ULTIMATE

WATER SMART INDUSTRIAL SYMBIOSIS

CS3 – Development of an early warning system for saltwater intrusion in the sewer system

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20th May 2021

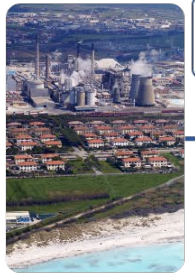
ULTIMATE Project

9 DEMOSITES

ULTIMATE will implement Water Smart Industrial Symbiosis in nine large-scale business cases from the international agro-food, petrochemical and biotech sector.

- 1- Tarragona (ES)
- 2- Nieuw Prinsenland (NL)
- 3- Rosignano (IT)
- 4- Nafplio (EL)
- 5- Lleida (ES), Ostrava (CZ)
- 6- Karmiel, Shafdan (IL)
- 7- Tain (UK)
- 8- Saint-Maurice l'Exil (FR)
- 9- Kalundborg (DK)

Cecina municipality



Rosignano municipality

Unpredicted Saltwater intrusion

Unpredicted Saltwater intrusion

Cecina WWTP

Rosignano WWTP

Flow splitter

To surface water body

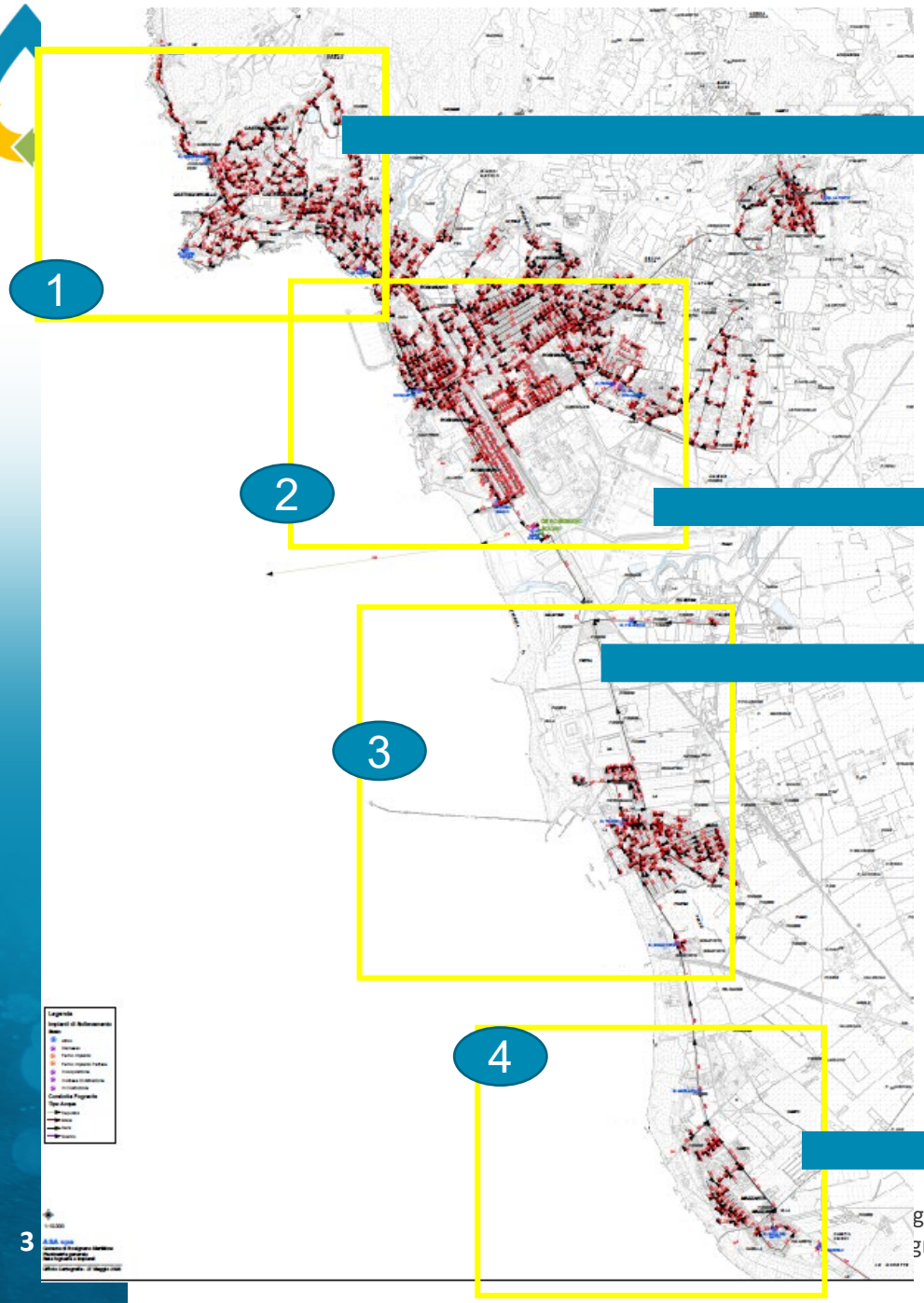
Aretusa WWRP

