

Join the FREEWAT family FREE and open source software tools for WATer resource management

Pieter Jan Haest

www.agt.be



AGT

Adviesbureau
Grondwater
Technieken

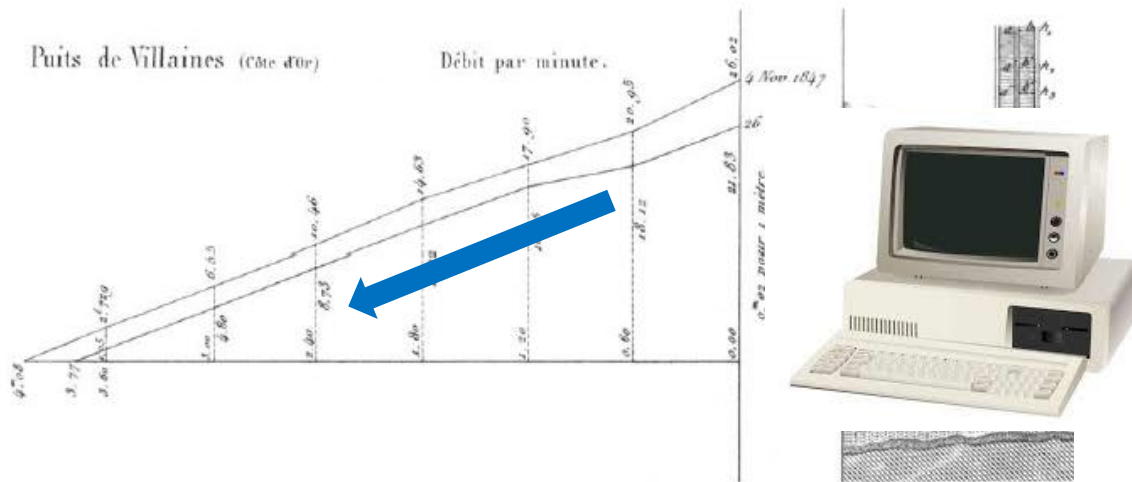


Introduction

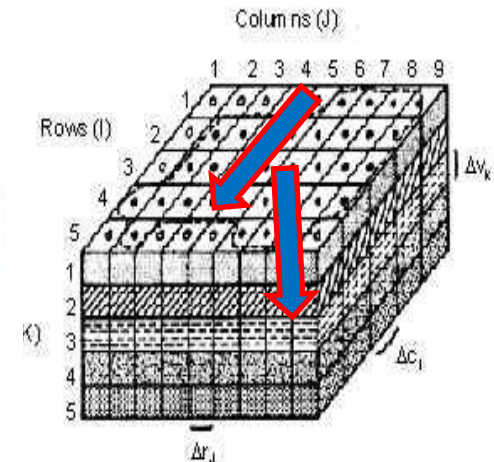
Hydrogeology?



Introduction



Source: Brown, 2002, 10.1029/2001WR000727



Explanation

----- Aquifer Boundary

● Inactive Cell

○ Inactive Cell

Dimension of cell along the column direction.
Subscript (J) indicates the number of the column.

Dimension of cell along the row direction.
Subscript (I) indicates the number of the row.

Δz
Dimension of cell along the vertical direction.
Subscript (K) indicates the number of the layer.

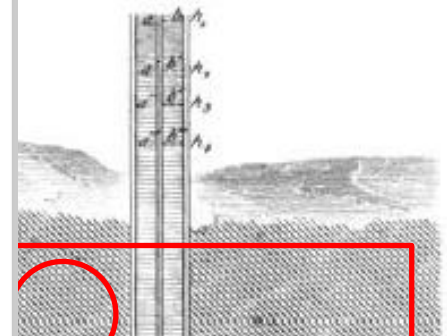
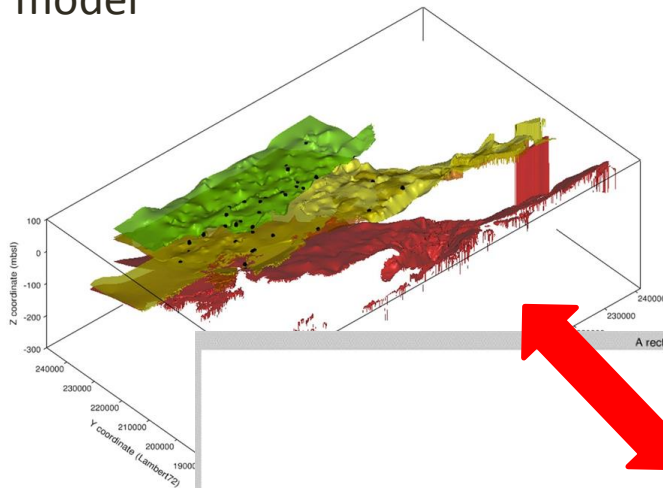
$$\frac{\partial}{\partial x} \left[K_{xx} \frac{\partial h}{\partial x} \right] + \frac{\partial}{\partial y} \left[K_{yy} \frac{\partial h}{\partial y} \right] + \frac{\partial}{\partial z} \left[K_{zz} \frac{\partial h}{\partial z} \right] - W = S_s \frac{\partial h}{\partial t}$$

Figure 16-1 (after figure 1, McDonald and Harbaugh, 1988).
A discretized hypothetical aquifer system.

