

# Tracer experiment group D

Technical Report Field Work Luxemburg



Group

D

Group member

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Date of experiment

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# 1 Introduction

This technical report describes the result of the tracer experiment of group D. This experiment is done in the Meckelbach catchment in Luxemburg. The goal of this experiment is to use EC measurements to determine the discharge. For this, EC measurements are done at several locations in the catchment. Also 4 discharge measurements are done. As an addition to the measurements also nitrate concentrations are measured at some locations. During the hike the first measurements are collected at the most downstream location.

This report describes the method and the results collected during the hike.

## 2 Method

During the experiment the following equipment is used:

- EC meter
- AquaCal Software + laptop
- Rhodamine probe
- Pre-made solution
- Nitrate strips

The discharge is measured using a Rhodamine probe. A solution containing rhodamine is added at a certain location to the river. A few meters further downstream the concentration is measured. During our experiment a four times higher rhodamine concentration is used compared to the groups before.

To approximate the needed amount of rhodamine a  $10 \text{ L} = 100 \text{ ml}$  of solution is used.

At the defined locations also the EC measurements are done in all side tributaries.

## 3 Results

### 3.1 Map of all locations

The map shows the locations of the EC and discharge locations. At location 1 extra coordinates for the discharge measurements are given, because the exact location is a little bit more upstream than the location itself.

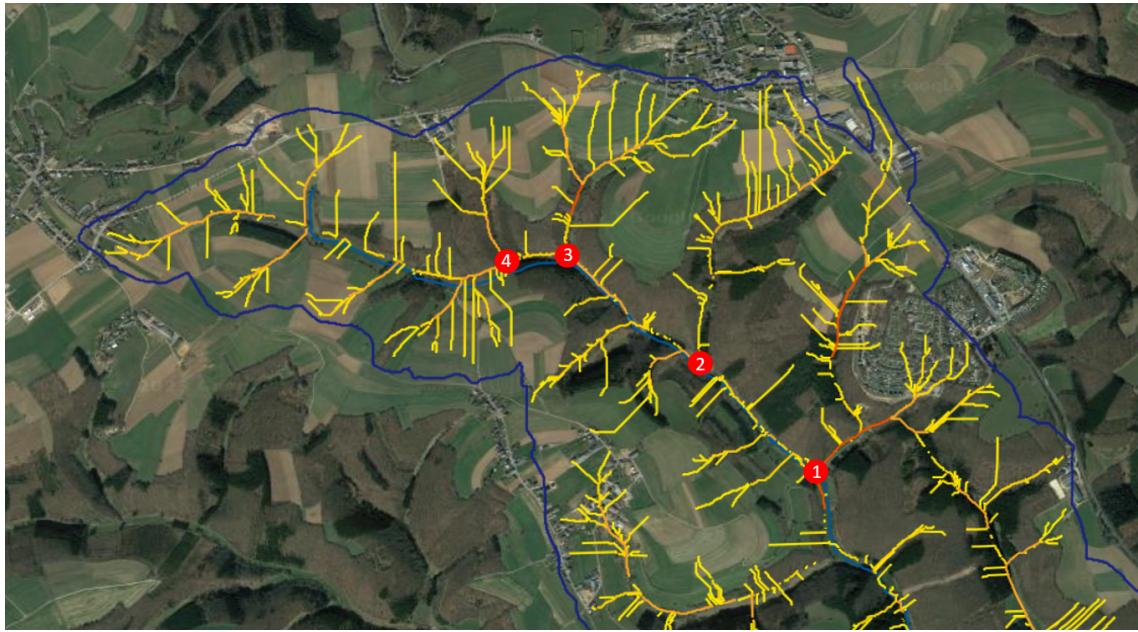


Figure 1: Map of locations of measurement in the upstream part of the Meckelbach catchment

Table 1: Coordinates of the locations

Location	Lat	Lon
1	49.8721698	5.9839181
Discharge location 1	49.8723726	5.9832519
2	49.8765606	5.9767881
3	49.8800527	5.9692723
4	49.8797718	5.9659078

### 3.2 EC measurements

The EC measurements are done at four locations. These locations are characterized by a tributary that enters the river. For each location a figure is given which shows all measurements at that specific location.