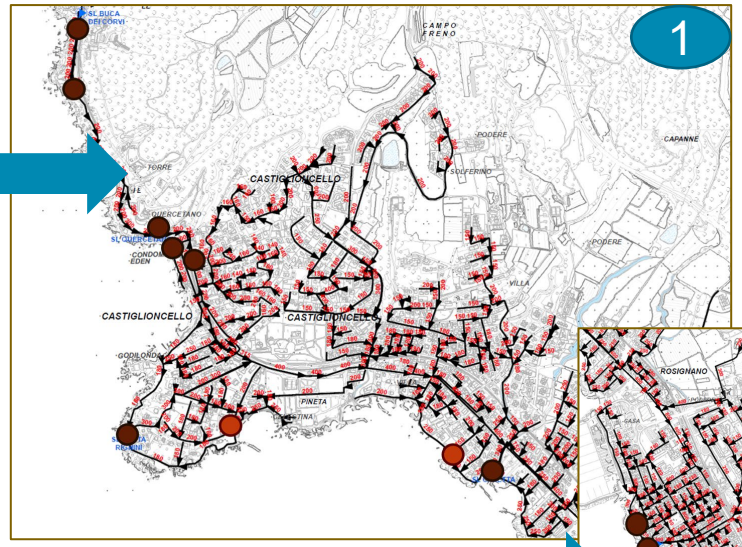
Groundwater

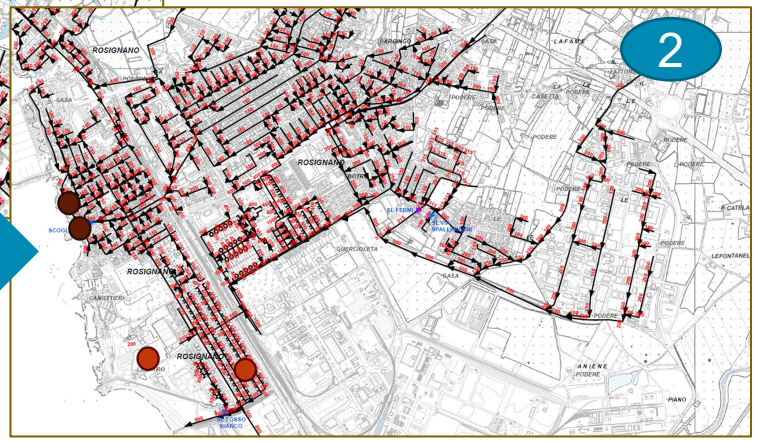
Unpredicted high unacceptable salinity

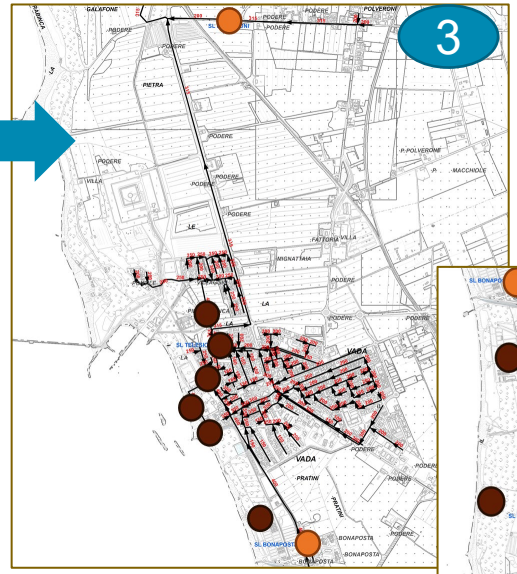
Solvay Industry

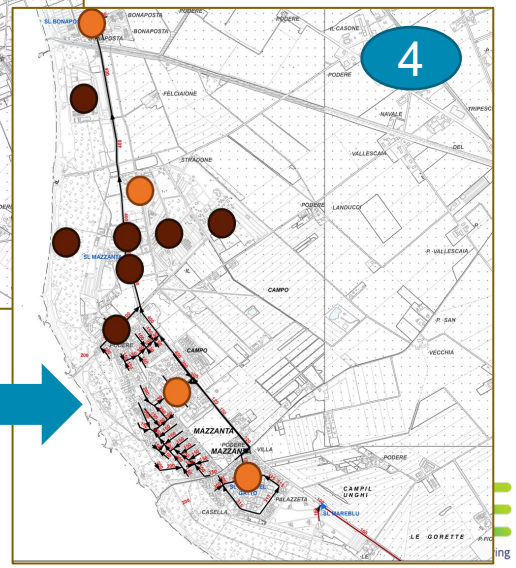
ROSIGNANO Targeted Sampling Campaign









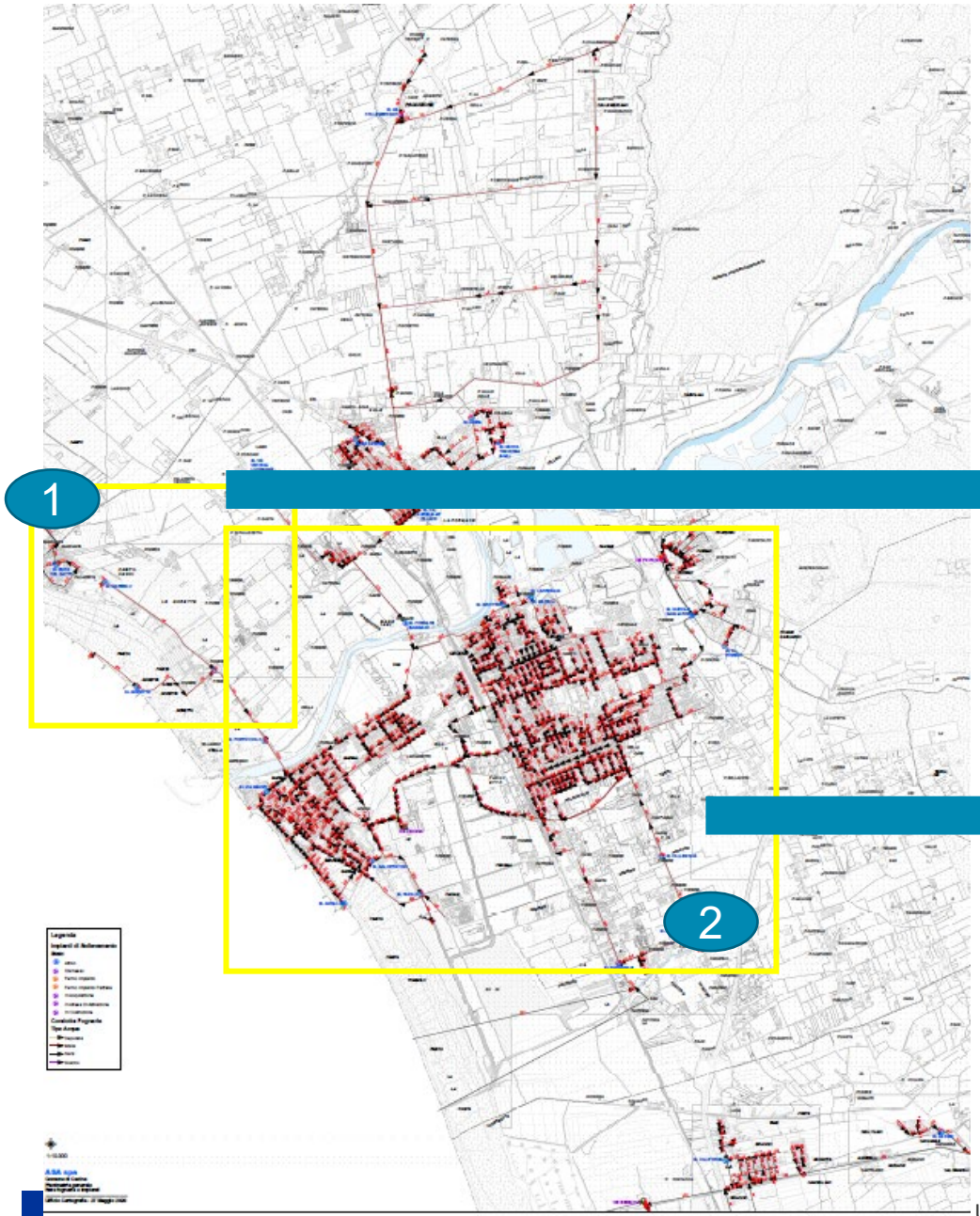


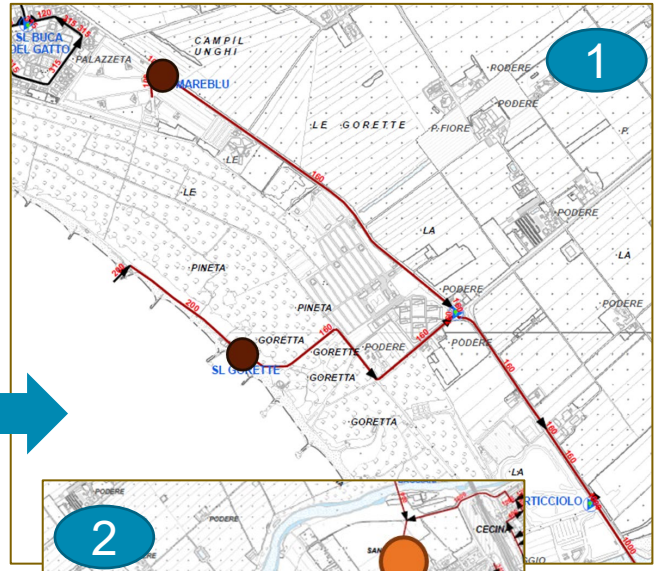
µS/cm

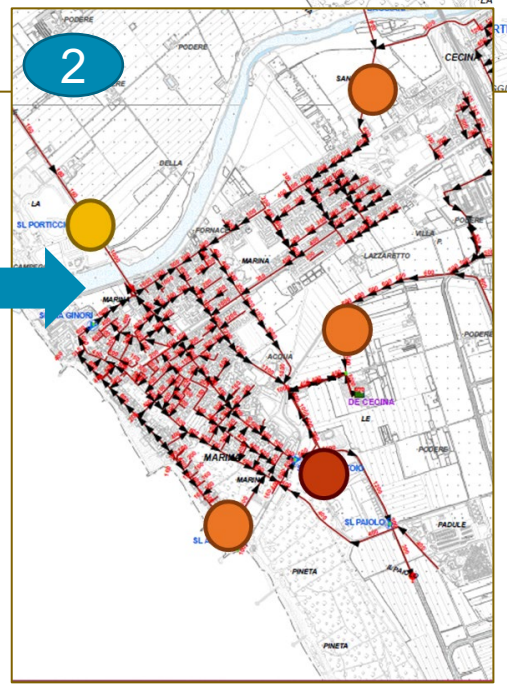
< 1800
1800-2000
2000-3000
3000-4000
> 4000

