

## Introduction

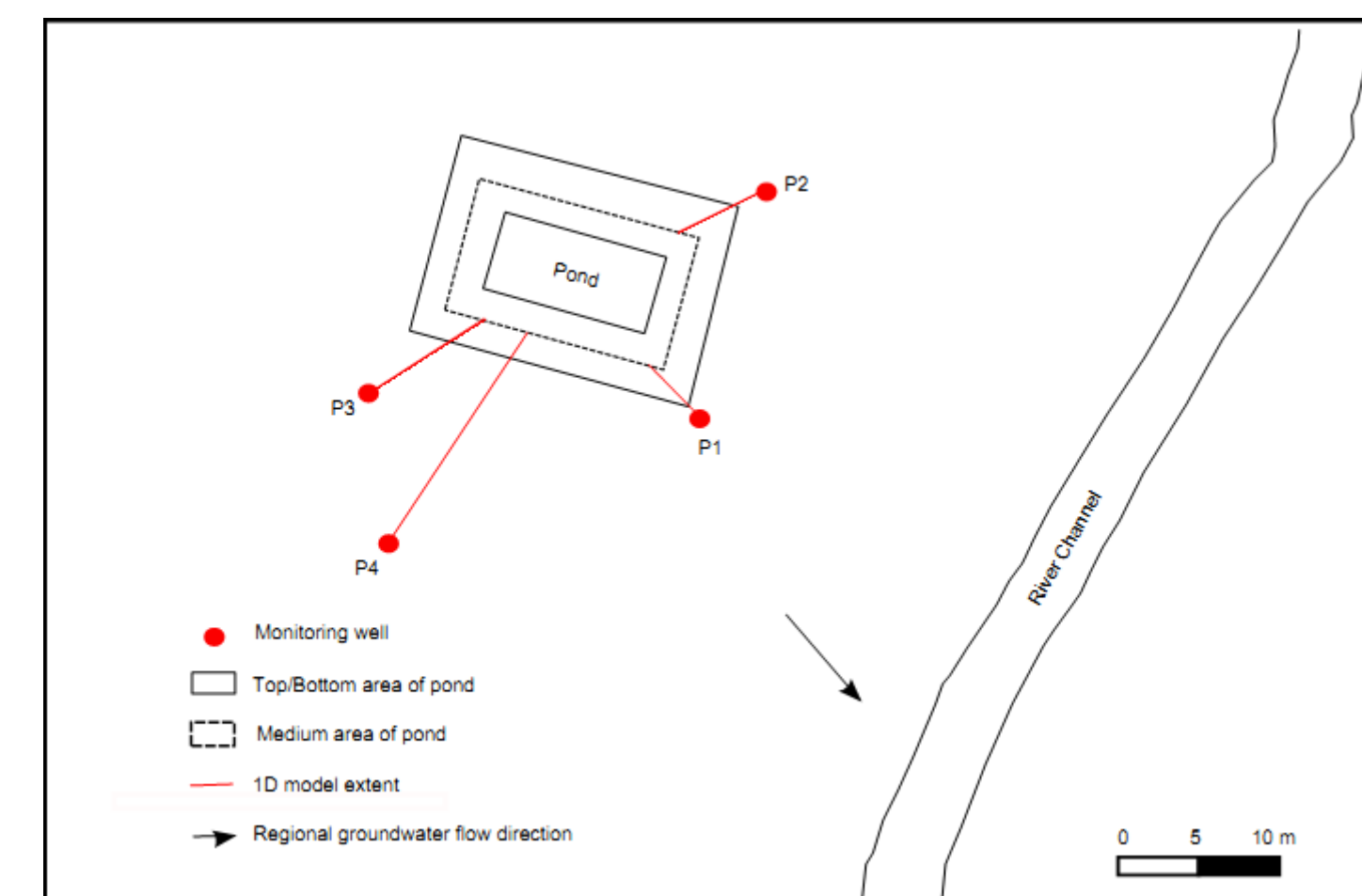
Soil-Aquifer Treatment (SAT) is a technique utilizing the natural filter and removal capacity of the soil and aquifer to improve the quality of surface water or treated waste water for later water supply.

Simple 1<sup>st</sup> order degradation rate constants and linear adsorption coefficients provide useful information to quantify the removal of compounds for a first-step assessment.

## Objective

To investigate the transport behavior of 16 emerging organic contaminants (EOCs) during ponded aquifer recharge by numerical modeling based on field scale experiments at a pilot site in Greece.

## Study Site



- Thickness of aquifer: 30 -120 m
- The unsaturated zone extent: 2 - 2.5 m

## Infiltration Experiments

- Experimental duration: from 28.08.2008 to 28.09.2008.
- Alternating infiltration of tap and wastewater for filling pond.

