Fate of agrochemicals in the field scale

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Fate of agrochemicals in the field scale:
flowpaths from the field to the stream

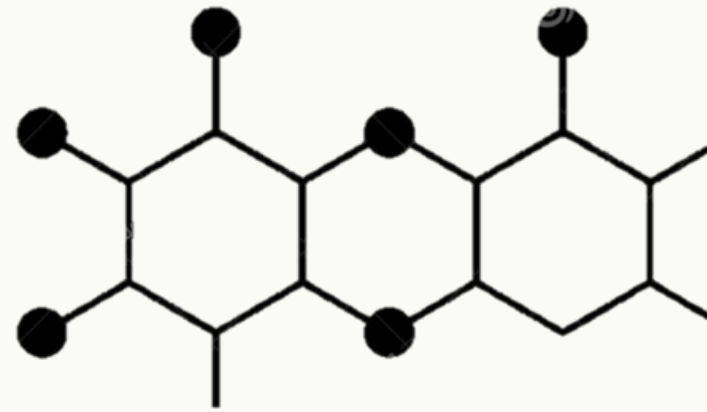Surface runoff

Interflow
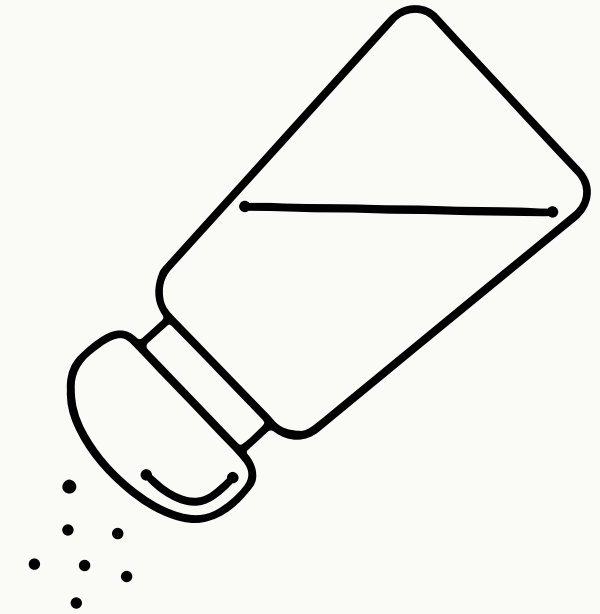(subsurface flow)

Groundwater

Intro

Fate of agrochemicals in the field scale:
the effect of chemistry

Toxicity

Degradability

Solubility-adsorption

Intro

Specific pesticide vs specific flowpaths

Environmental Pollution 250 (2019) 29–39

Contents lists available at ScienceDirect

Environmental Pollution

journal homepage: www.elsevier.com/locate/envpol

Widespread occurrence and spatial distribution of glyphosate, atrazine, and neonicotinoids pesticides in the St. Lawrence and tributary rivers

Juan Manuel Montiel-León [a], Gabriel Munoz [a], Sung Vo Duy [a], Dat Tien Do [a], Marc-Antoine Vaudreuil [a], Ken Goeury [a], François Guillemette [b], Marc Amyot [c], Sébastien Sauvé [a,*]

Science of the Total Environment 852 (2022) 158498

Contents lists available at ScienceDirect

Science of the Total Environment

journal homepage: www.elsevier.com/locate/scitotenv

Atrazine pollution in groundwater and raw bovine milk: Water quality, bioaccumulation and human risk assessment

Noelia Urseler [a,*], Romina Bachetti [a], Fernanda Biolé [a], Verónica Morgante [b], Carolina Morgante [a]

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Science of the Total Environment

journal homepage: www.elsevier.com/locate/scitotenv

Holistic assessment of occurrence and fate of metolachlor within environmental compartments of agricultural watersheds

Claire E. Rose [a,*], Richard H. Coupe [a], Paul D. Capel [b], Richard M.T. Webb [c]