g from the European Union's
grant agreement No 869318

CECINA targeted sampling campaign







µS/cm

< 1800
1800-2000
2000-3000
3000-4000
> 4000

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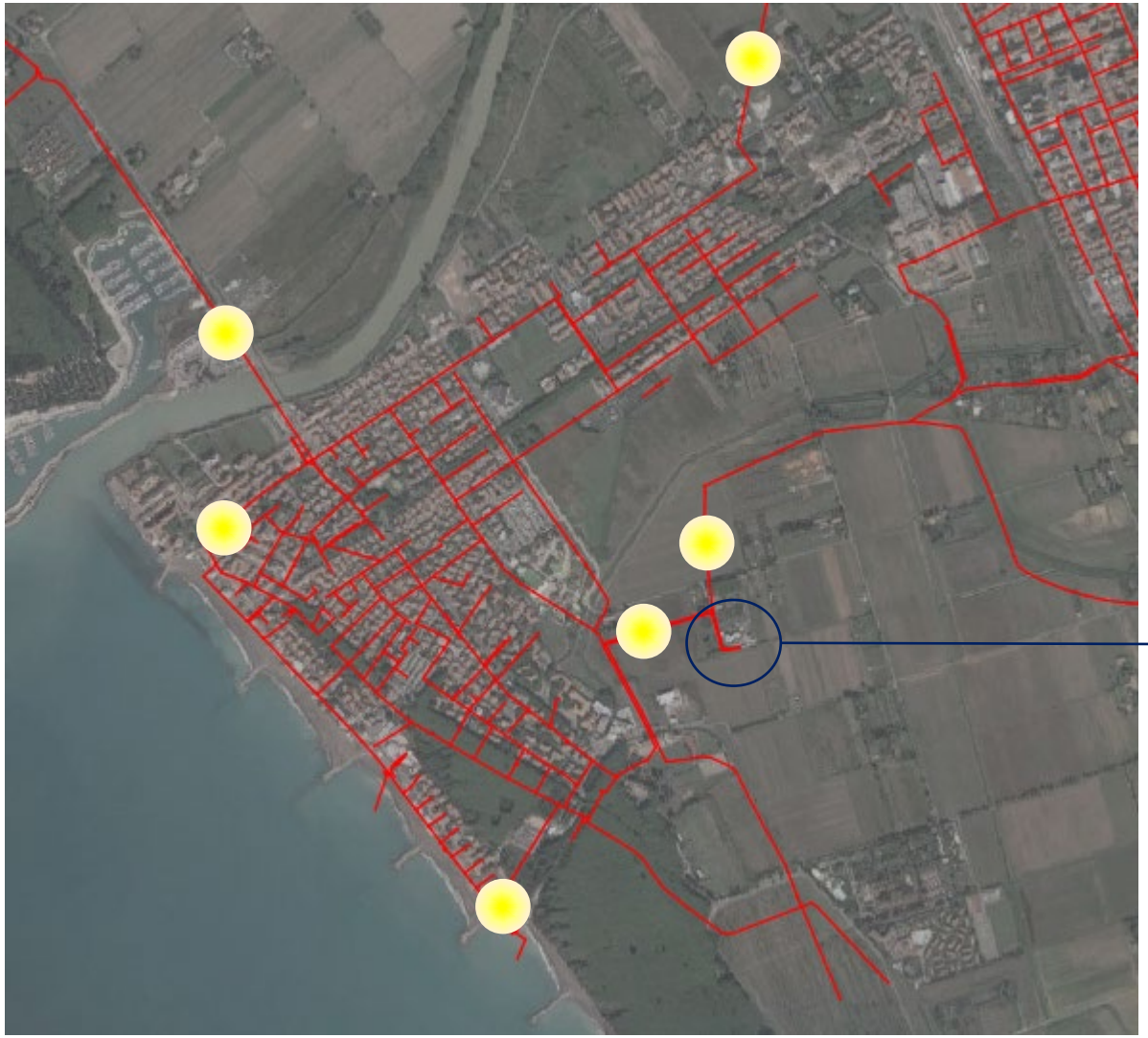
CECINA Sensor network



- ✓ 3 conductivity sensors in Cecina sewer network
- ✓ 4 flow sensors in Cecina sewer network
- ✓ 2 conductivity sensors at Cecina WWTP

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ROSIGNANO and ARETUSA Sensor network

Influent

ROSIGNANO WASTEWATER TREATMENT PLANT

Effluent

Influent

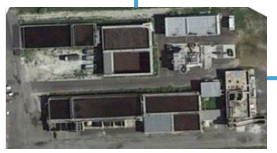
ARETUSA WASTEWATER REUSE PLANT

Effluent

- ✓ 6 conductivity sensors in Rosignano sewer network
- ✓ 6 flow sensors in Rosignano sewer network
- ✓ 2 conductivity sensors at Rosignano WWTP
- ✓ 2 conductivity sensors at Aretusa WWRP

Smart equalization before ARETUSA WWRP

Flow = 2458 ± 3241 m3/d
EC = 2661 ± 552 µS/cm
Surface water body


Rosignano WWTP

Flow = 9281 ± 3623 m3/d
EC = 2661 ± 552 µS/cm

Cecina WWTP

Flow = 3477 ± 2140 m3/d
EC = 1976 ± 541 µS/cm

Flow = 2893 ± 2798 m3/d
EC = 1976 ± 541 µS/cm
Surface water body

Aretusa WWRP

1. Equalization
2. Coagulation/flocculation
3. Sedimentation
4. Sand filtration
5. Biological activated carbon
6. Activated carbon filtration

