TECHNISCHE UNIVERSITÄT DRESDEN

INOWAS
Innovative Groundwater Solutions

Real-time monitoring using the INOWAS platform

Tutorial: Utilizing the real-time monitoring tool to import time-series data

Developed within:

SMARTControl

Project funded by:

Water International Cooperation 2017 JOINT CALL

Federal Ministry of Education and Research

ANR

Research Promotion Foundation

FACEPE Fundação de Amparo à Ciência e Tecnologia do Estado de Pernambuco

FAPESQPB

Real-time monitoring tool

INTRODUCTION

Real-time monitoring tool

Main objective:

Add monitoring (time series) data to the web-based INOWAS platform

Specific objectives:

- Collection of (real-time) time series data from the in-situ site-specific observation systems in one data base
- Process the monitoring data to extract outliers, default values, change the time resolution, …
- Visualize the sensor data to compare various sites
- Prepare the data for further usage in other tools on the INOWAS platform:
    - Numerical groundwater modelling and observation (T03)
    - Heat transport (T19)
    - Real-time groundwater model (T20)

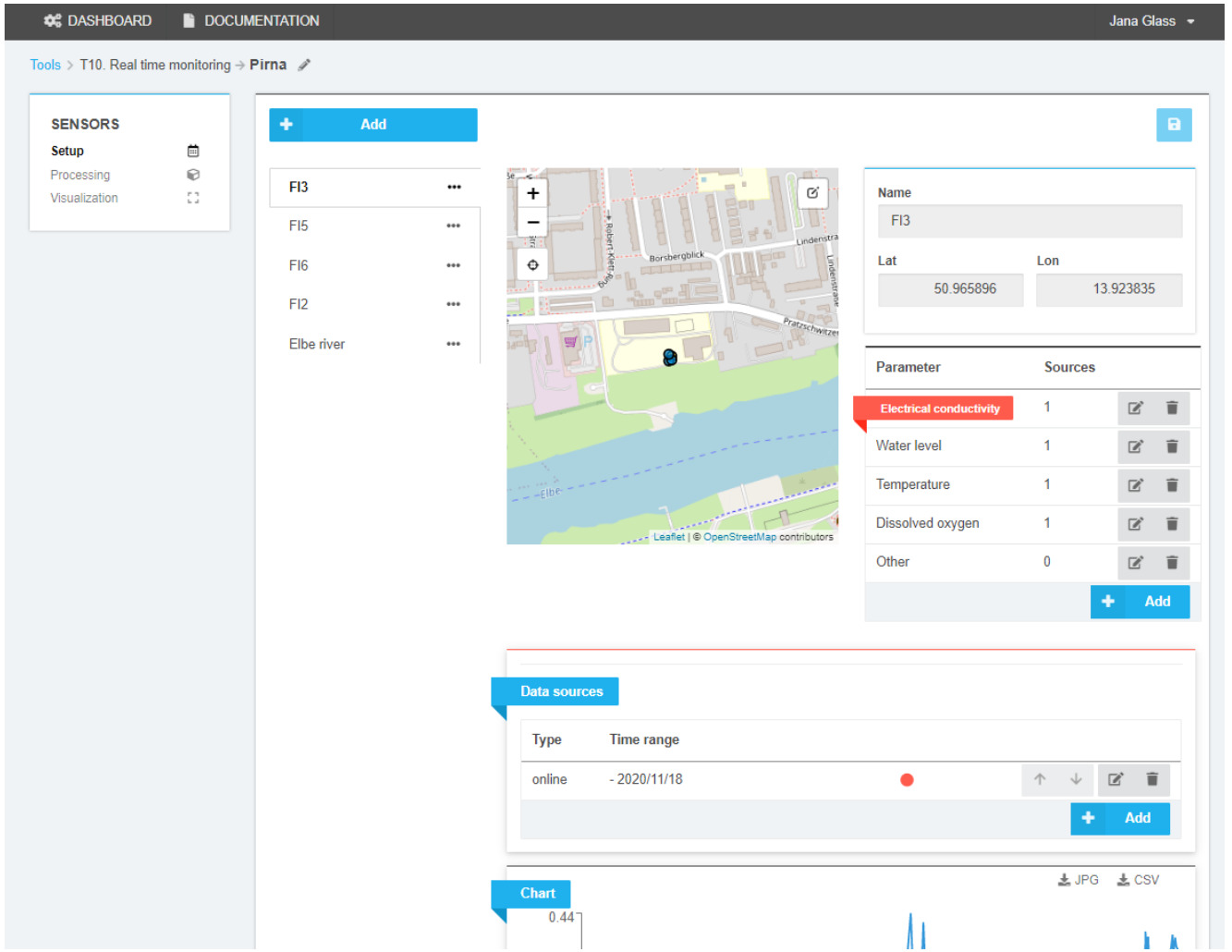
Real-time monitoring tool

Tool setup:

1. **Sensor setup**
2. **Data processing**
3. **Visualization**

Online documentation available under:

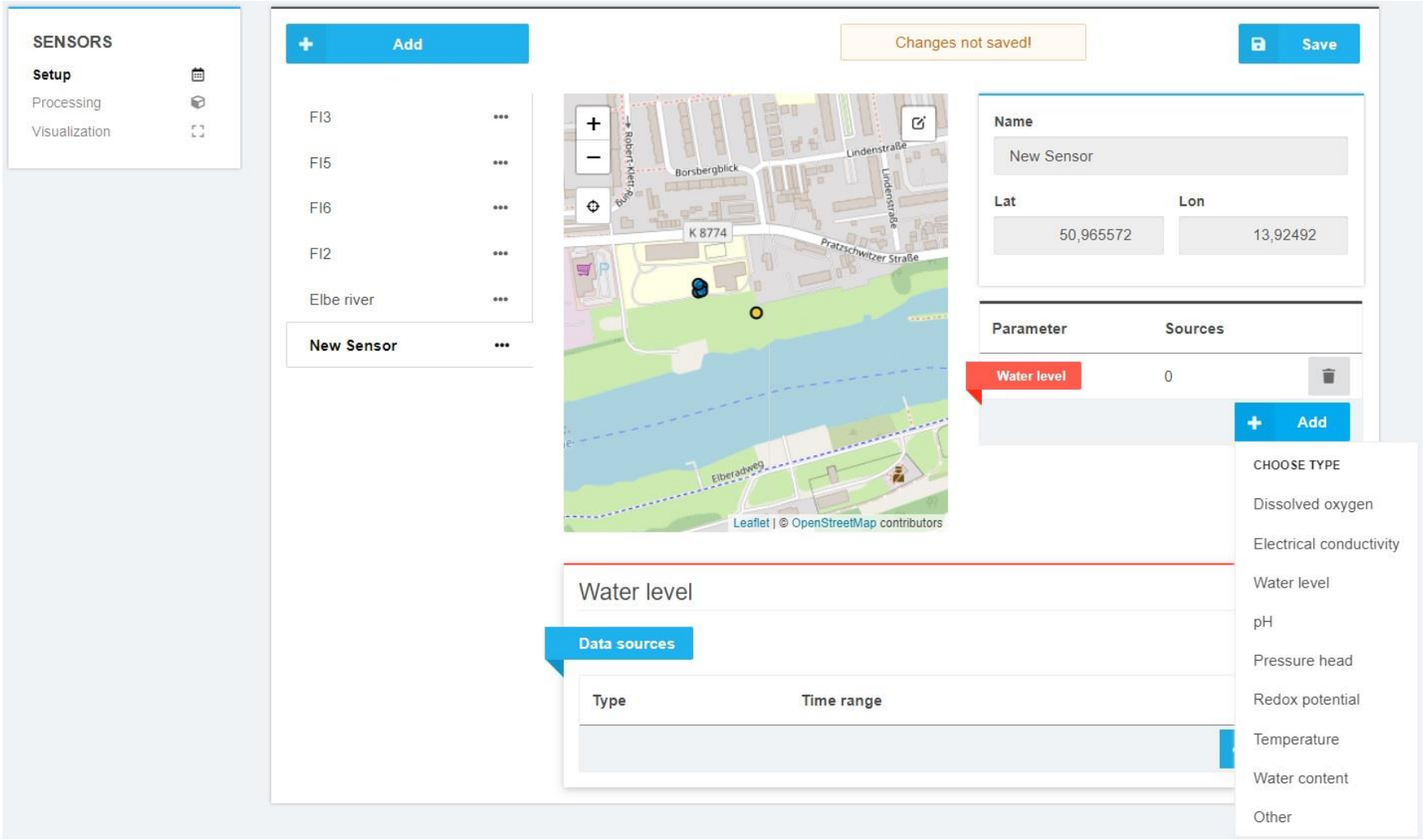
https://inowas.com/tools/t10-real-time-monitoring/