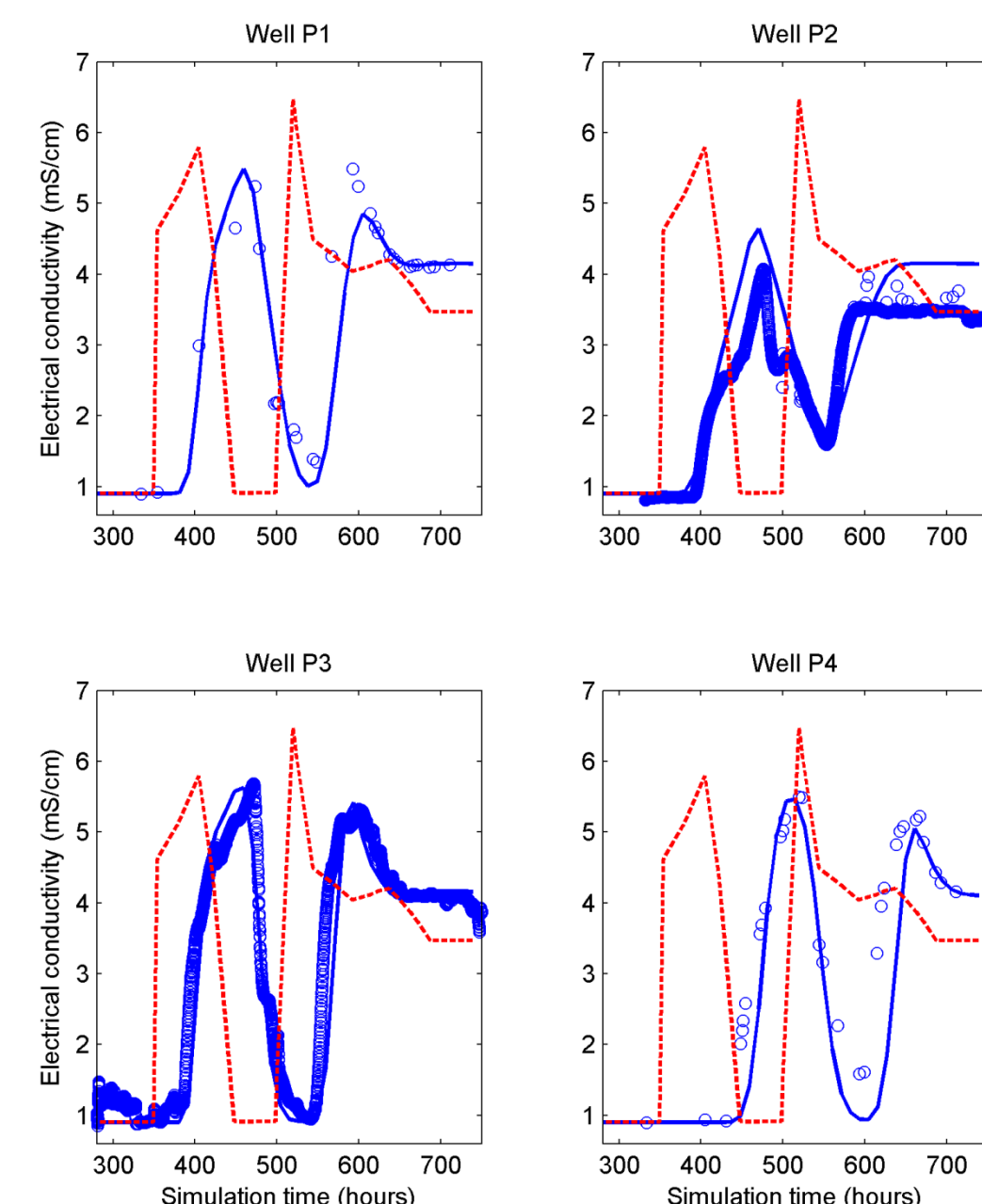
## Field - Site



## Model Setup

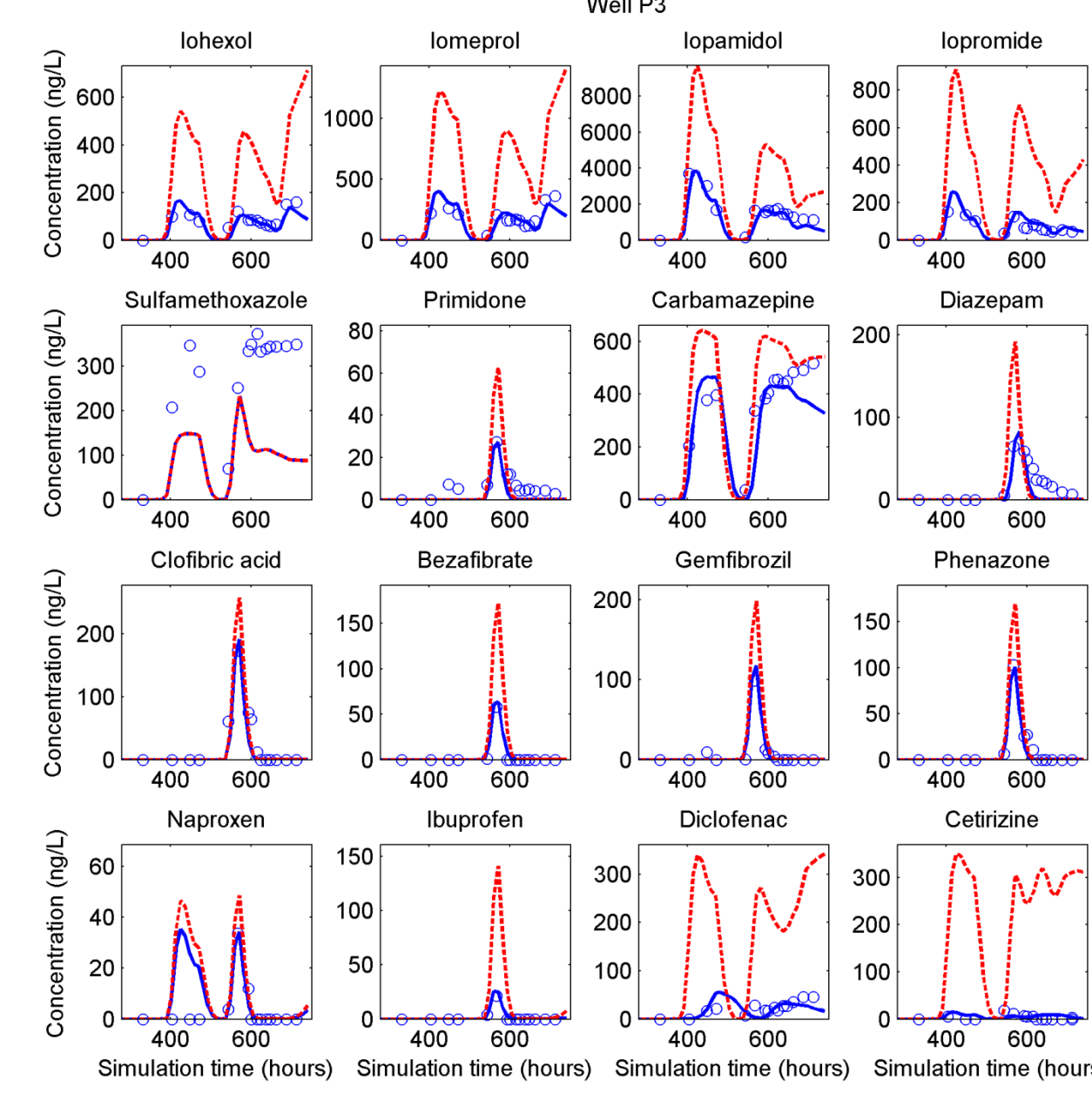
- PMWIN software: MODFLOW /MT3DMS
- Individual 1D models for wells P1, P2, P3 & P4
- Transient flow model
- Non-reactive transport model
- Reactive transport model

