online

Implementation of modePROCON showcasing for karst aquifer – Waidhofen a/d Ybbs, Austria

boDEREC-CE I Chair of Hydrology and River Basin Management

OUTLINE

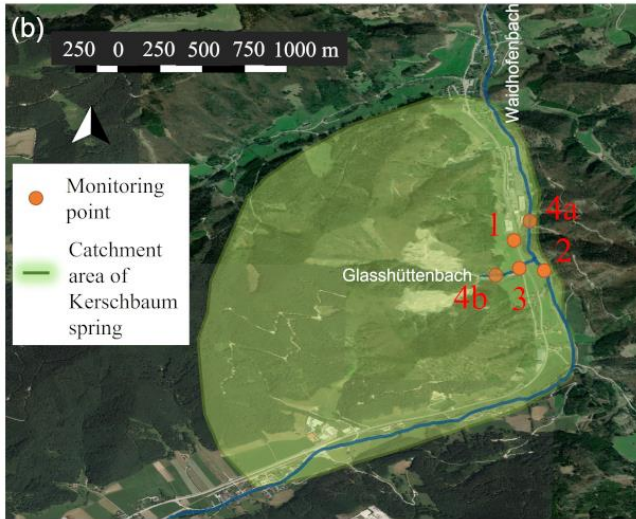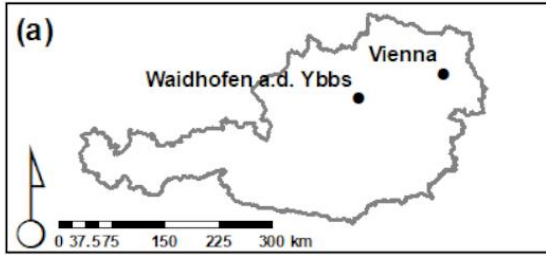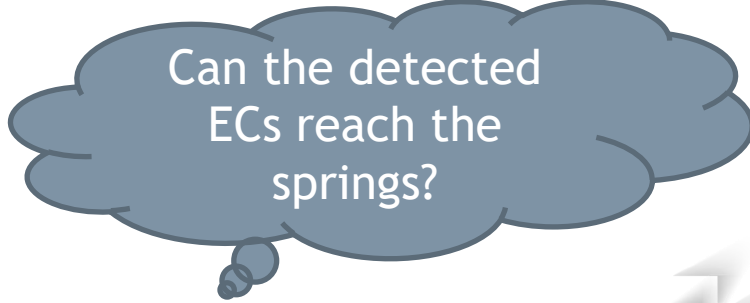|			
1	**2**	**3**	**4**
Study area	**Detected PPCPs**	**Applying modePROCON**	**Model results**

STUDY AREA

- Investigated aquifers: Waidhofen a/d Ybbs, Austria

- It is composed of the recharge area of one of the main springs exploited for the drinking water supply (Kerschbaum spring)

- Recharge area of the Kerschbaum spring: ~2.5 km²

- The geology of the study area induced the formation of several karstic springs at different altitudes

DETECTED PPCPs

- The following Emerging Contaminants (ECs) were detected and selected to be modeled in the nearby river and in the groundwater:
    - Diclogenac
    - Methylparaben
    - Valsartan

Can the detected ECs reach the springs?

APPLYING modePROCON
Selecting the water source

APPLYING modePROCON
Selecting the PPCPs

The detected PPCPs **Diclogenac**, **Methylparaben** and **Valsartan** are contained in the database and can be **selected simultaneously**.