Wastewater to Solvay

Flow = 9753 ± 1945 m3/d
EC = 2319 ± 483 µS/cm
Required EC: < 2000 µS/cm

SOLVAY

Groundwater

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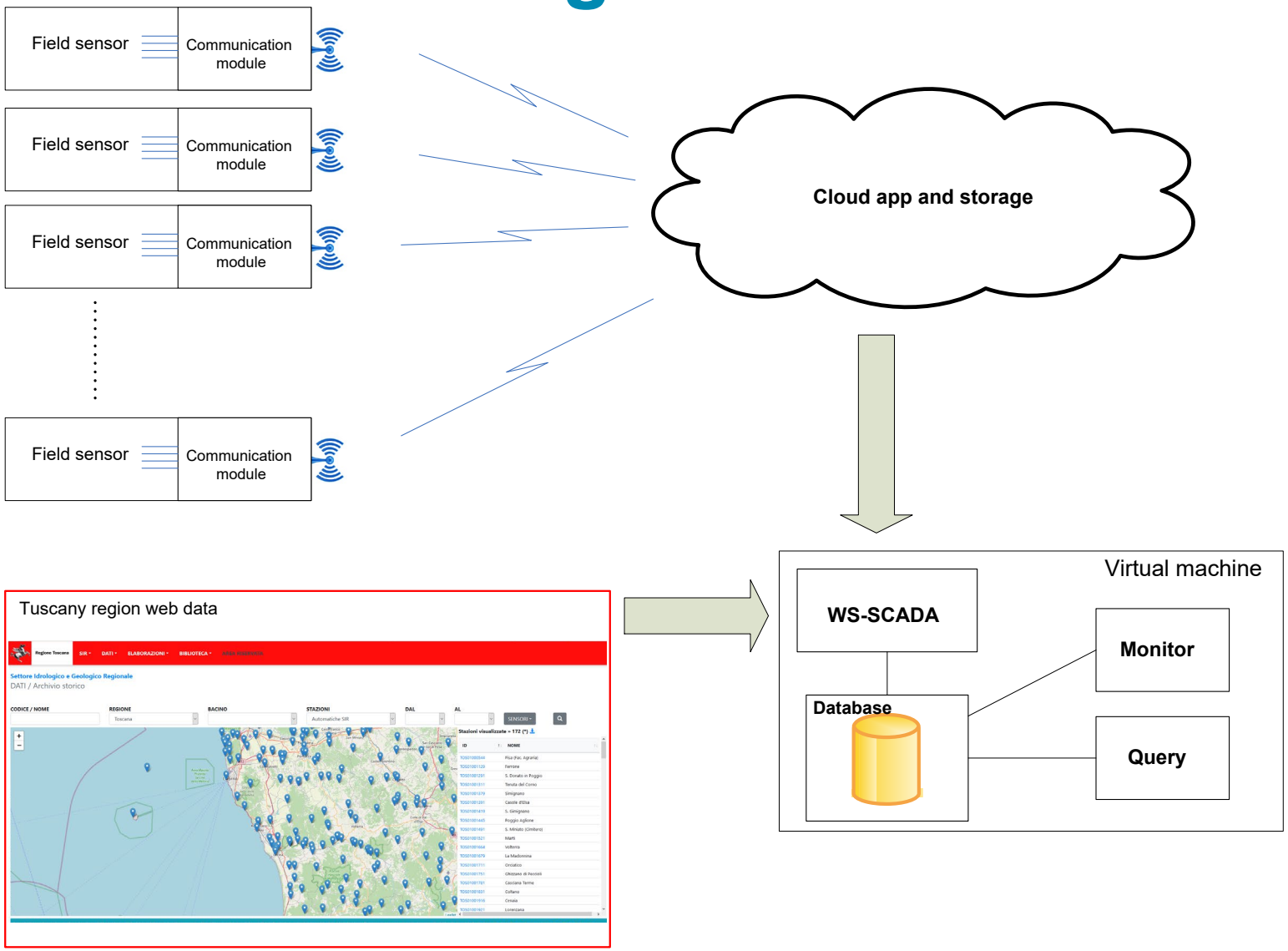
Real-time data monitoring



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Sensor

- 4 electrodes (2 graphic, 2 platinum)
- Range 0 to 200 mS/cm
- Digital sensor / **Modbus** RS-485
- Robust and Watertight

Resolution Conductivity	0,01 to 1 according the range
Accuracy Conductivity	+/- 1 % of the full range Beyond 100 mS/cm use appropriate buffer solution
Measure range salinity	5-60 g/Kg
Measure range TDS -KCl	0-133 000 ppm
Measure range Temperature	0,00 °C to + 50,00°C
Resolution Temperature	0,01 °C
Accuracy temperature	± 0,5 °C
Response time	< 5 s
Working temperature	0°C to 50°C
Temperature compensation	NTC
Stocking temperature	- 10°C to + 60°C
Signal interface	Modbus RS-485 (option SDI-12)
Maximum refreshing time	Max < 1 s
Sensor power-supply	5 to 12 volts
Electric consumption	Standby : 25 µA Average RS485 (1 measure/seconde) : 6,3 mA Average SDI12 (1 measure/seconde) : 9,2 mA Current pulse : 500 mA

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Datalogger

- **2 Analog inputs (0-20 mA, 0-5 V, 0-10 V)**
- **RS-485 Communication**
- **Cloud computing (MiDOMetSoft)**
- **Battery powered**
- **GSM/GPRS data communication**

The data logger is connected to a cloud platform to upload the data recorded

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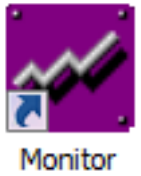
WS-SCADA software suite

WS-Scada (SCADA - *Supervisory Control And Data Acquisi*tion)