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[b] U.S. Geological Survey, 122 Civil Engineering Building, 500 Pillsbury Drive, SE, Minneapolis, MN 55455, United States
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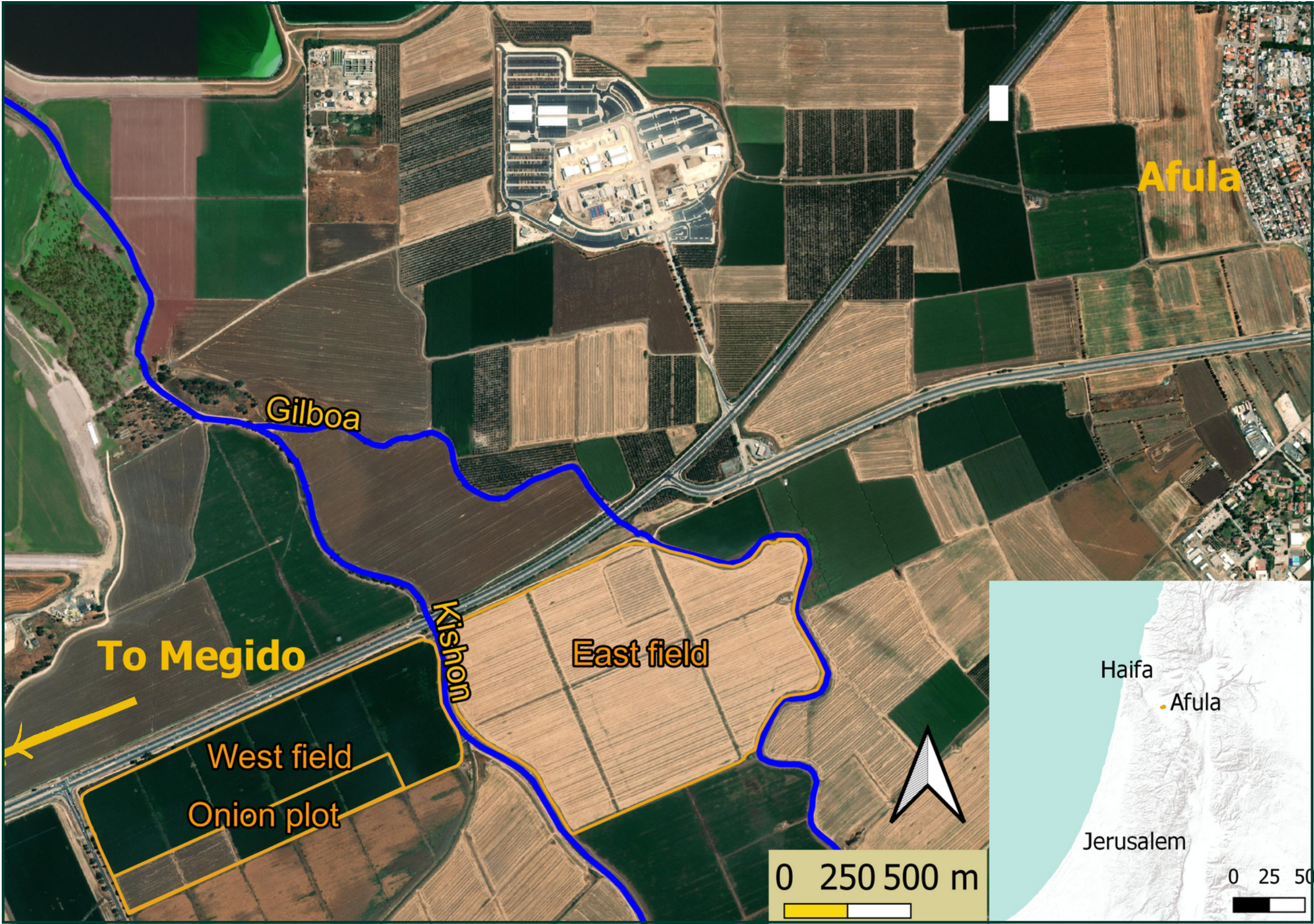
Intro

Research questions and novelty

1. What are the **dominant flowpaths**?
2. How is it affected by **chemical features** of the agropollutants?
3. What is the **time scale of leaching** and the rain effect?

- **large** amount of pesticides
- **3 main flowpaths** simultaneusly
- **Time series**: interflow and groud water
- **Mediterranean climate**- after long and dry summer

Intro

Study area

Methods

Tile drainage system

Manhole

Subsurface drainage pipe outlet

Methods

RCU

Runoff **C**ollector **U**nit

Subsurface drainage pipe and manhole

Methods

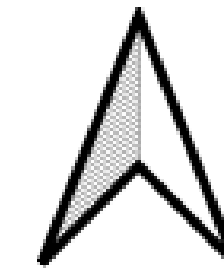# Groundwater

Purging then sampling piezometers

Methods

Field (surface runoff)
Groundwater
Manhole (subsurfacewater)
Pipe (subsurfacewater)
Pri. drinage trench
Sec. drinage trench
Stream
Kishon

0   100 200 m

sampling map
1st & 2nd campaigns

Methods

Analysis

Glass bottles

Cooled

LC-MS analysis, Lab Of Agriculture Faculty Hebrew, Rehovot University

Methods

Flowpath	Methoxyfenozide
Stream	9.18
	24.59
P2 (12Jan22)	60.59
	3.59
Manhole	971.37
	747.32
Subsurface pipe (irr)	0.97
	751.88
	1229.13
Field	5.39
	199.22
	1.35
	N/A
Groundwater	2.38
	3.51
	0.67
	2.77
	1.07
	3.64
Subsurface pipe (rain)	595.06
	511.2
	808.66