APPLYING modePROCON
Probability Estimation
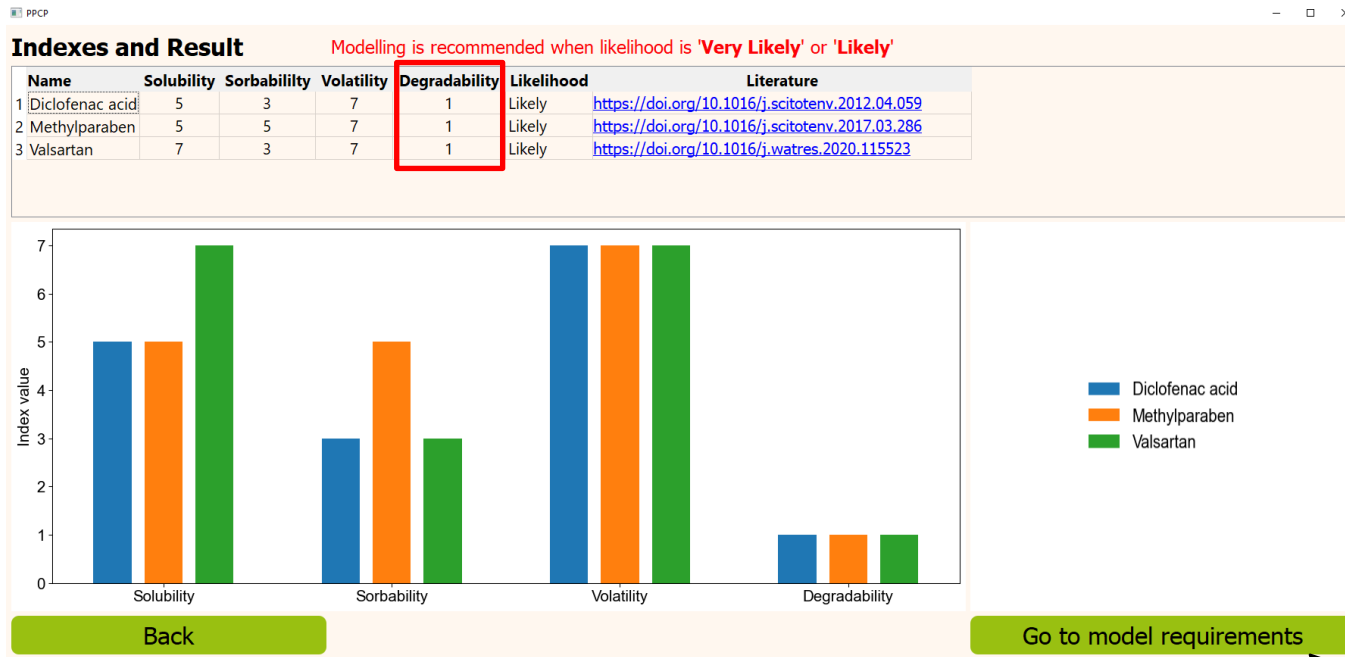
- All the investigated compounds are **easily biodegradable.**

APPLYING modePROCON
Probability Estimation
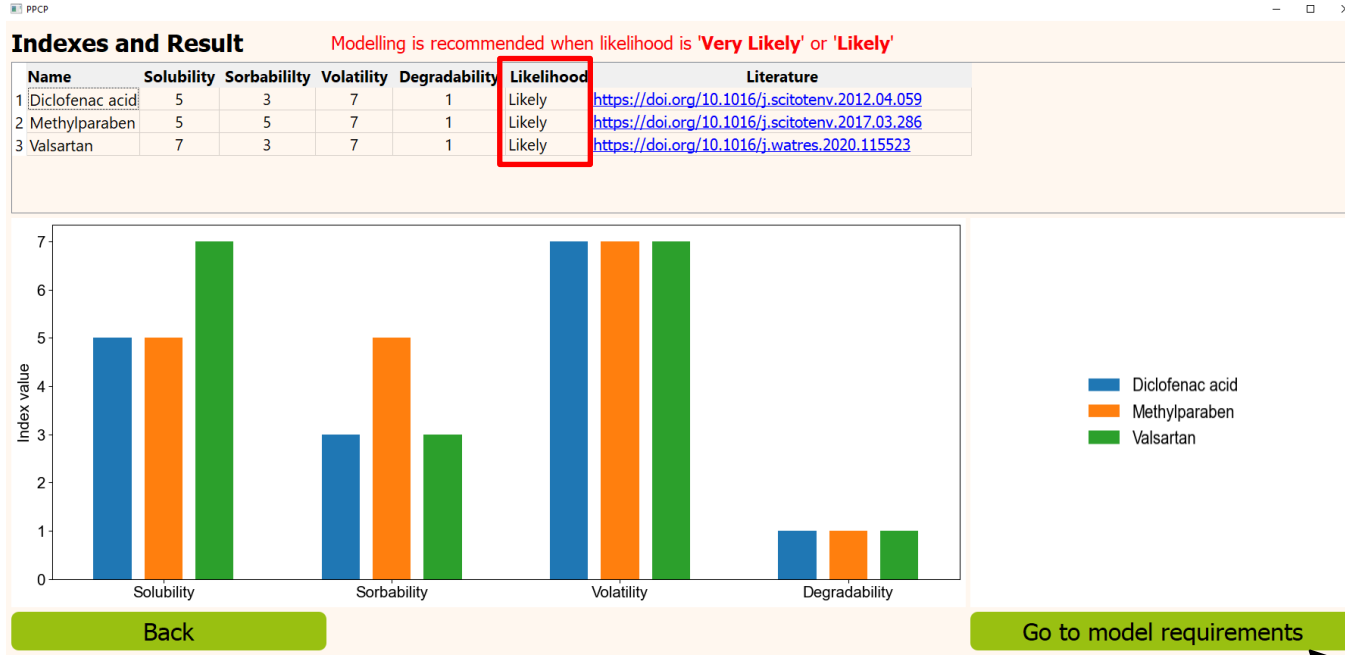
- Due to the high index values, the detection probabilities of **Diclogenac**, **Methylparaben** and **Valsartan** are **likely**.