Real-time monitoring tool

1. **Sensor setup**

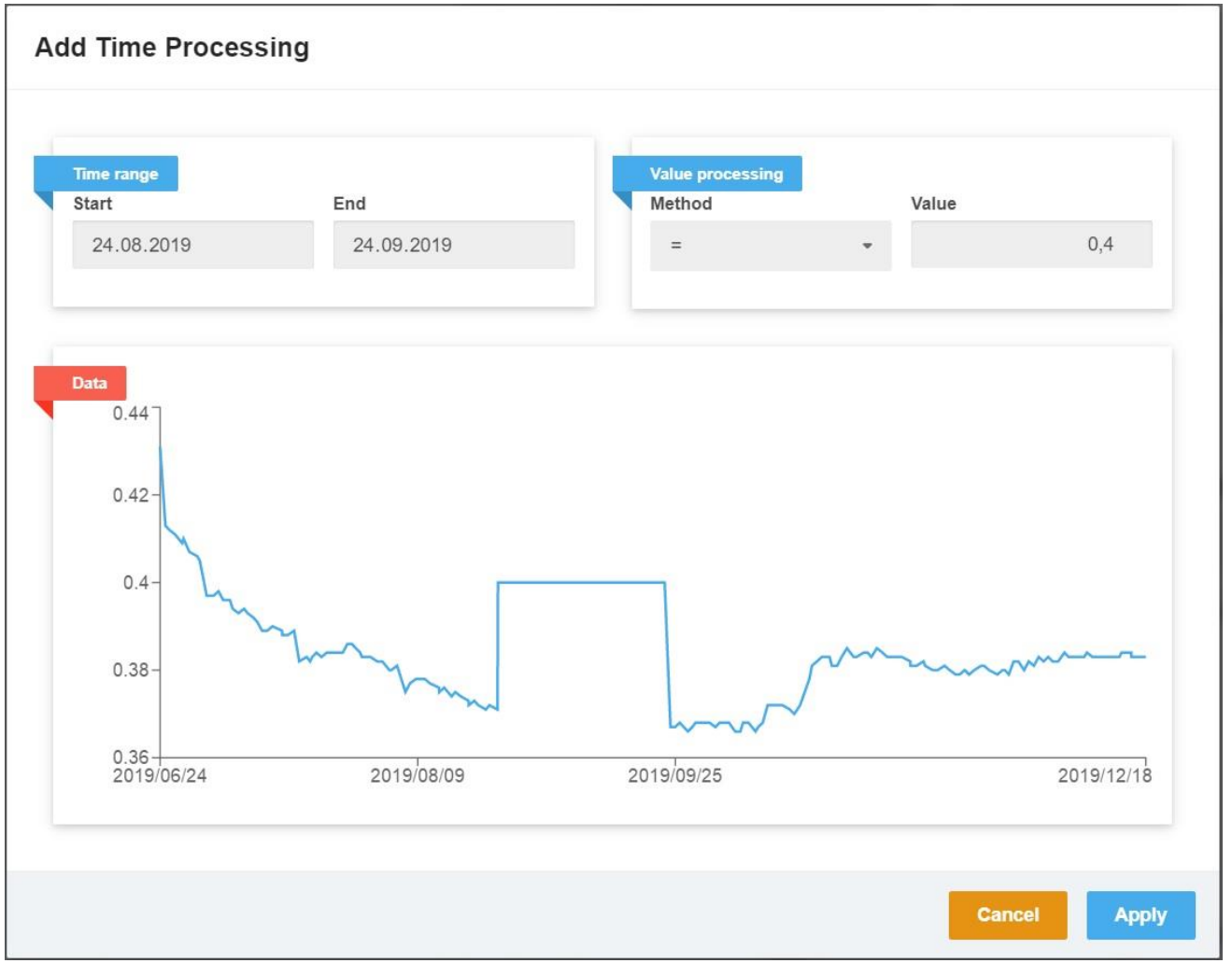
- New sensors can be setup including location
- Parameters can be added to the sensor (e.g. water level, electrical conductivity)
- Data sources can be defined:
  - CSV upload
  - Connection of online sensors
  - External online services (via Prometheus)



Real-time monitoring tool

2. Data processing

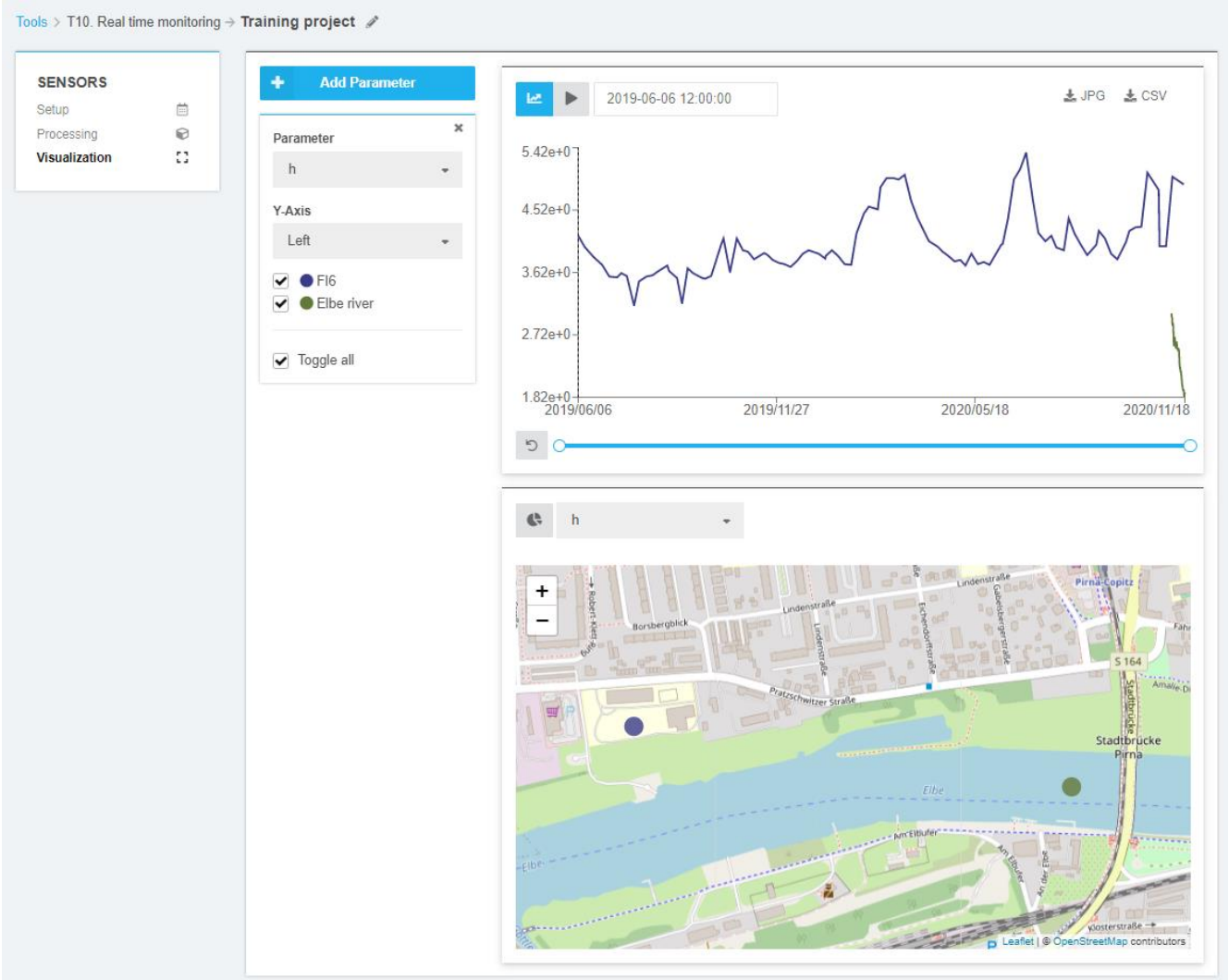
- Time processing:
  - change the time resolution of a time series
  - cut time series (define beginning and end that will be used)
- Value processing:
  - Various processing algorithms e.g. =, +,-, *,/, >, <
- Export of resulting time series via CSV or JPG