Subsurface water was detected in pipes and manholes

Similar order of magnitude is characteristic to subsurface water
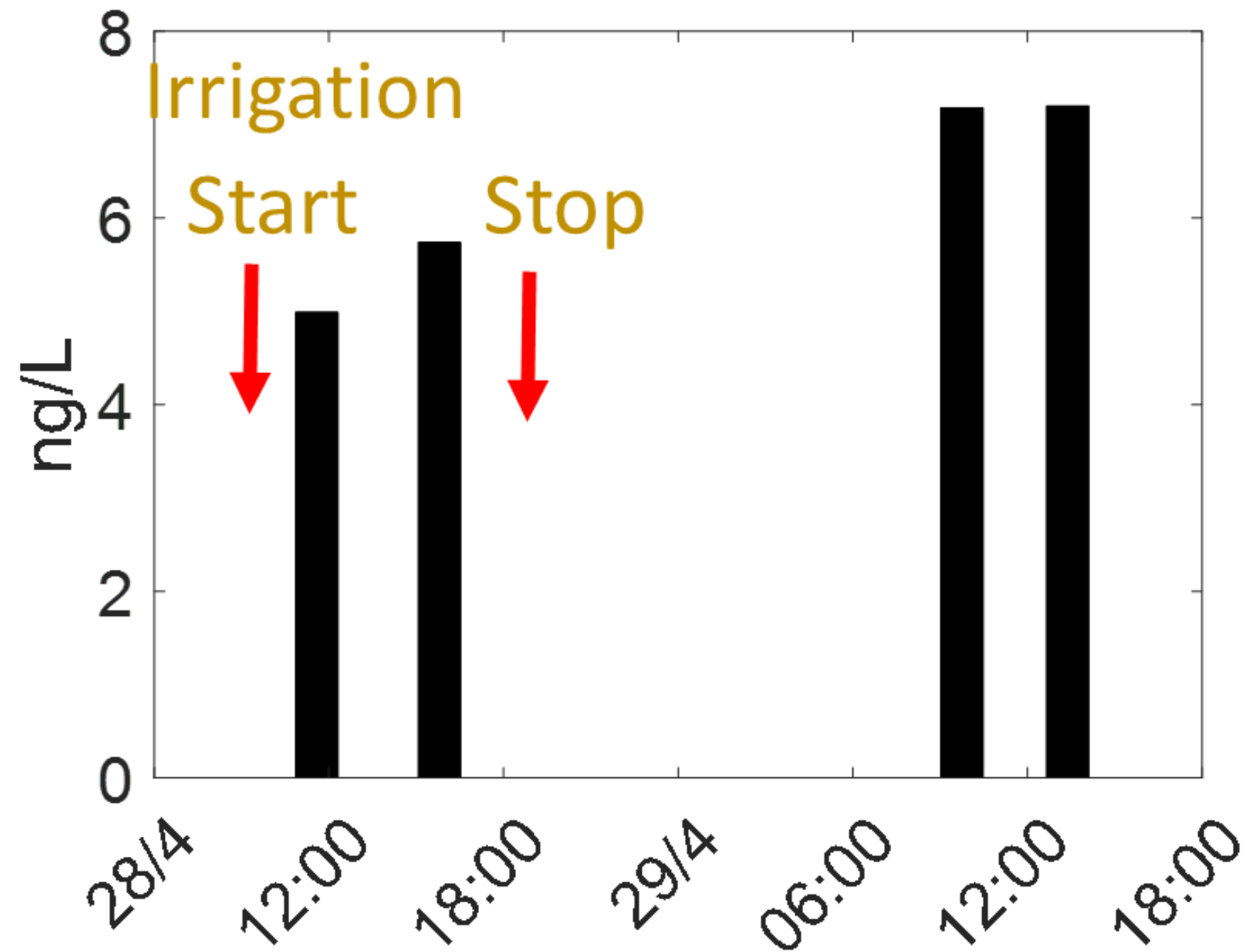
Results