- This is related to the **low sorption capacity** combined with the **high solubility**.

APPLYING modePROCON
Probability Estimation

As all considered PPCPs are **likely** to be detected in the karst aquifers, modePROCON **recommends to model** the situation for further investigation.

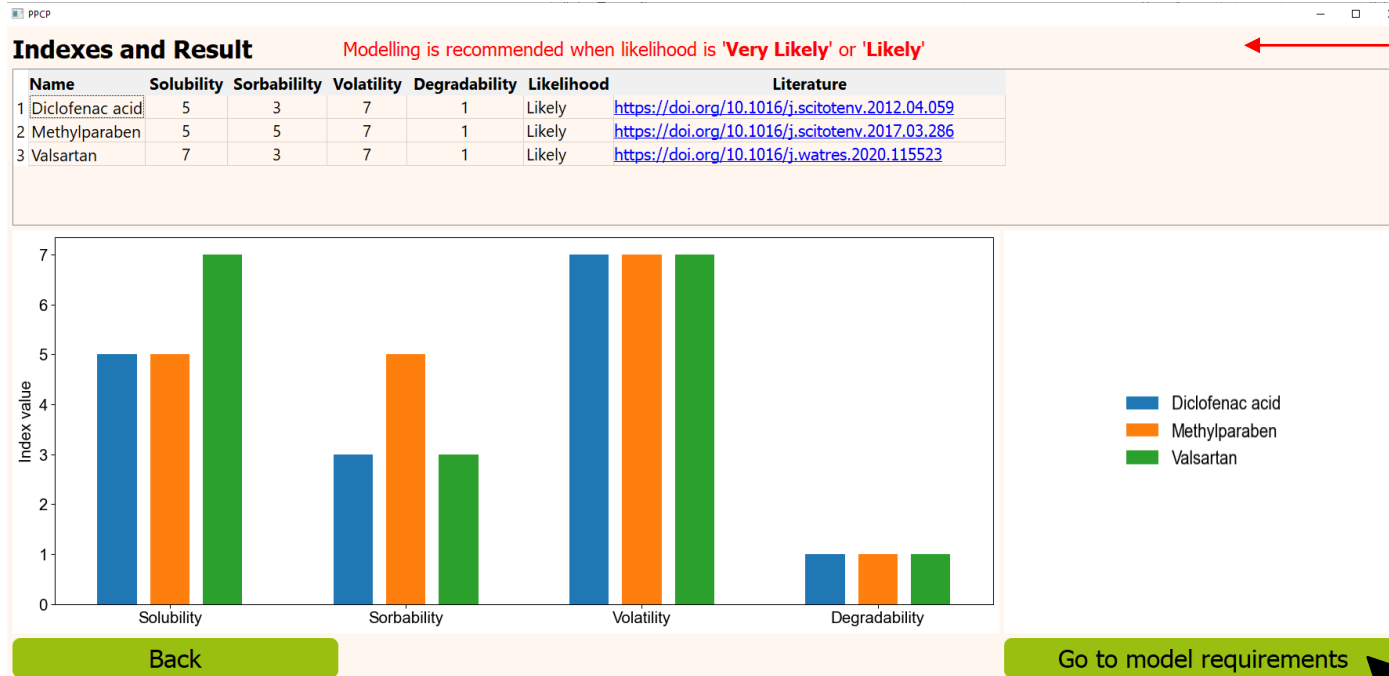# APPLYING modePROCON
Model requirements

- All the required model **parameters** are known in this case, **except** of the **source of contamination**.