Real-time monitoring tool

3. Data visualization

- Visualize and compare various time series of one parameter at different locations
- Two parameters on one or two y-axis can be added
- Displayed time range can be adapted
- Export via CSV or JPG



Learn how to use the real-time monitoring tool and get to know the main features

INTERACTIVE STEP-BY-STEP TUTORIAL

Overview of the interactive tutorial

- Login to the INOWAS platform
- Learn how to navigate to the various tools, how to save a project
- Set up a monitoring project including two sensors (FI6, Elbe river) from the test site in Pirna, Germany
- Add parameters to the sensor
- Add sensor data via CSV, online sensor and add an external web service (via Prometheus)
- Manipulate the sensor data using time and value processing capabilities
- Visualize and compare the time series

Login to the INOWAS website

Go to

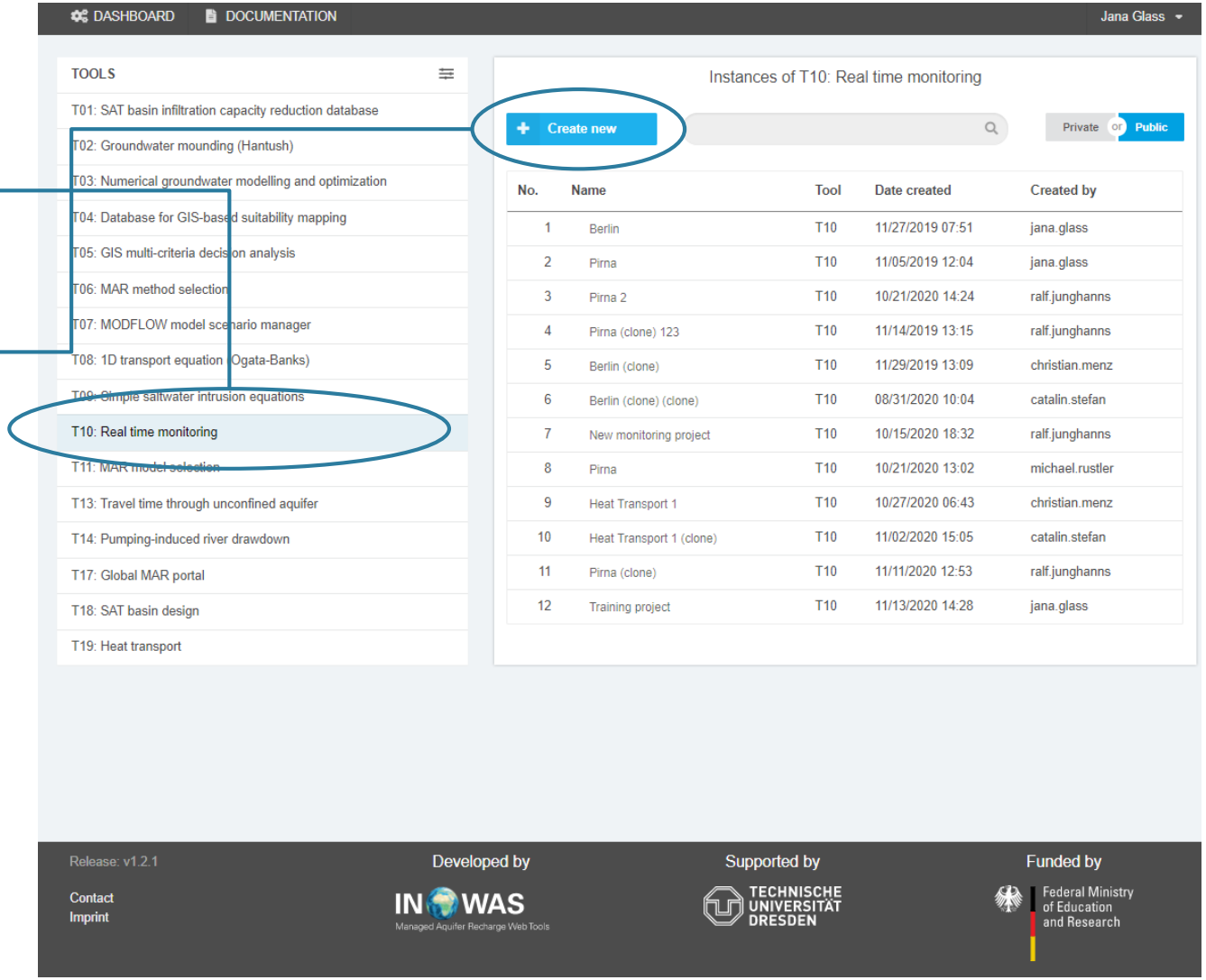
inowas.com

And **login** with your **personal user name** and **password**.

If you aren´t registered yet, please sign up on the following webpage: https://dss.inowas.com/signup

Start Tool T10: Real-time monitoring

- Navigate to T10 in the Dashboard
- Create a new project
- Define a name for your project
- Choose whether to save it private or public (can be later changed)

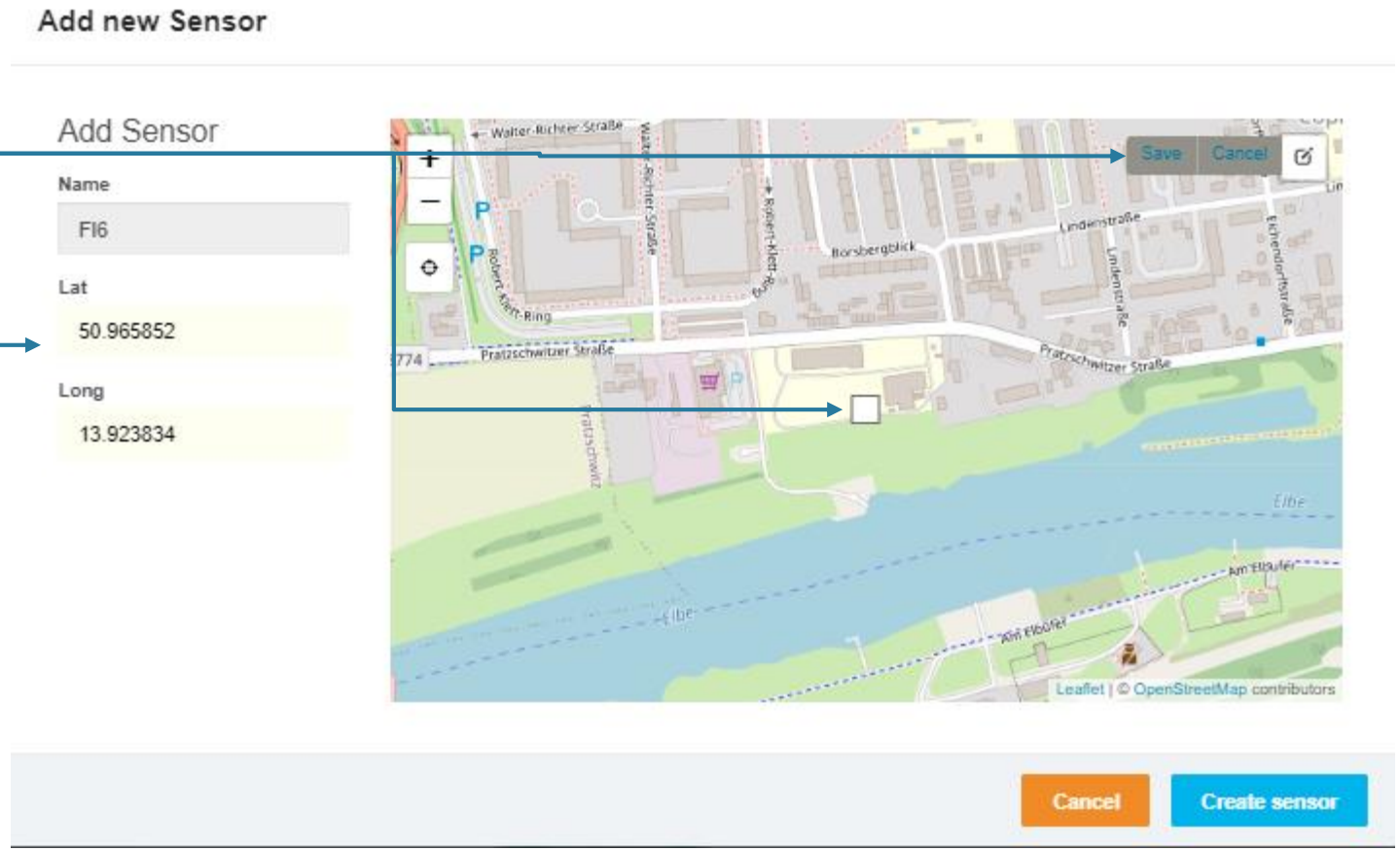


Sensor setup: add new sensor

A new sensor can be added by using the **“+Add”** button.