Metalaxyl

log Kow=1.65

Immidiate dilution of metalaxyl concentration in groundwater as a result of rain
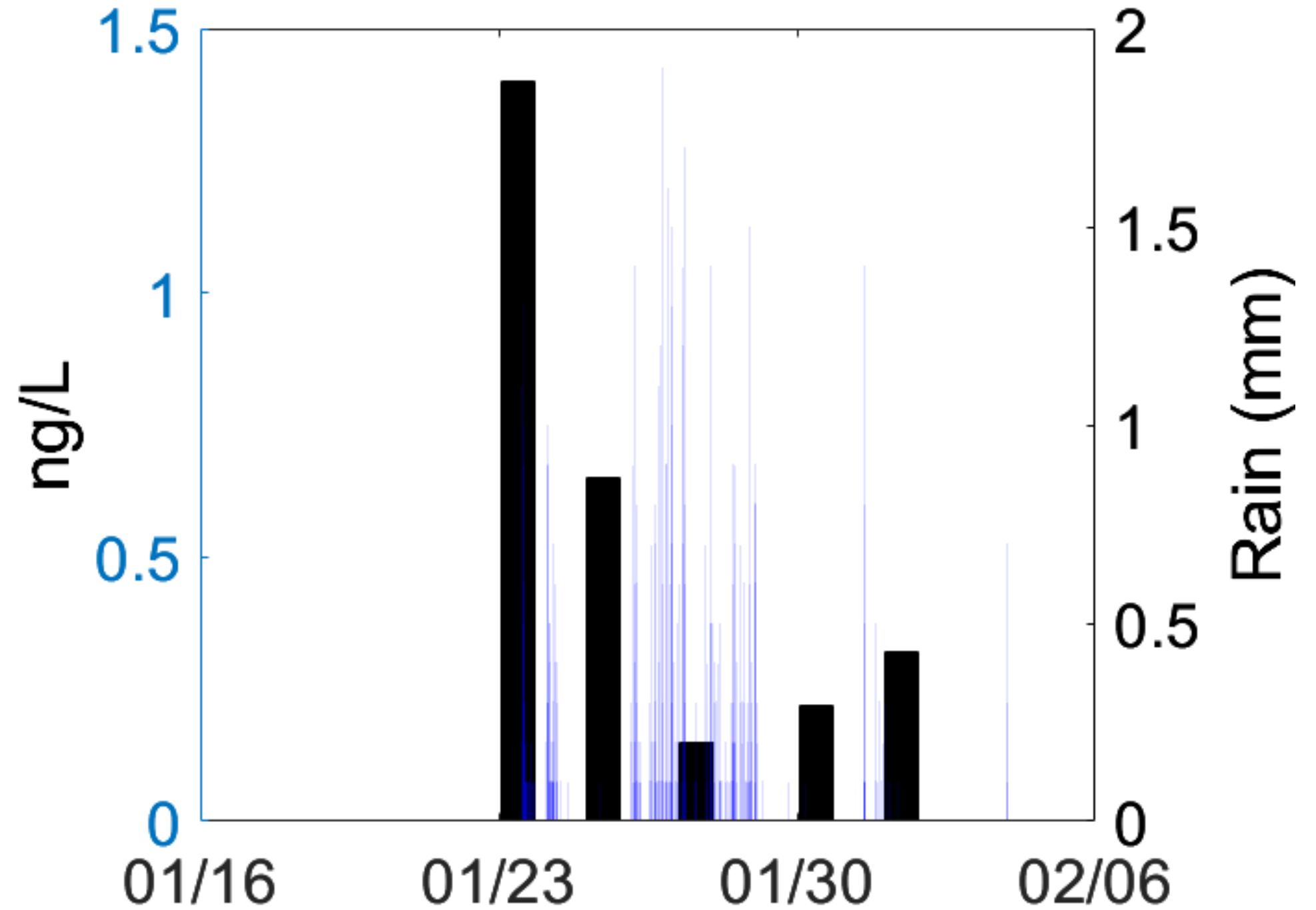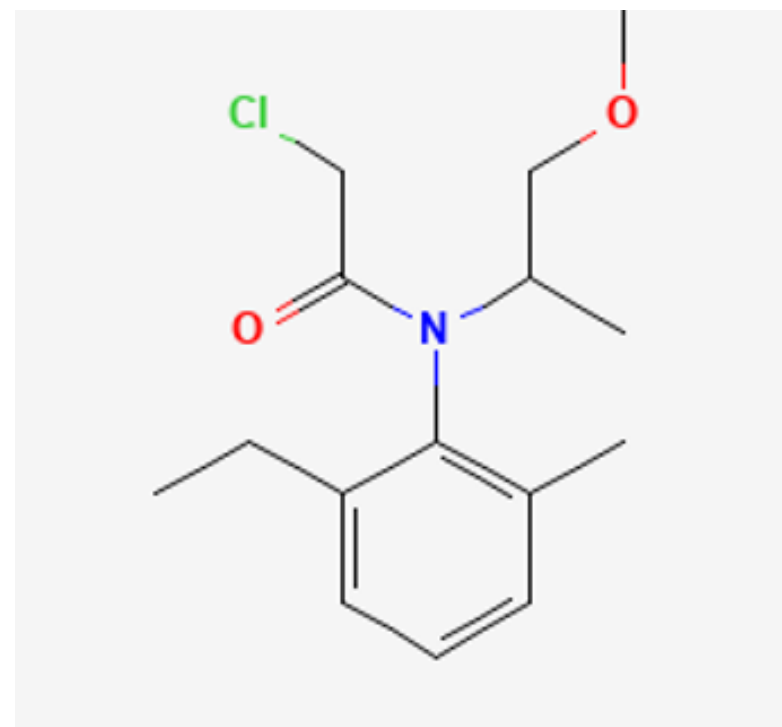
Metalaxyl