#### 3.2.1 Location 1

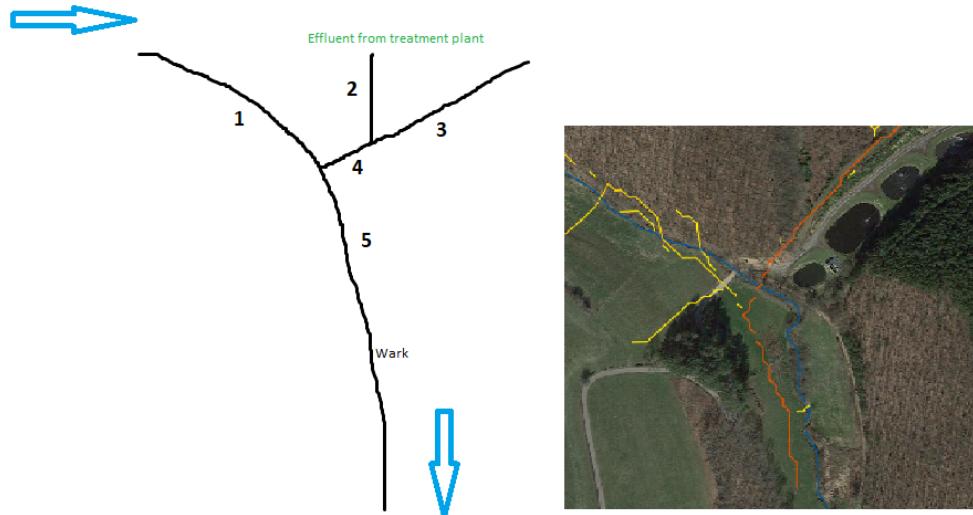


Figure 2: Drawing location 1

Table 2: Results of EC experiment location 1

Location	Temperature (Celsius)	EC
1	12.5	202
2	14	680
3	10.2	312
4	10.8	382
5	11.8	264

### 3.2.2 Location 2

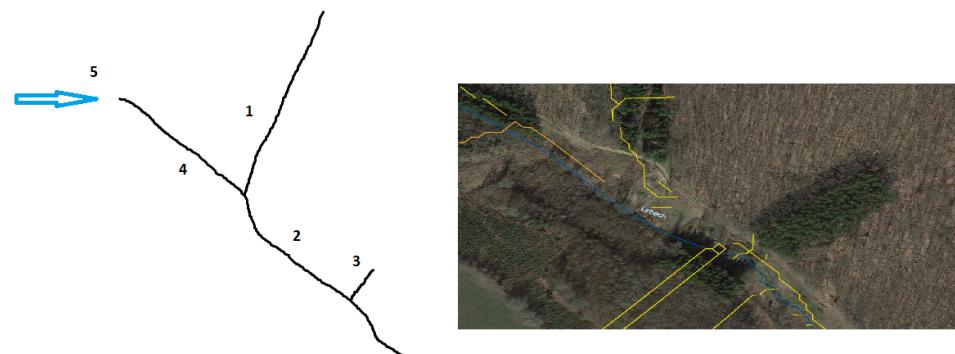


Figure 3: Drawing location 2

Table 3: Results of EC experiment location 2

Location	Temperature (Celsius)	EC
1	10.5	302
2	11.2	216
3	11.2	155
4	11.5	184.6
5	11.5	190

### 3.2.3 Location 3



Figure 4: Drawing location 3

Table 4: Results of EC experiment location 3

Location	Temperature (Celsius)	EC
1	10.7	202
2	10.3	294
3	10.3	186

### 3.2.4 Location 4



Figure 5: Drawing location 4

Table 5: Results of EC experiment location 4

Location	Temperature (Celsius)	EC
1	11	142
2	11.5	205
3	11.5	203

### 3.3 Discharge measurements

In the upstream part of the catchment 4 discharge measurements are done. The first two measurements are done close to location 1. The third tracer experiment is done at location 2 and the last at location 3 (Figure 1).

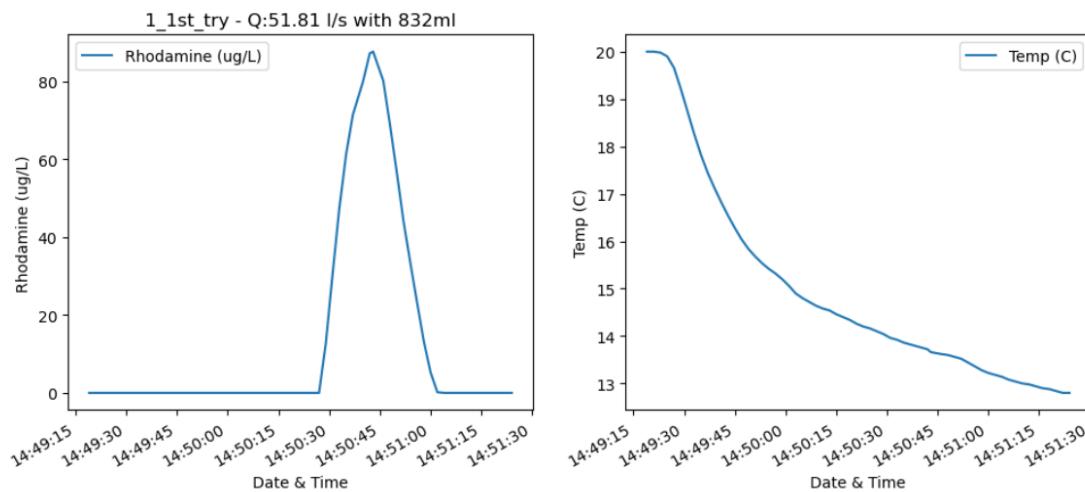
The reason for the 2 measurements at the first location are the fact that during the first experiment a branch was present in the water approximately 1 meter upstream of the tracer measurement point, which blocks the water from flowing. After removing the branch, the experiment was repeated.