The sensor location needs to be defined by **clicking on the specific location on the map** using the GIS functionalities of the INOWAS platform or by **specifying the latitude and longitude** of the sensor.

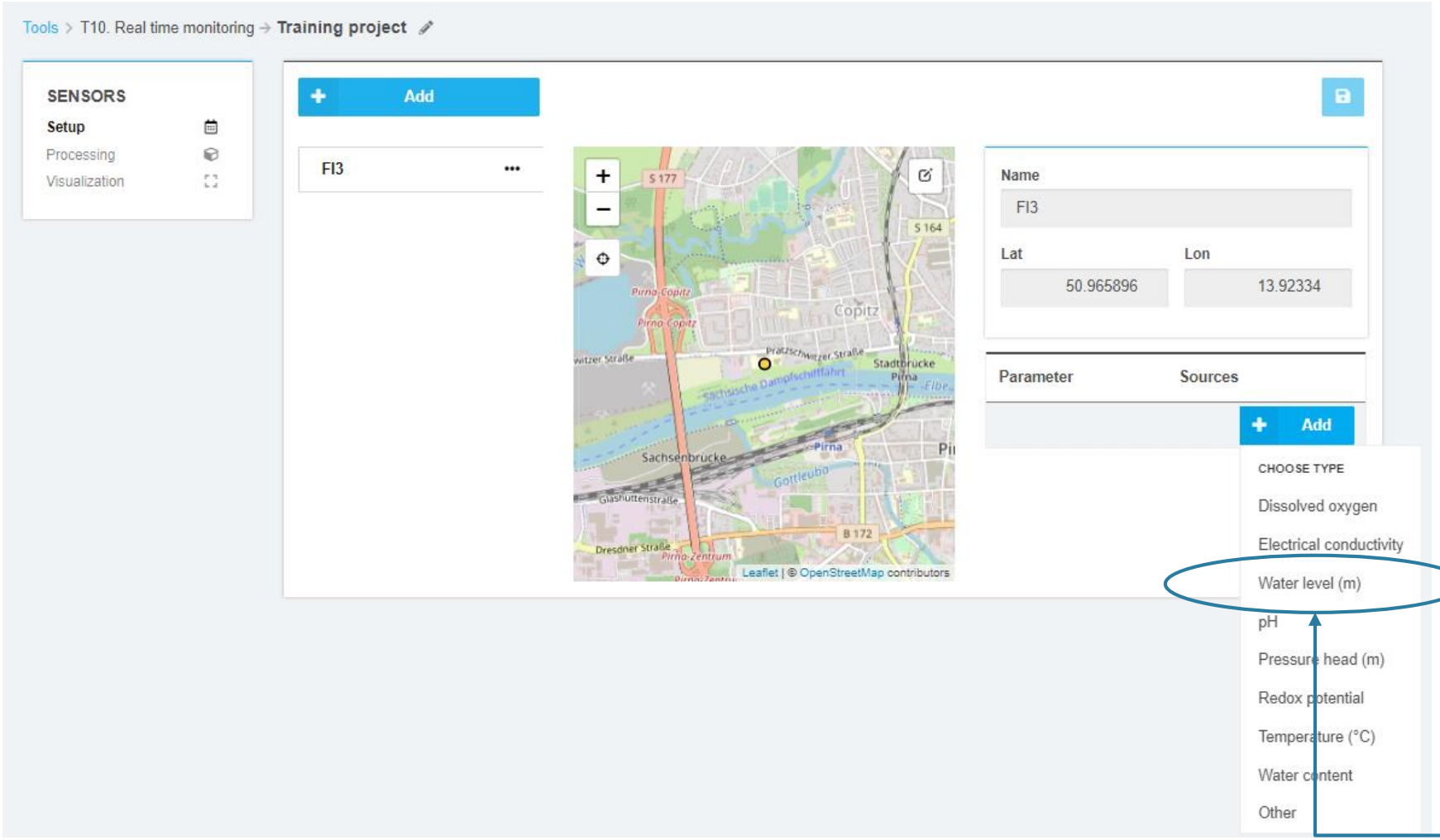
The INOWAS platform uses WGS84 as the standard coordinate system.



Please include the following sensor as an example:

Name:	**FI6** in Pirna, Germany
Latitude:	**50.965852**
Longitude:	**13.923834**

Sensor setup: add parameter

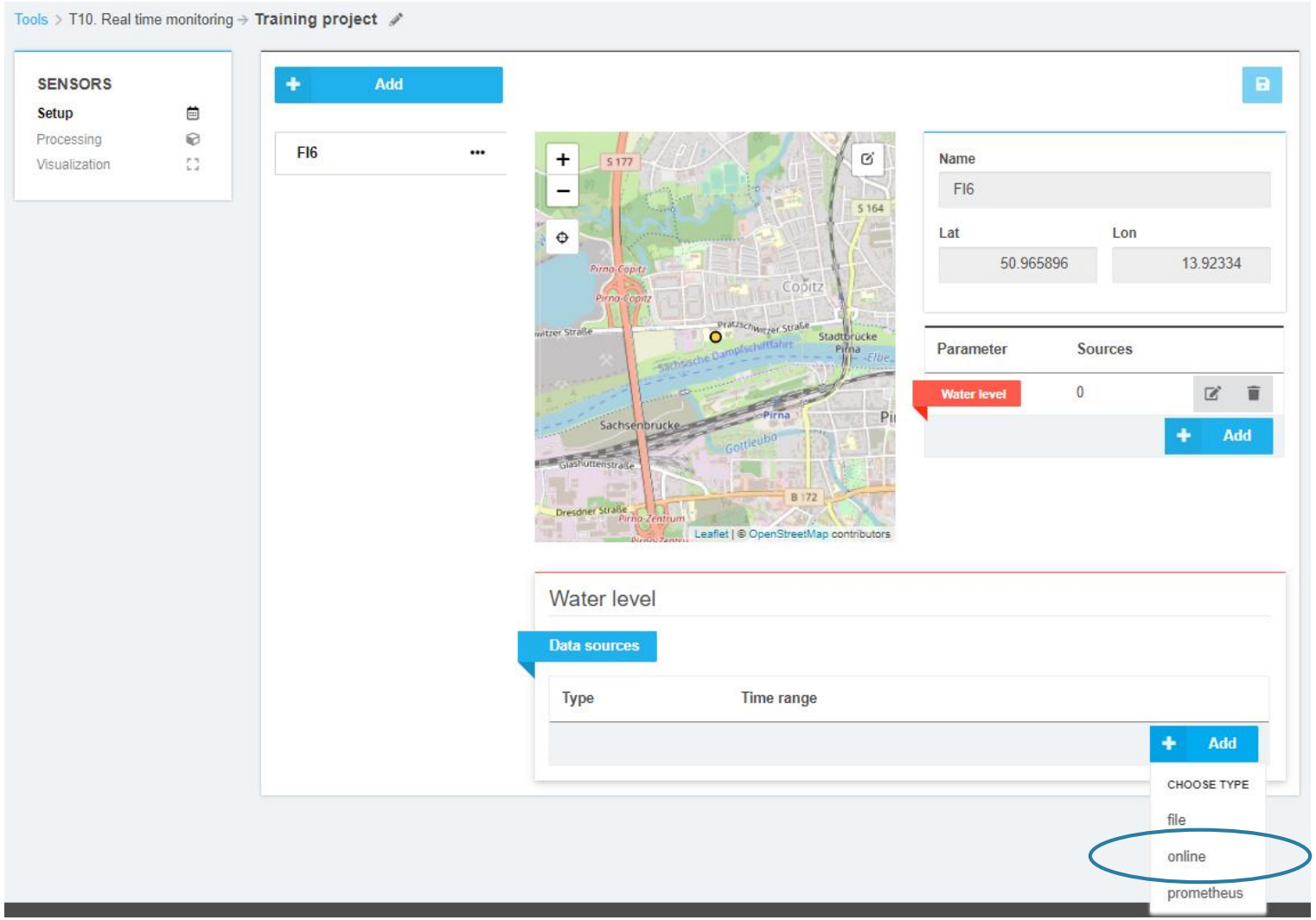


After creating the sensor, the metadata including the name and location (WGS84) can be edited and parameters can be added using the following categories:

- Electrical conductivity
- Water level
- Pressure head
- Dissolved oxygen
- Temperature
- pH
- Water content
- Redox potential
- Others

→ ***Add water level to your sensor***

Sensor setup: add data source – online sensor



For each parameter, time series data can be added as **CSV,** as **online** sensors using a server connection or via **prometheus** for public available data .

Groundwater sensors of the company UIT can be connected via FTP and SensoWeb to the INOWAS platform. For that the data source type **“Online”** is chosen.
The specific project, sensor and desired parameter needs to be selected. The time and value range can be specified in addition.

Sensor setup: add data source – online sensor

*Please add an **online sensor** and choose the following settings as an example:*

Project: **DEU1**

(for the test field in Pirna, Germany)

Sensor**:** **I-6**

Parameter: **h**

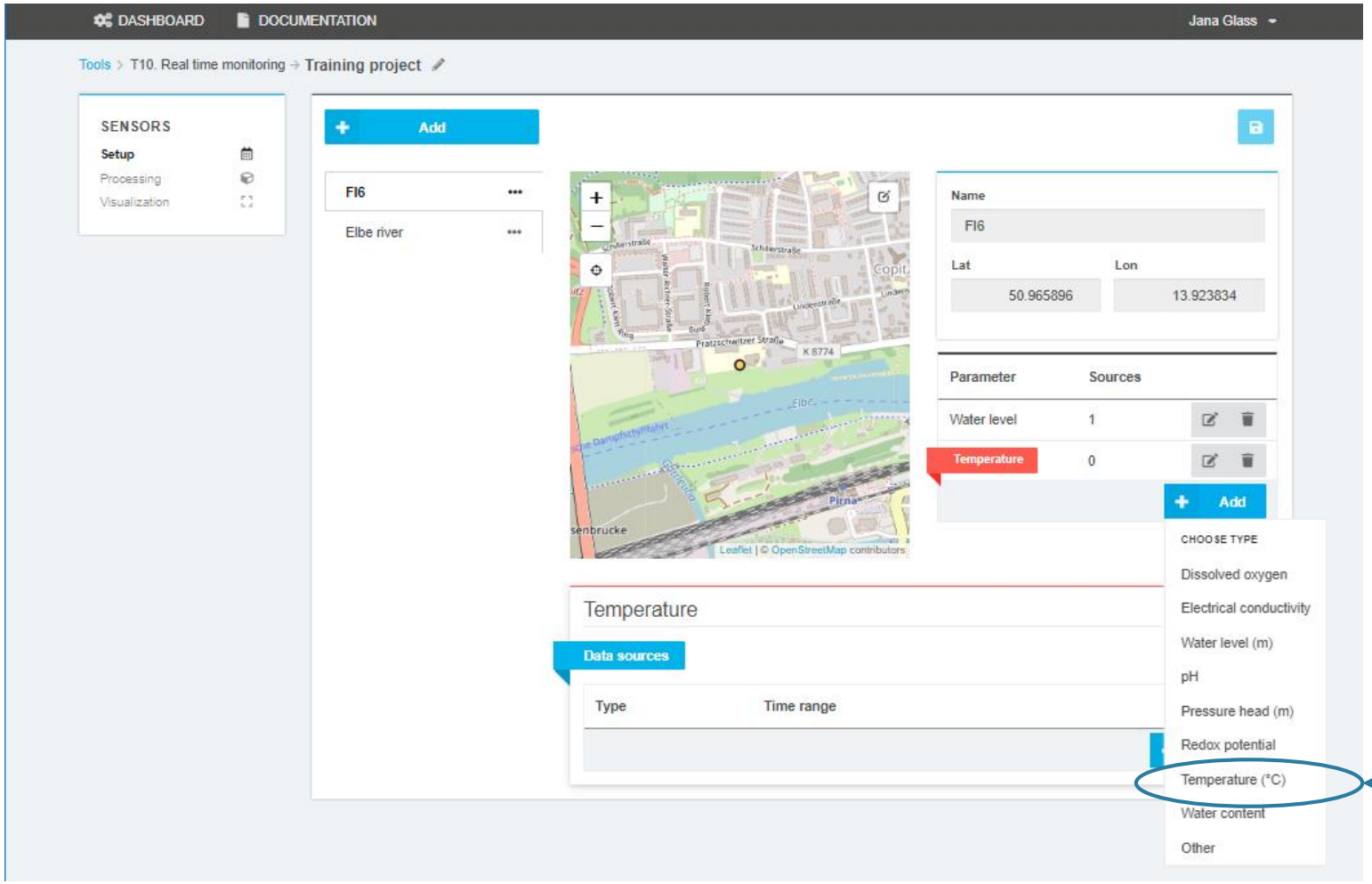
Lower limit: **1**

(due to maintenance / low battery some values are missing)

The chosen time series data is visualized in the graph.

Click on **“apply”** to save the time series to your project

Sensor setup: add data source – CSV file



→ *Add a new parameter **"temperature"** to the FI6 sensor*

→ *Add a new data source with the type **"file"***

Sensor setup: add data source – import csv file

*Download the provided **CSV file** on the Tutorial website and choose it on your computer. The name of the file is:*