log Kow=1.65

Immediate response to water from top soil (irrigation/rain)
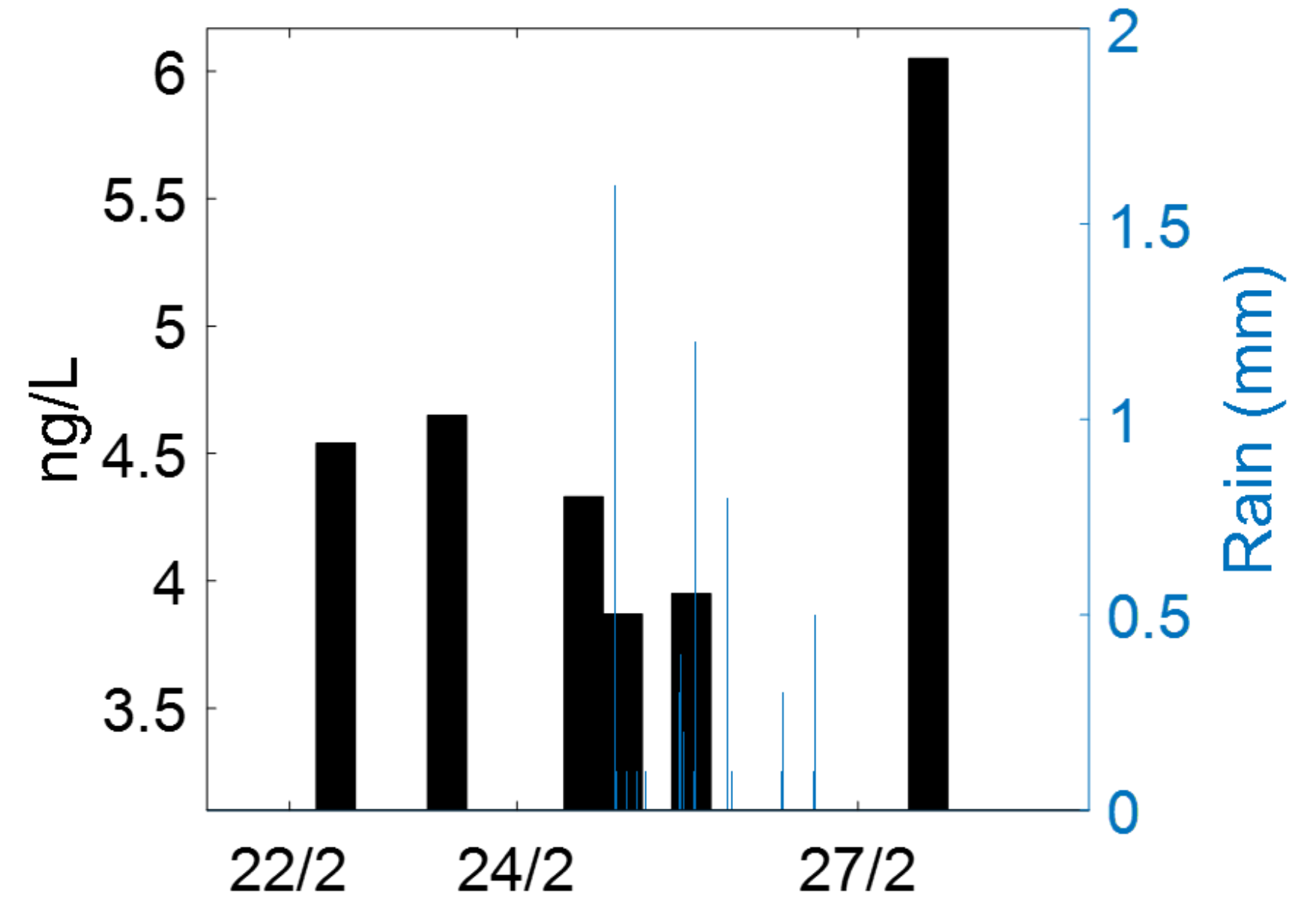
Results and discussion