Monitor

Query

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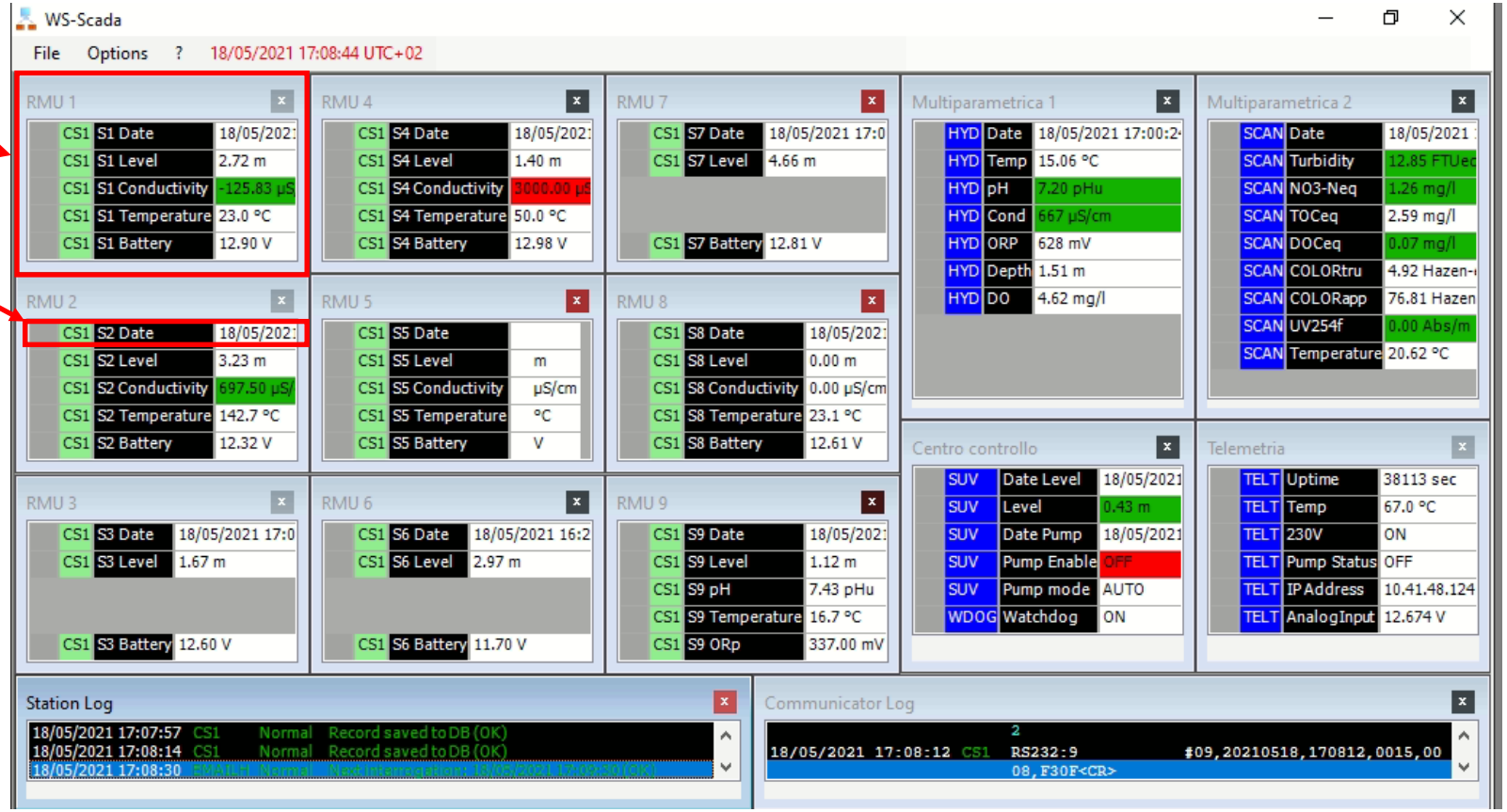
WS-SCADA software suite

WS-SCADA is able to downlaod data from different sources and save onto the database.

Parameters of each sensor/datalogger connected to the system is shown inside a box