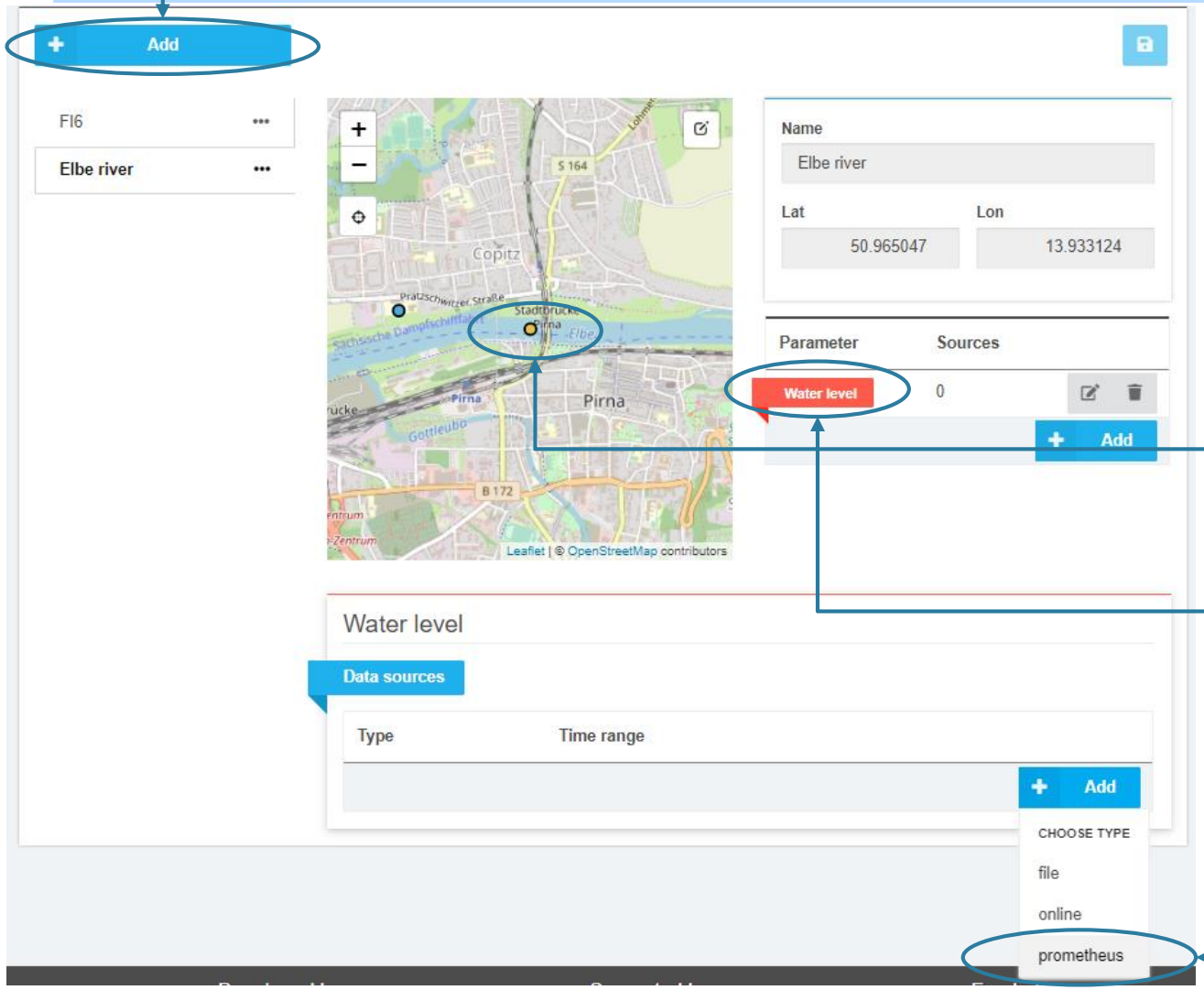
„FI6_temperature“

Choose as Datetime: **TimeStamp**

Choose as Parameter: **value**

The visible temperature minimum was during an infiltration test in October 2019

Sensor setup: add data source - prometheus



Besides CSV upload and online sensors connected via FTP, it is possible to add time-series data of public available data via **prometheus**.

Add new sensor (**Elbe river**)