Metolachlor was applied
in the West field on 11/3/2020
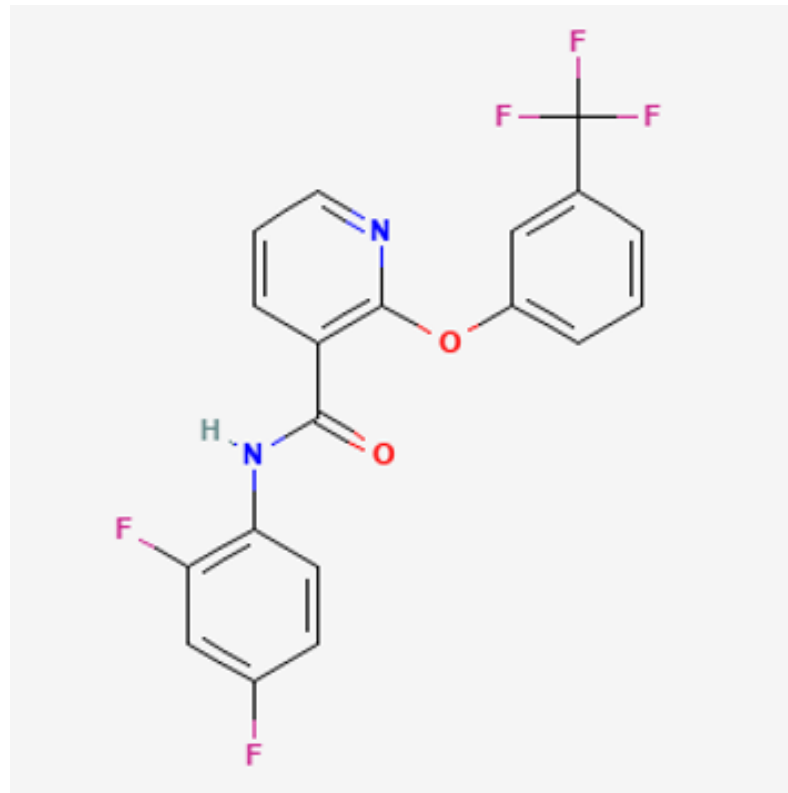
Metolachlor
MW: 283.79
Koc:22-2020
Mobile