The first line shows date and time of the last value downloaded



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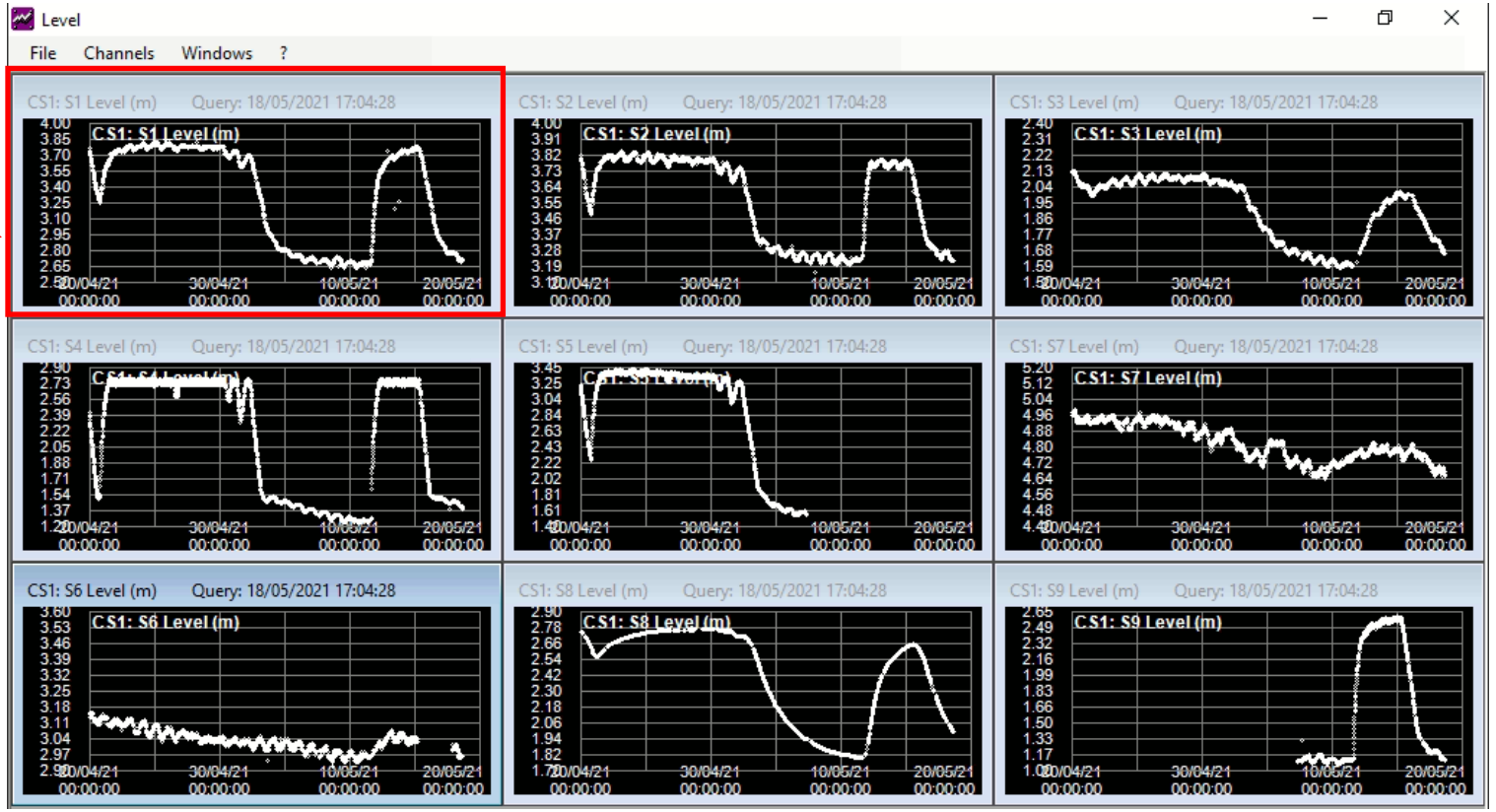
WS-SCADA monitor

Each box shows the plot of the temporal variation of a single parameter monitored

Time scale (x) and vertical scale (y) can be configured to set a different zoom



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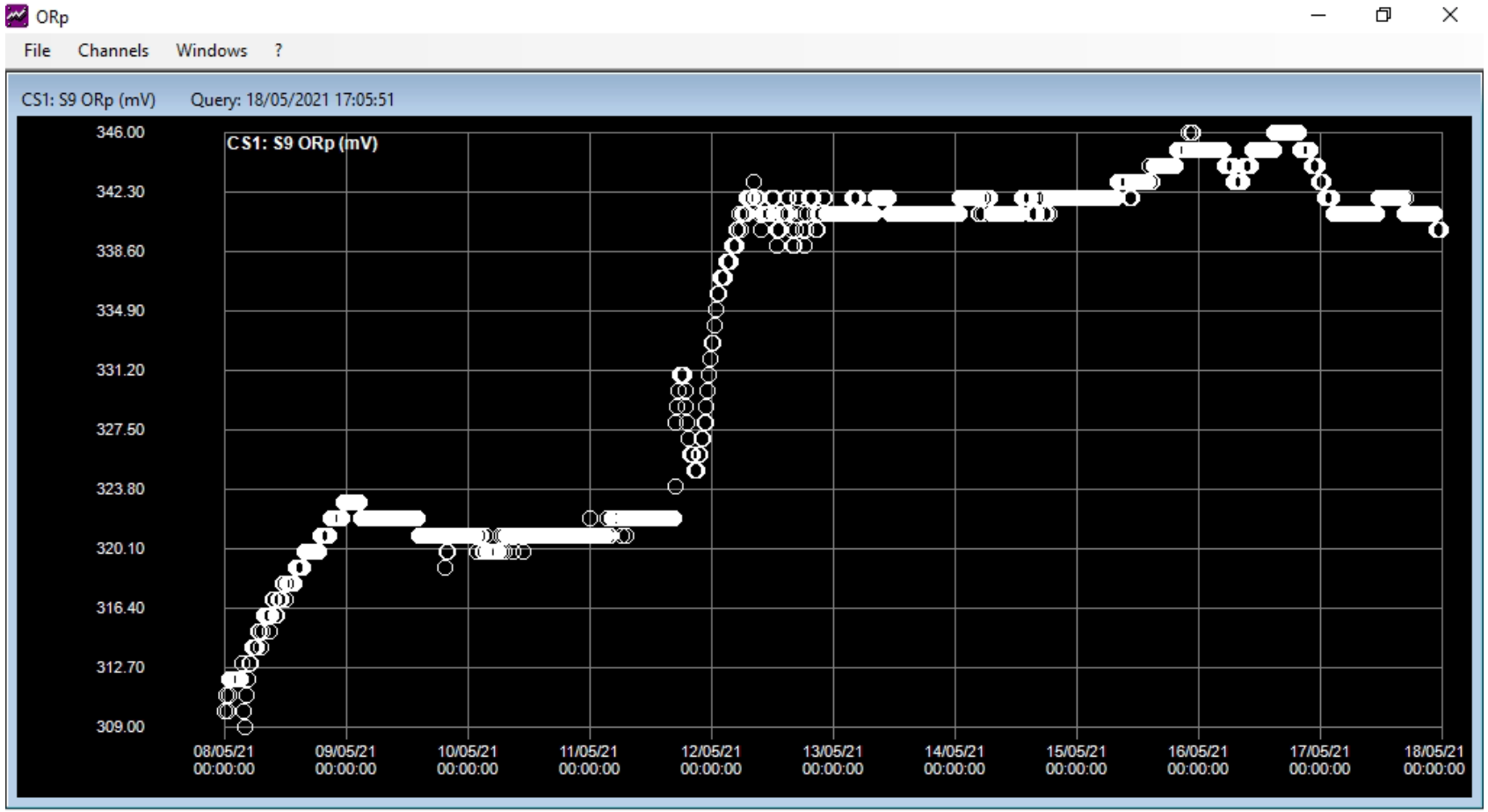
WS-SCADA monitor