Introduction

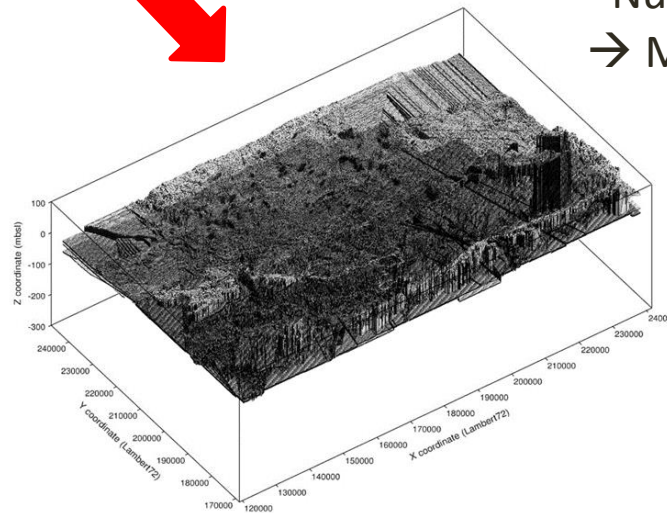
Conceptual model

→ GIS



A rectangular hydrogeological model for the Campine Aquifer System

Numerical model
→ MODFLOW GUI



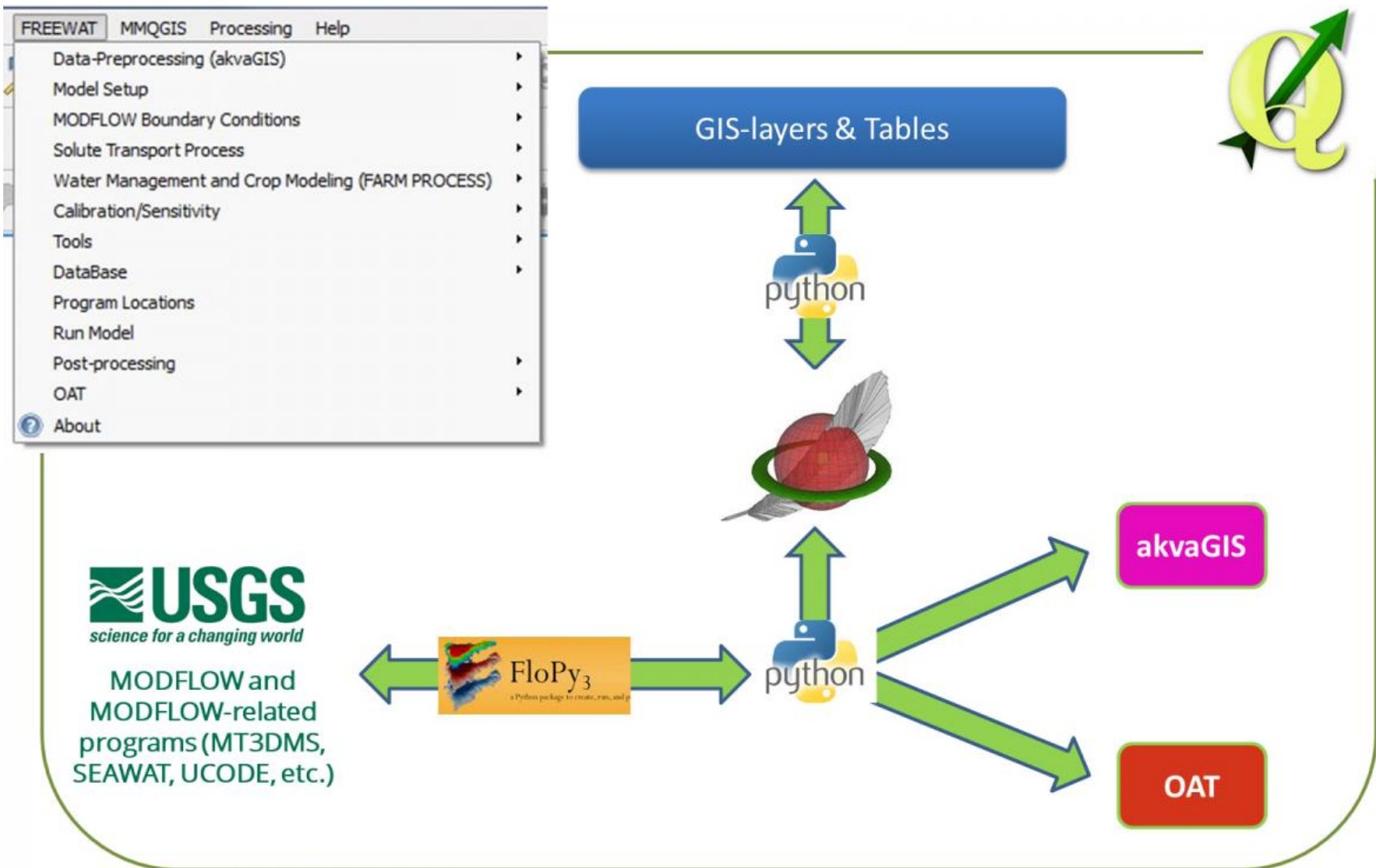
value value value

The H2020 FREEWAT project

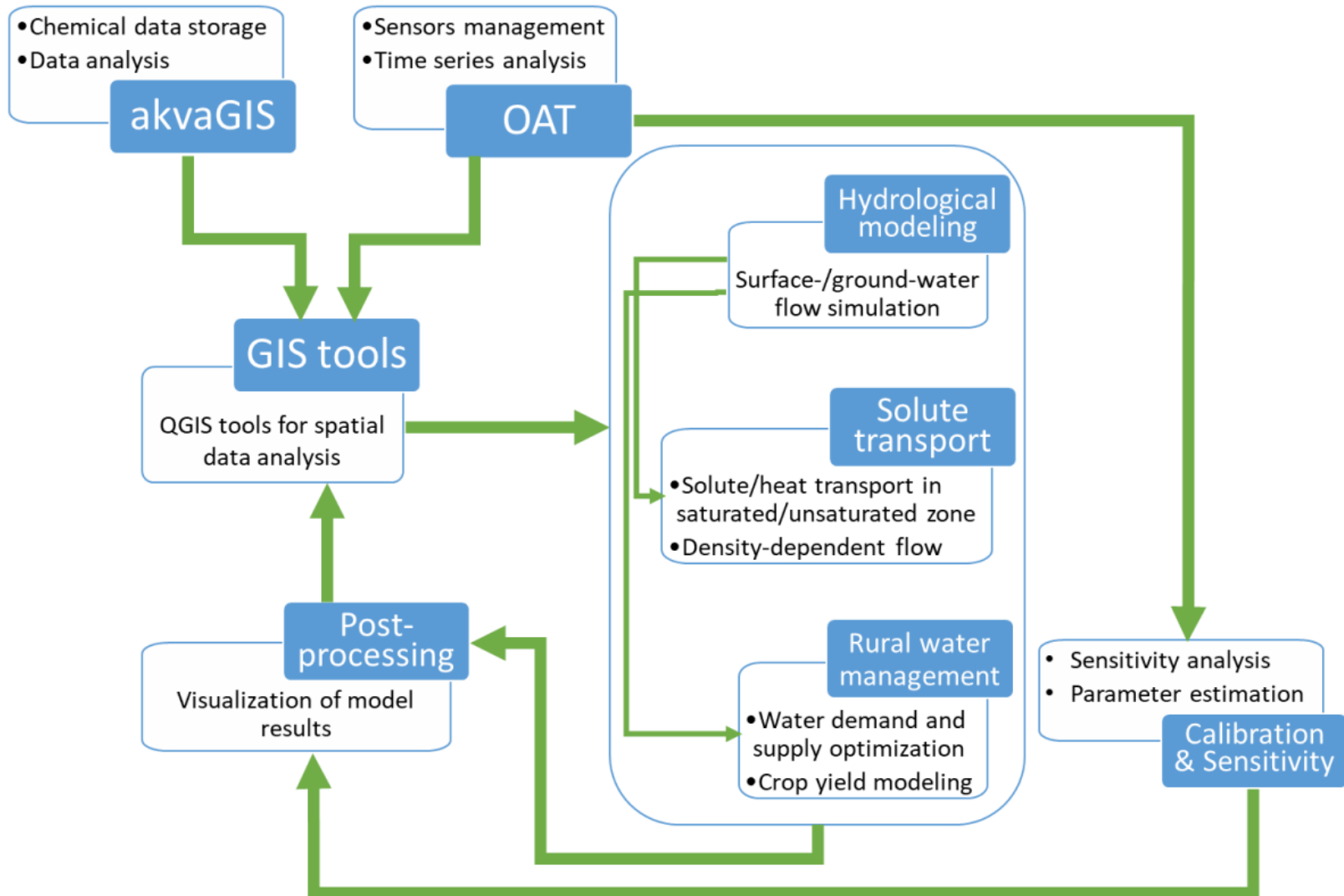
- FREEWAT (FREE and open source software tools for WATer resource management):
 - **Open source** and **public domain**, **GIS-integrated** modelling platform
 - **Promote** scientifically and technically sound decision making by a **participatory, data-driven** approach
 - Move money from license to **human capital**