Metolachlor (ng/L)
0.81 - 1.56
1.56 - 3.82
3.82 - 8.46
8.46 - 78.15

Results and discussion

Diflufenican was applied before 23/10/2019

Diflufenican

MW: 394.3
Koc: 5504

Immobile
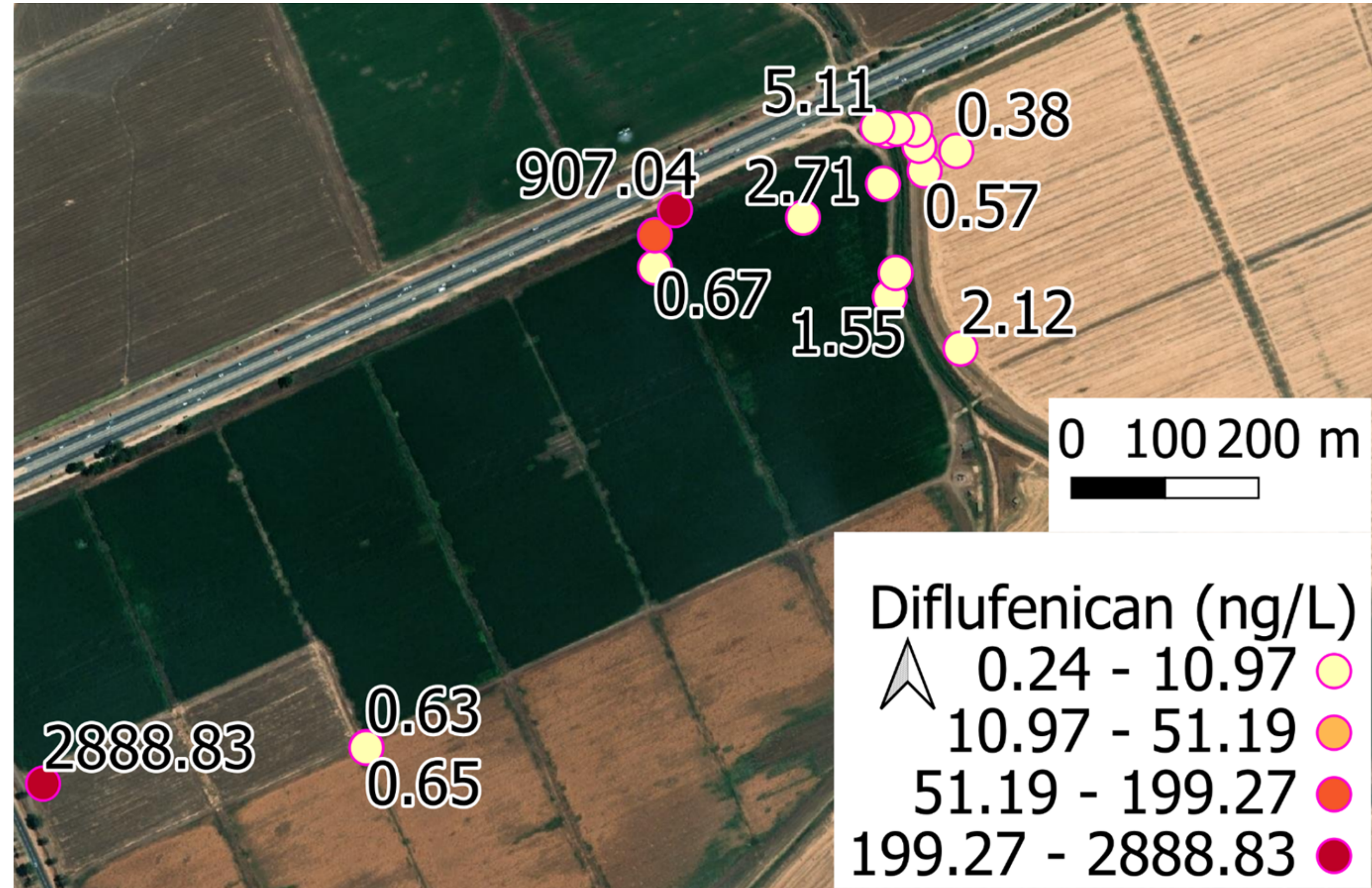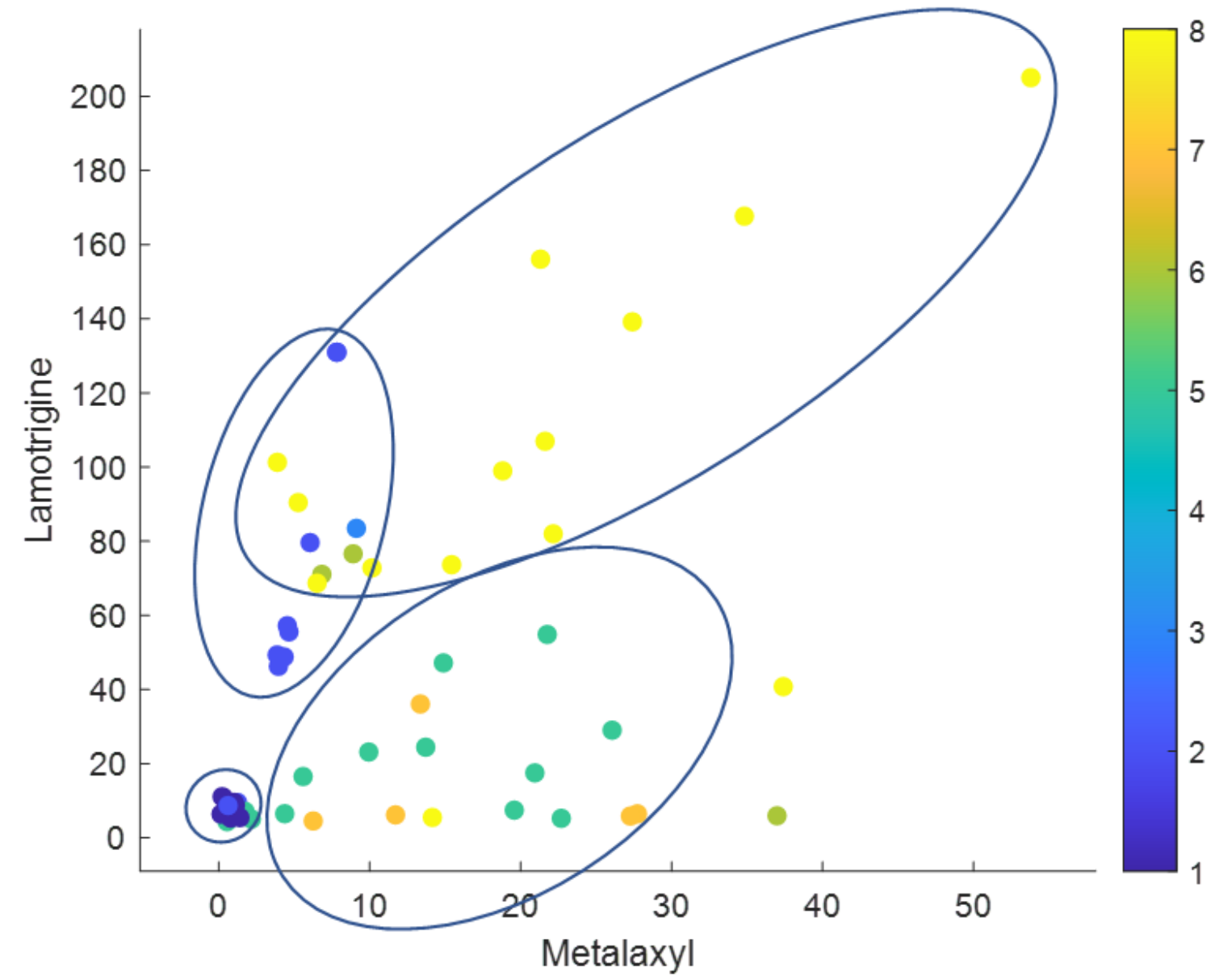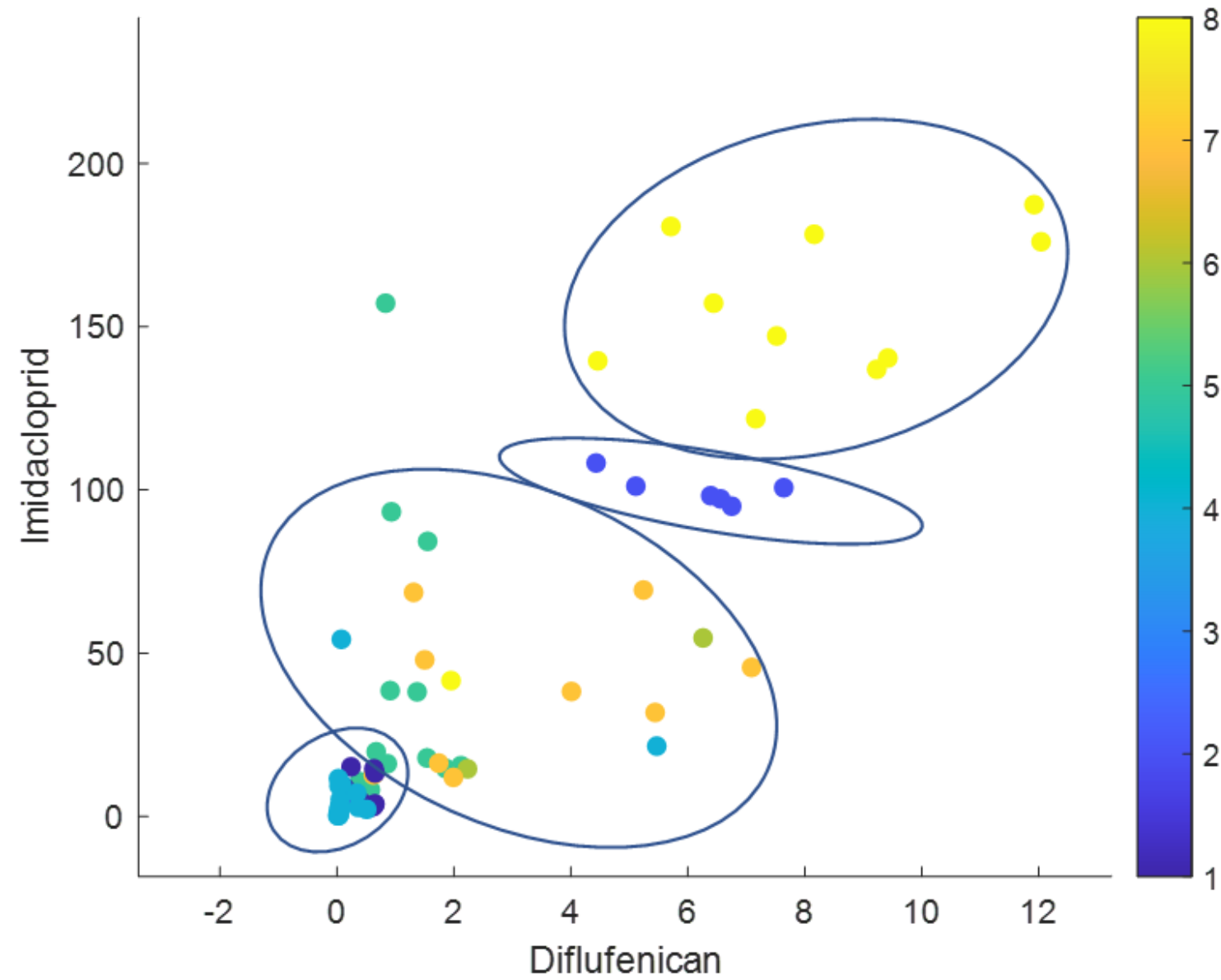
Low degradability

Results and discussion

Diflufenican (ng/L)
0.24 – 10.97
10.97 – 51.19
51.19 – 199.27
199.27 – 2888.83

clustering analysis

Results and discussion

To summarize...

–Dynamics depands on 1. pollutant characteristics

                                2. timing during/after storm

–Chemical characteristics are critic to obtain the spatial distribution

–Different flowpath has unique concentration range

Summary

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The Chaikin Chair for Geostrategy

Thank you for your attention!

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