The Rhodamine concentrations for each experiment are given in the table below. Important to take into account is that during this experiment the concentration of Rhodamine was 4 times higher compared to the experiments before.

Table 6: Rhodamine solutions

Experiment	Location	Rhodamine solution (ml)
1	1	208
2	1	199
3	2 (Figure 3: tributary 1)	79
4	3	70

The figure below shows the first analysis of the tracer data. In the left graphs the concentration of Rhodamine over time is given. In the right figure the change in temperature is shown. Based on the result it can be seen that the temperature for the second experiment is not changing a lot as the device was already cooled down during the first test. After removing the branch between test 1 and 2 the peak is arriving earlier and is higher.



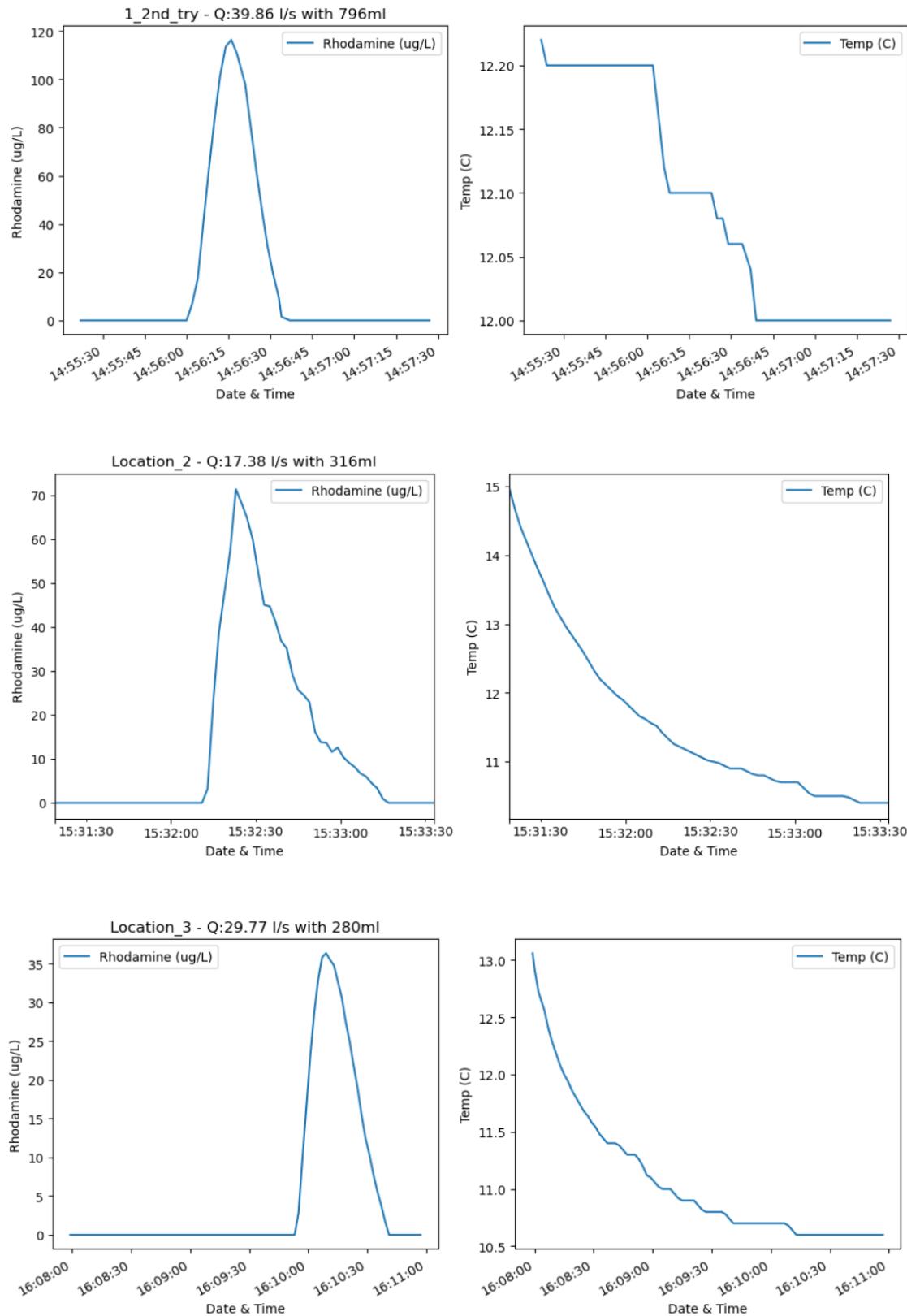


Figure 6: Results of discharge tracer experiment

### 3.3 Nitrate measurements

At location 3 and 4 nitrate measurements are done. The values of these measurements are shown in table 7.

*Table 7: Nitrate results*

Location	Exact location	Nitrate (ppm)
3	Figure 4: 3	5
3	Figure 4: 2	20
3	Figure 5: 2	10
4	Figure 5: 1	5