→ *place it anywhere in the Elbe river*

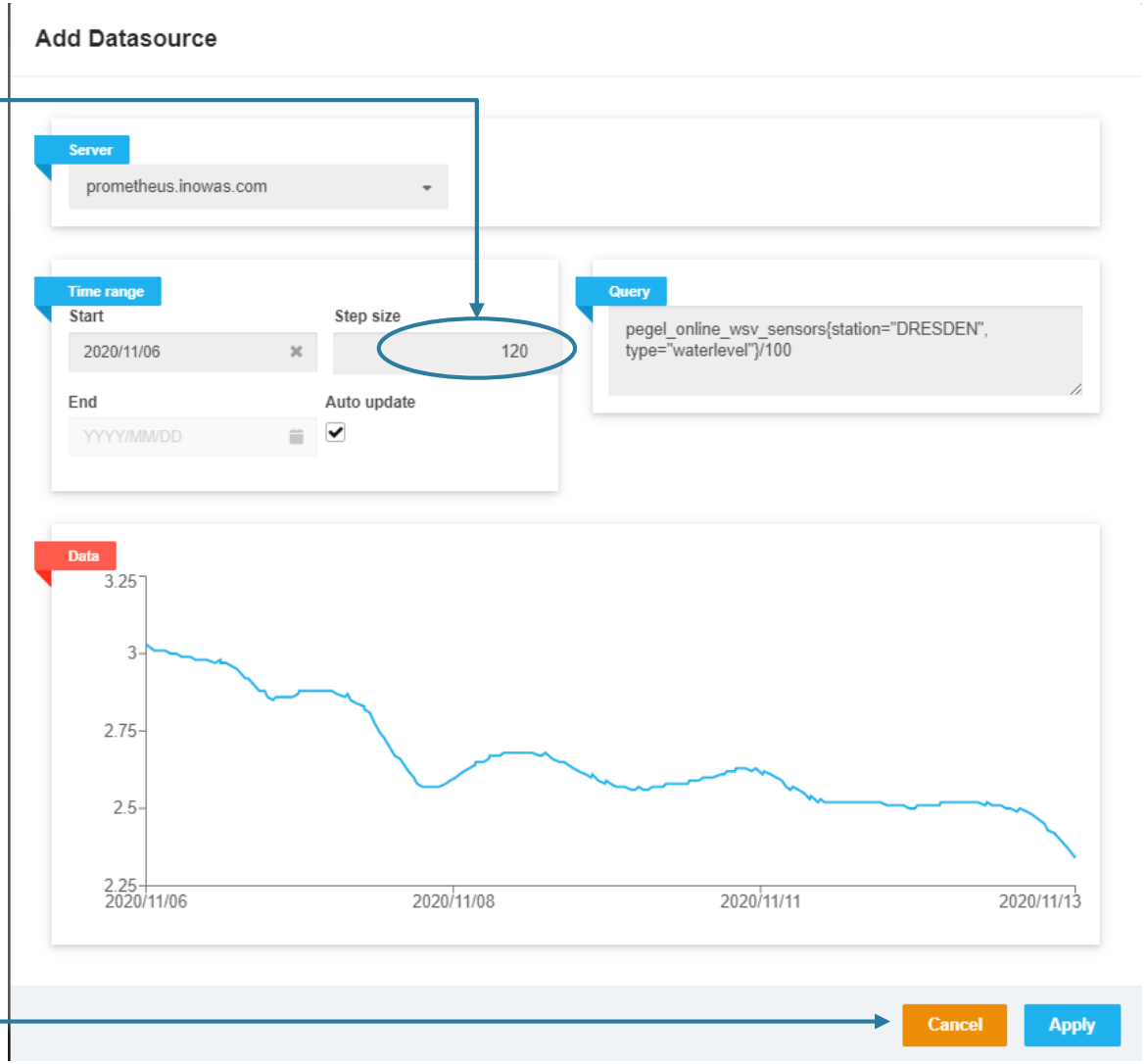
→*Add **water level***

→*Add data source **prometheus***

Sensor setup: add data source - prometheus

→ *Change the **step size** to 10 000*

→ *Go on **„apply“** to include the data into your project*



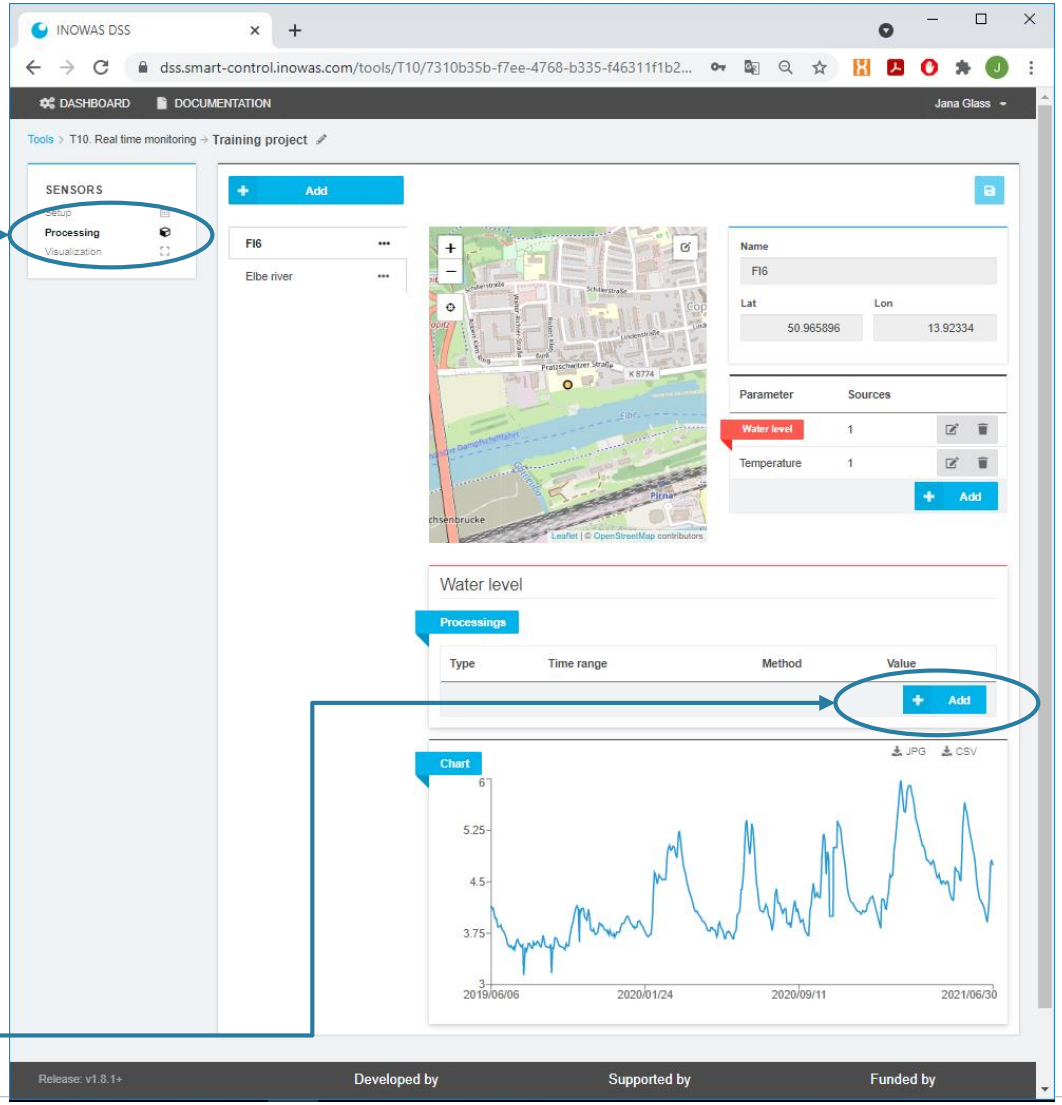
Sensor Processing

→ *Navigate to the **sensor processing** section*

The following features are implemented:

- Time processing:
  - change the time resolution of a time series
  - cut time series (define beginning and end that will be used)
- Value processing:
  - Various processing algorithms e.g. =, +,-, *,/, >, <
- Export of resulting time series via CSV or JPG

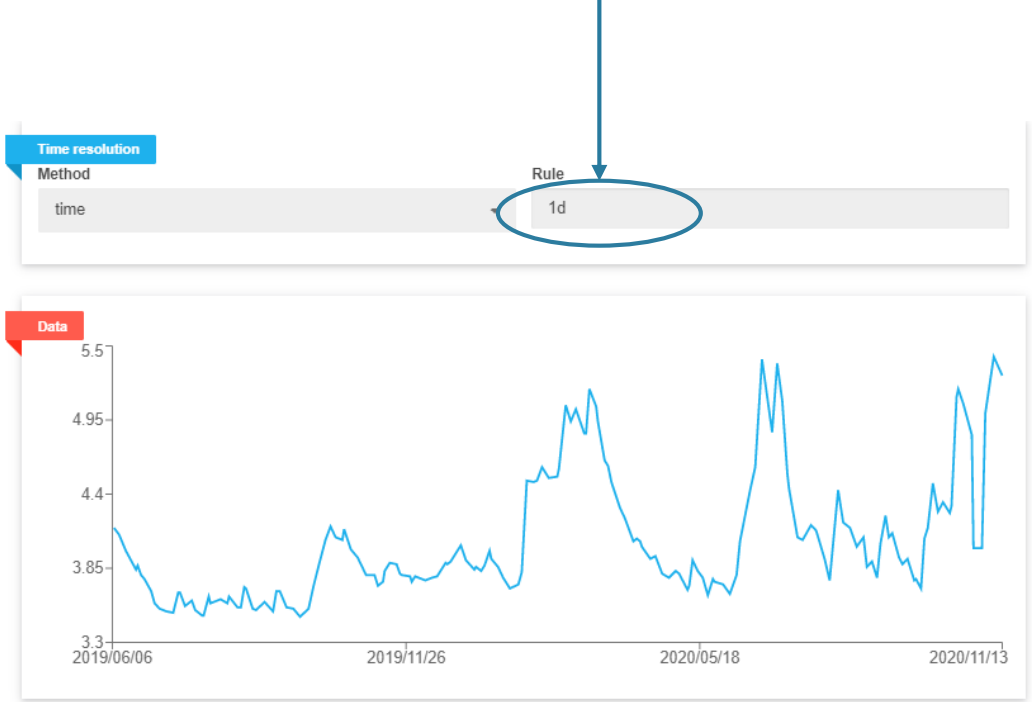
→ *Start **time processing** of the **water level** of **FI6***

