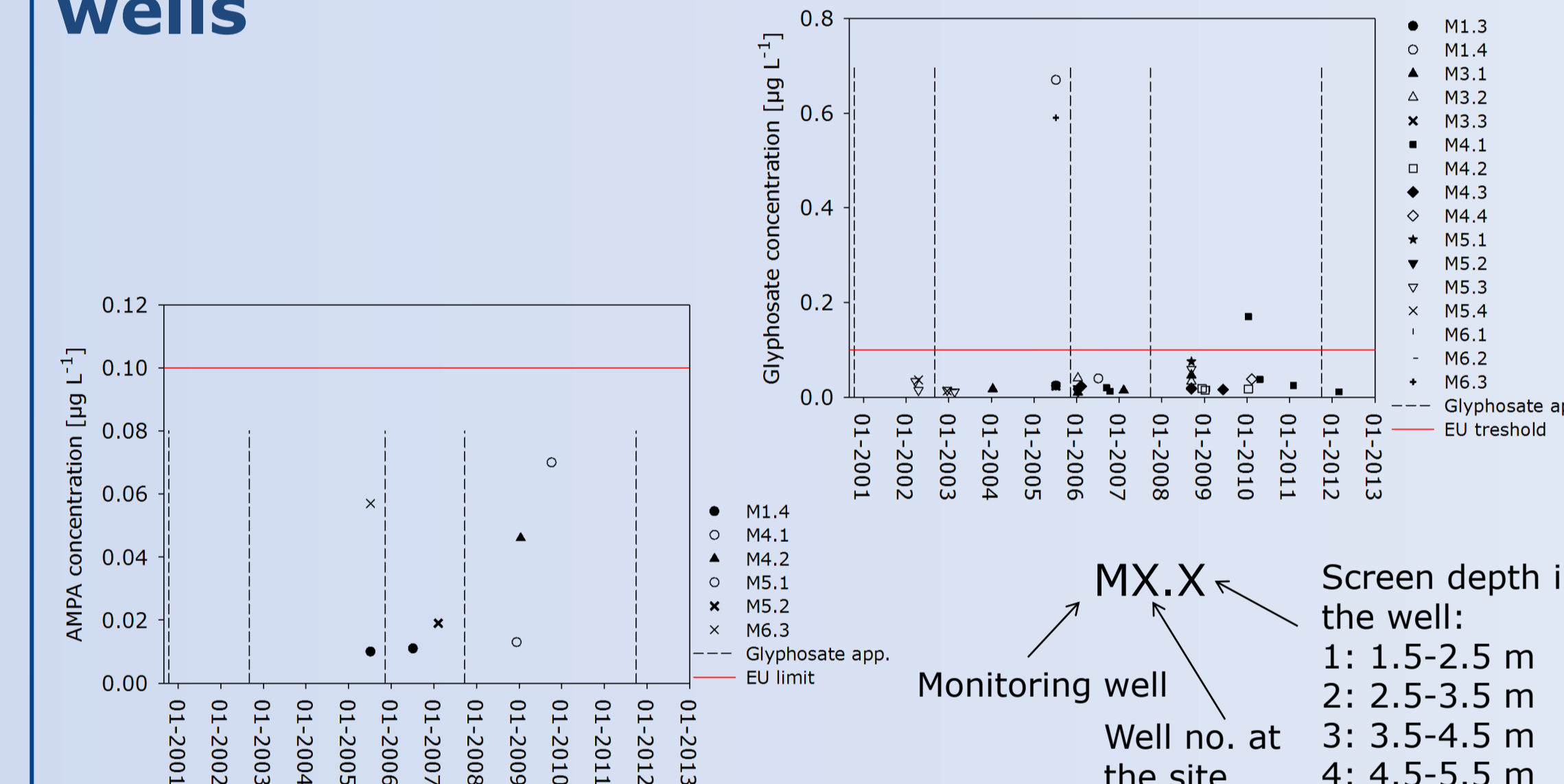


• The total amount of precipitation affects the leached particle mass, but the leached amount of glyphosate is mainly affected by soil-water content at application and storm events right after application.

12 years monitoring results



Detections in groundwater monitoring wells



Conclusions & Perspectives

- Tillage events trigger continuous leaching of glyphosate and especially AMPA.
- Glyphosate and AMPA leaching is highly event driven. Peak concentrations occur at the beginning of each new drainage event. Glyphosate applications on very wet soils prior to high intensity storm events should be avoided, e.g., by avoiding applications in the autumn with large vertical water transport.
- Sampling and analyses on drainage water can be used as an early warning system for groundwater contamination.

Reference

Stone, W.W. & Wilson, J.T. 2006. Preferential Flow Estimates to an Agricultural Tile Drain with Implications for Glyphosate Transport. *J. Environ. Qual.*; 35:1825-1835.

Acknowledgements

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