## Results



Results of the non-reactive transport model at four selected monitoring wells

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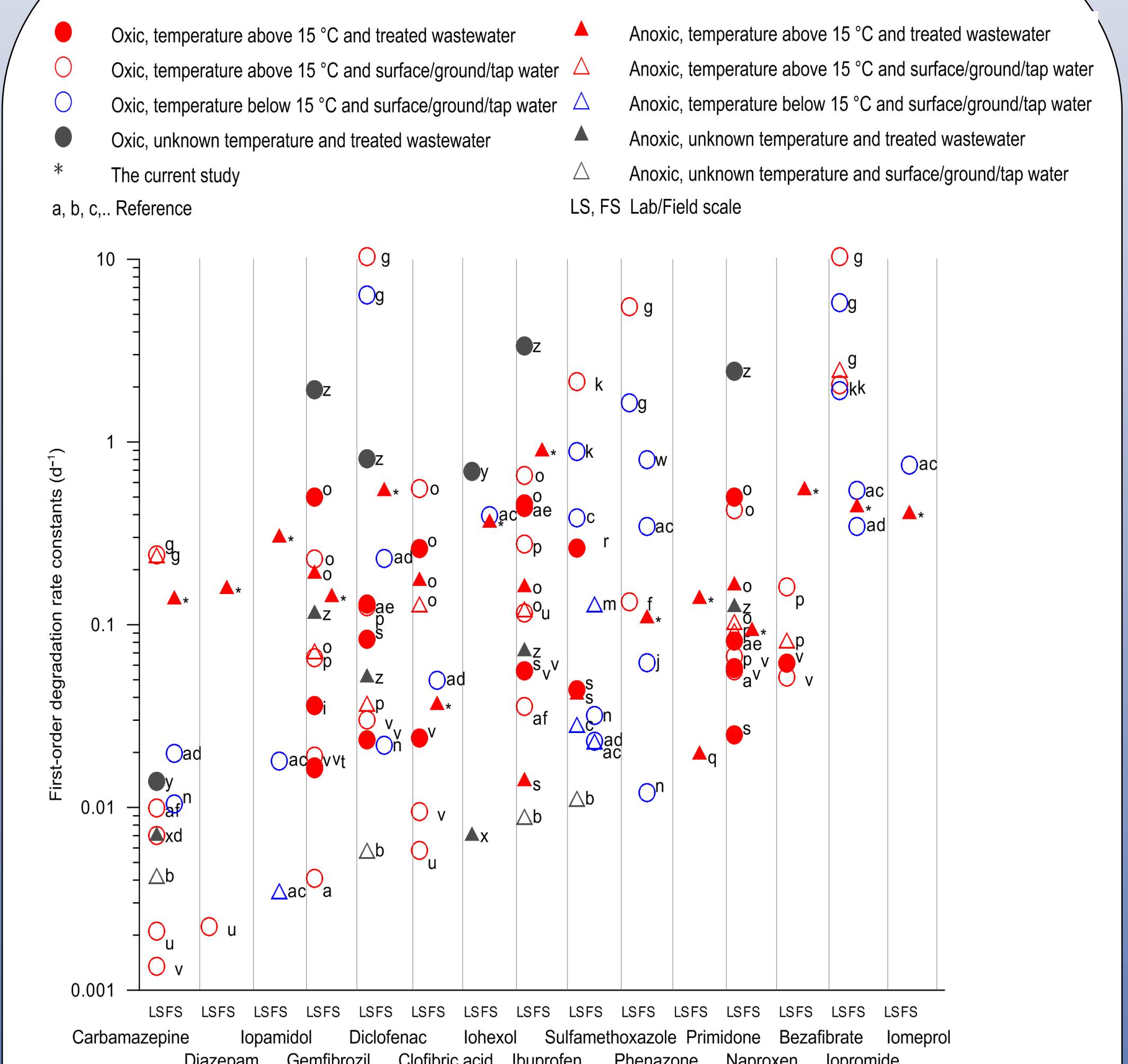


Results of the reactive transport model for sixteen EOCs at the monitoring well P3

## Results

Application	Substance	Retardation R	Degradation	
			$\lambda$ (1/d)	$T_{1/2}$ (day)
Contrast media	Iohexol		0.28 - 0.50	1.4 - 2.5
	Iomeprol		0.35 - 0.46	1.5 - 2
	Iopamidol		0.20 - 0.39	1.8 - 3.5
	Iopromide		0.35 - 0.53	1.3 - 2
	Sulfamethoxazol		0	$\infty$
Anticonvulsants, sedatives	Primidone		0.14 - 0.28	2.5 - 5
Lipid regulators	Carbamazepine	1.04 - 1.16	0.10 - 0.20	3.5 - 7
	Diazepam	1.16 - 1.81	0.20 - 0.23	3 - 3.5
	Clofibric acid		0.00 - 0.10	7 - $\infty$
Anti-inflammatory drugs	Bezafibrate		0.33 - 0.69	1 - 2.1
	Gemfibrozil		0.05 - 0.17	4 - 15
	Phenazone		0.09 - 0.17	4 - $\infty$
Antihistamines	Naproxen		0.12 - 0.14	5 - $\infty$
	Ibuprofen		0.58 - 0.99	0.7 - 1.2
	Diclofenac		0.39 - 0.69	1.0 - 1.8
	Cetirizine		1.38	0.5

Calibration results of reactive transport models



Comparison of first-order decay rate constants from the literature and this study

## Conclusions

- Sorption was mostly insignificant.
- Degradation rate constants show strong variations, but are generally high compared to those of the literature.
- Transferring rate constants from one site to another and/or from one study to another must be carefully.

## Acknowledgments

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