- modePROCON evaluates the data…

APPLYING modePROCON
Model requirements

- … and replies that a **model cannot be built** with the available data.

modePROCON suggests a **possibility to obtain** the **missing data** in the remark column.

The screenshot shows:

PPCP

Karst aquifer model requirements

[Evaluate]

Model cannot be built. Please collect the missing data.

Please check the available parameter to evaluate

	Parameter	Application	Remark
4 ☑	Air temperature	The spatial-temporal discharge pattern in the conduits, fracture networks and matrix is strongly controlled by temperature variations.	The data are available.
5 ☑	Precipitation	It influences the infiltration discharge and electrical conductivity and it is a source of recharge. The water levels and spring discharge can change rapidly in response to rainfall.	The data are available.
6 ☐	Source of contamination and initial concentration of the contaminant	They are needed to set initial conditions to solve the transport equation and define the contaminant sources and releases.	It can be estimated by analysing seepage water collected in a collection bag of a seepage meter, or with a network of monitoring wells. Another alternative is to solve inverse problems of unknown contaminant source (e.g., particle backtracking). Potential sources of contamination are: infiltration of contaminated surface water, leaking sewers, landfills, septic systems, livestock breeding and agriculture. Intensive research in the study area is recommended.

[Back]

APPLYING modePROCON
Model requirements

- In this case, two scenarios were assumed.
- Scenario 1: untreated wastewater as contamination source
- Scenario 2: WWTP-effluent as contamination source
- Now modePROCON replies that a **model can be built**.
- In a next step, a **modelling expert** should be contacted to set up a transport model.

MODEL RESULTS
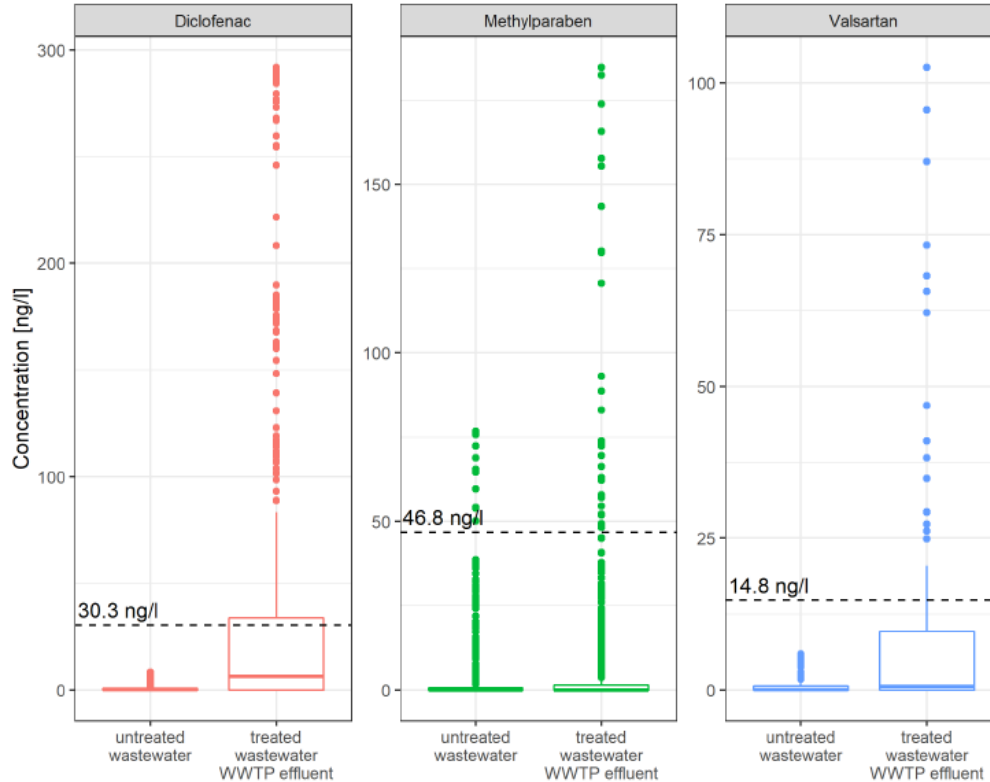
Estimated concentrations in the spring from scenario analysis

- The model results indicate that infiltration of surface water from the Waidhofenbach (**contaminated by treated wastewater**) is much more plausible as a source for the detected concentrations in the Kerschbaum spring compared to the alternative source from leakage of a sewer system or septic tank.