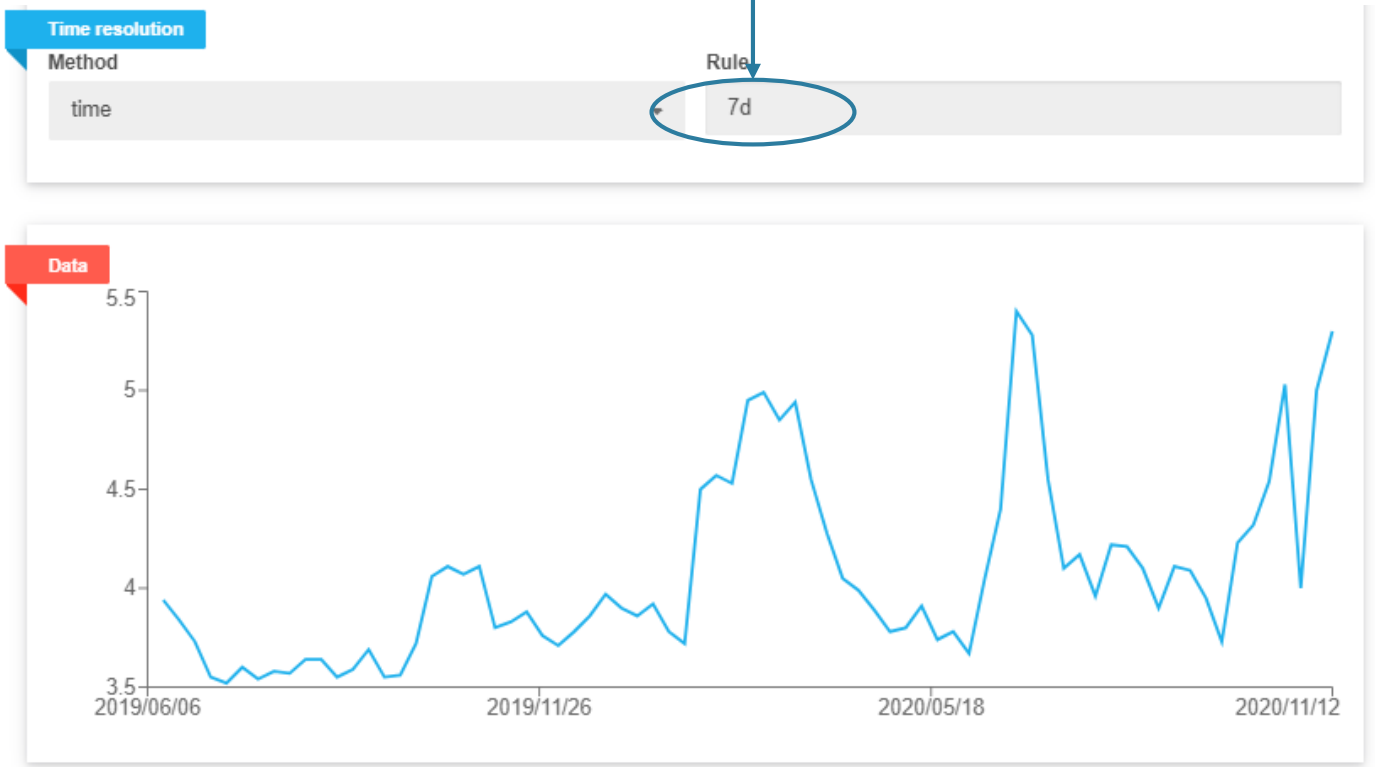


Sensor data processing - time

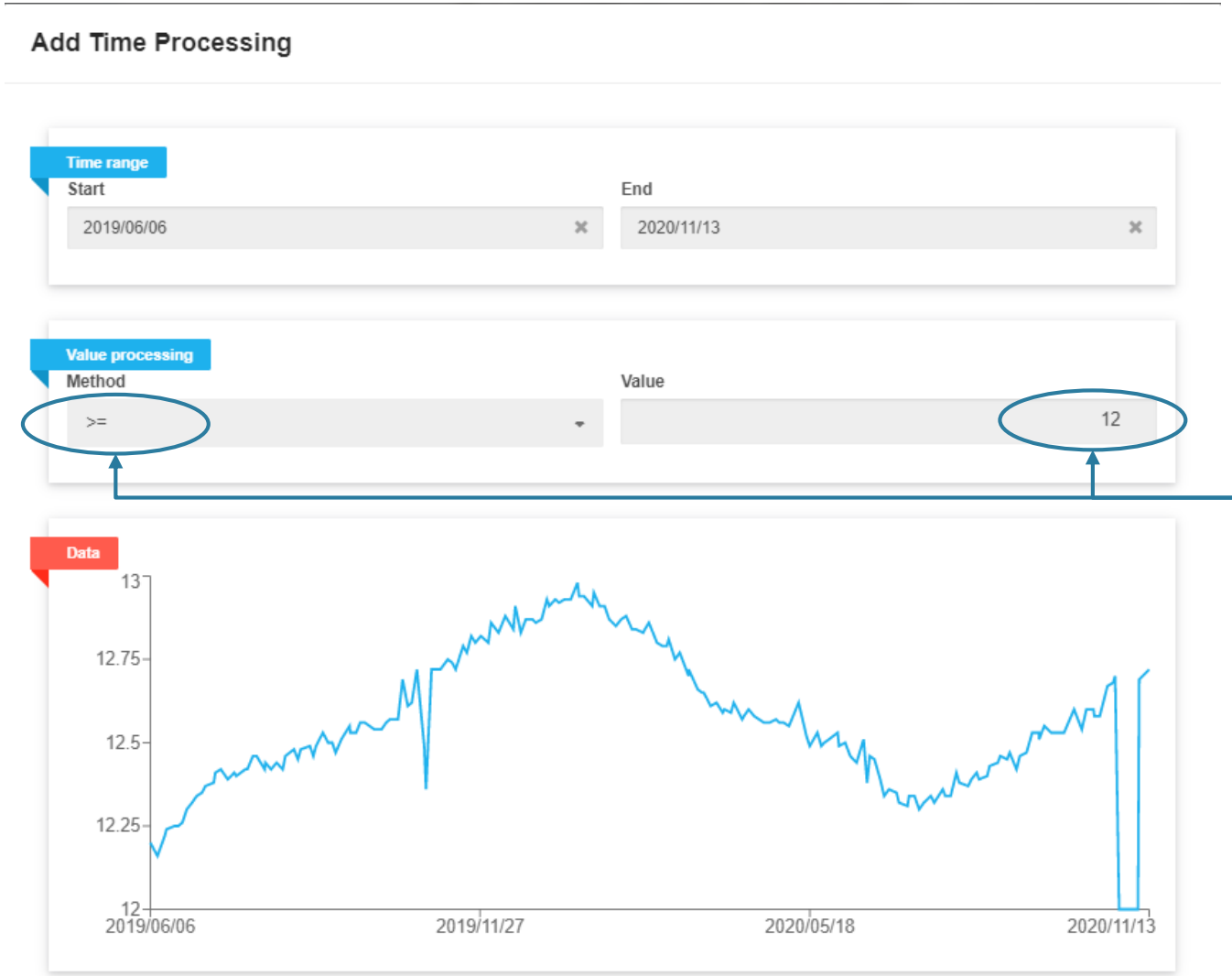
Change the resolution of the time series data of the water level of FI6 from

1 d to 7 d





Sensor data processing - value



→ *Start **value processing** of the **temperature** of **FI6** to filter temperature values*

Example:

Only show values >= 12

→ *Click **"apply"** to save the changes*

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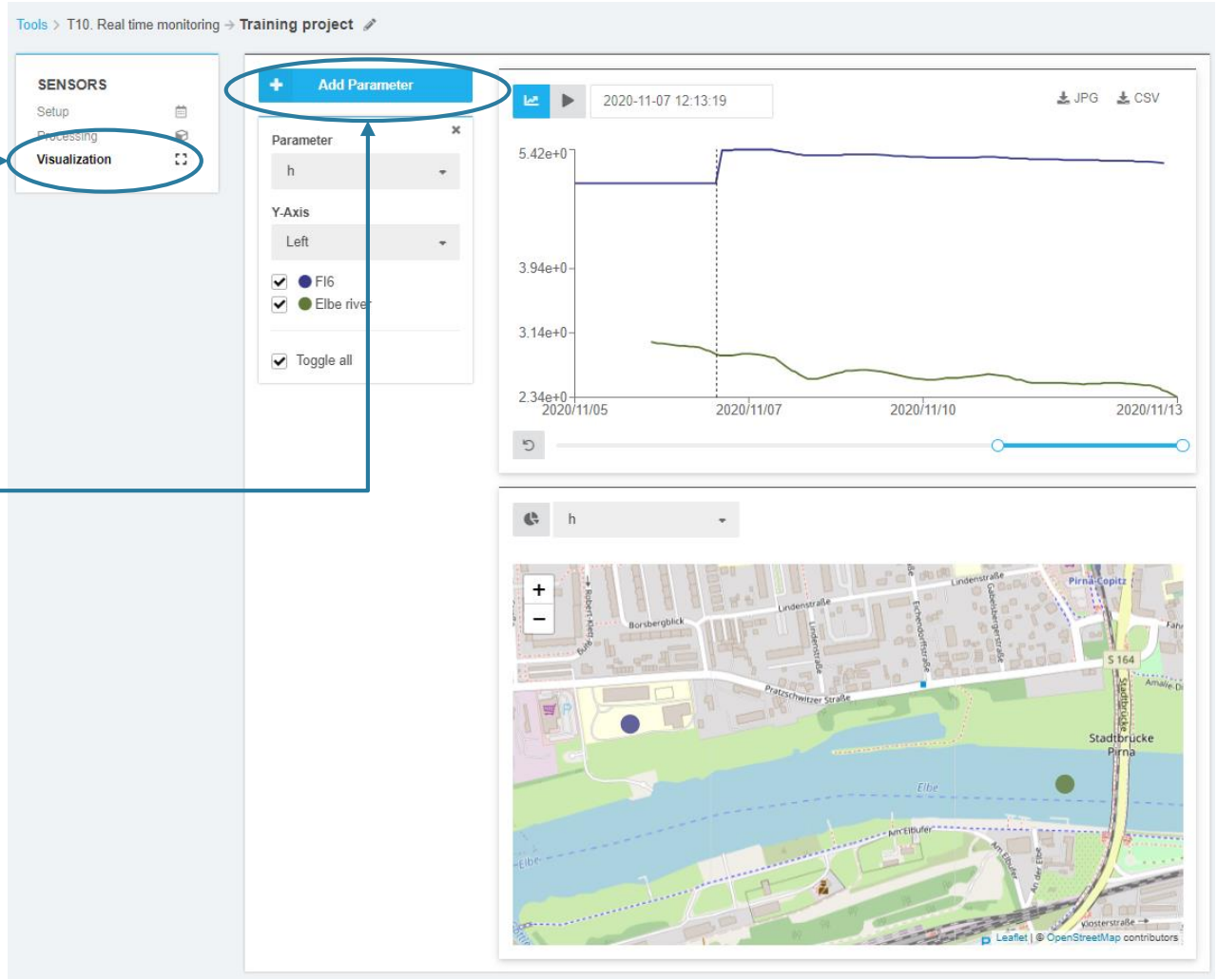
Sensor visualization

→ *Navigate to the **visualisation** section*

→ *Compare various sensors or parameters*

→ *Using the add parameter button, a second parameter can be added, e.g. the temperature to the right y-axis*

Be aware that new Elbe river data and water level data of the sensor FI6 are automatically integrated



Contact

Thank you for going through the tutorial. If you have any comments or questions, please contact us.

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