Each dot on the plot represents the value of a single measurement stored in the database



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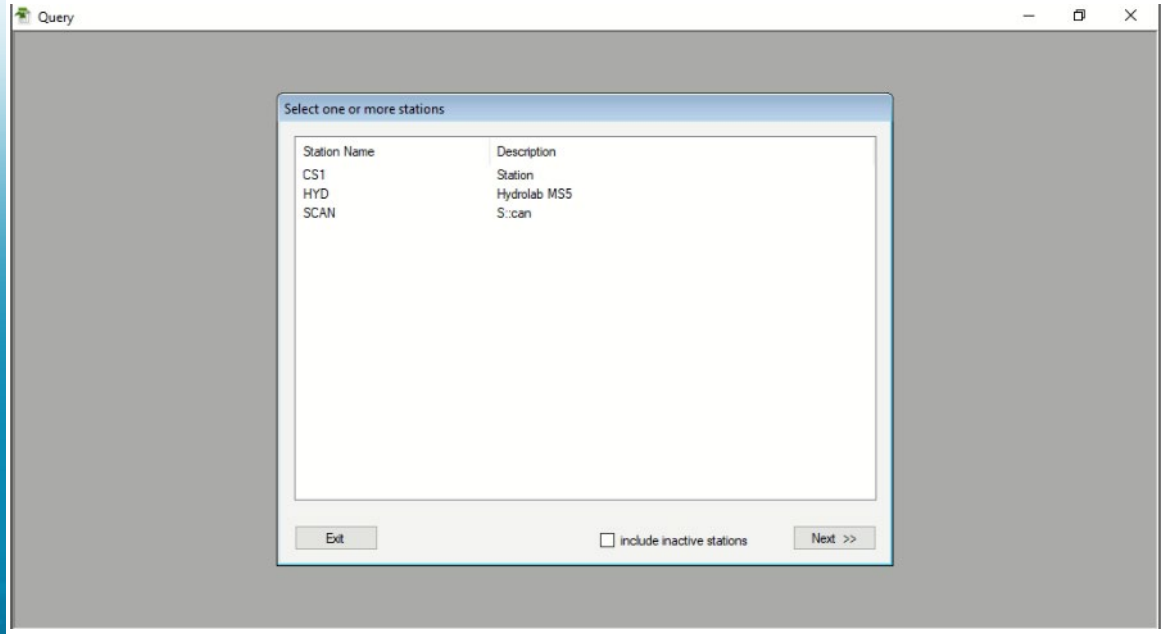
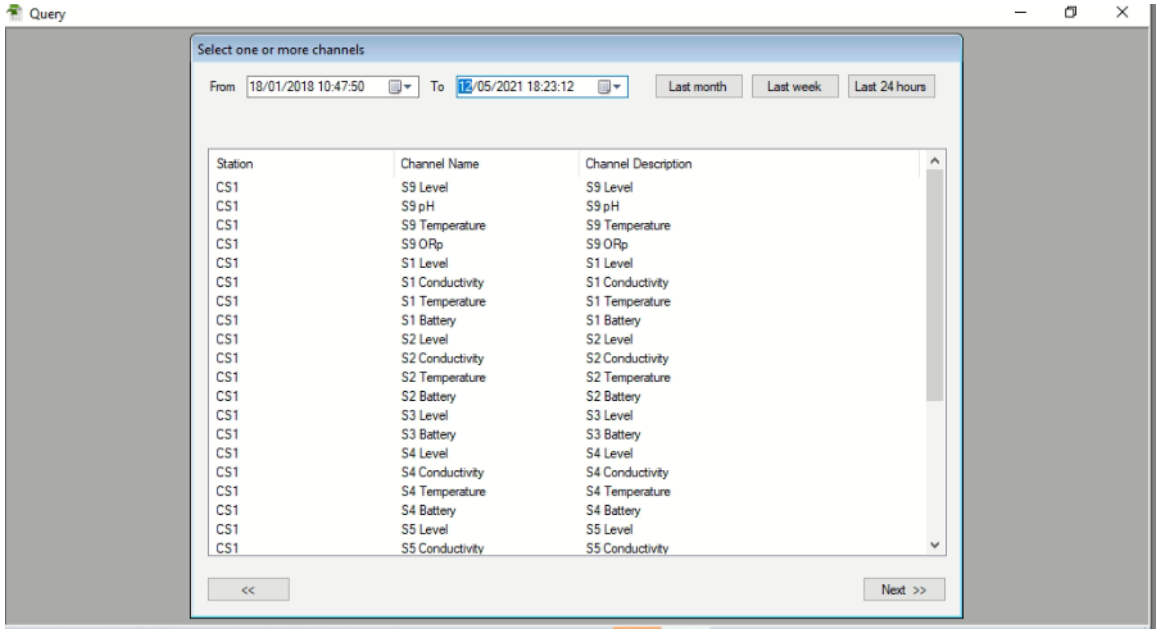
WS-SCADA query

Query

Allows to export data from the database and save them in Excel format or in Text format for data processing





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Thank You!

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