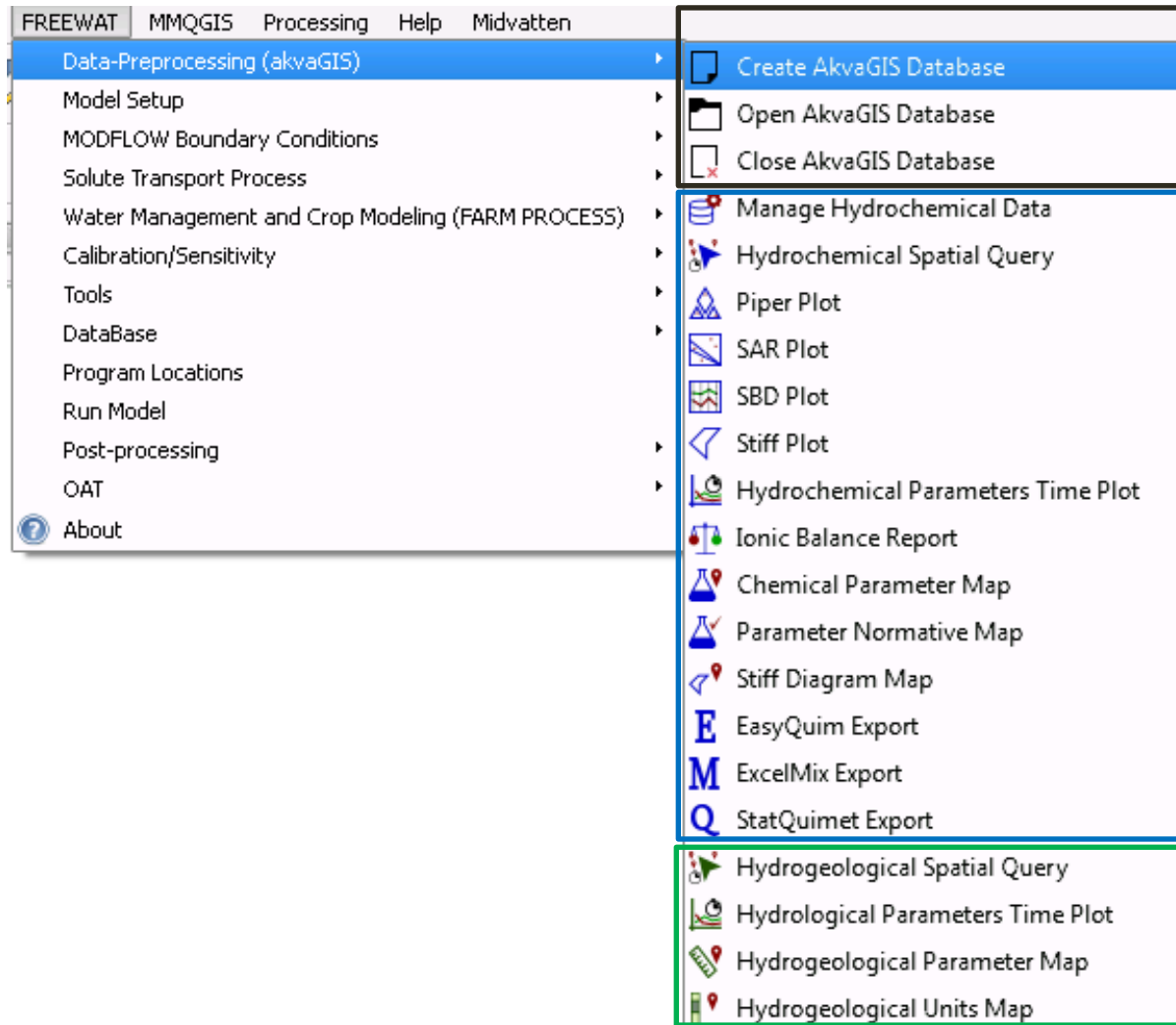
FREEWAT: QGIS plugin architecture



FREEWAT: modules



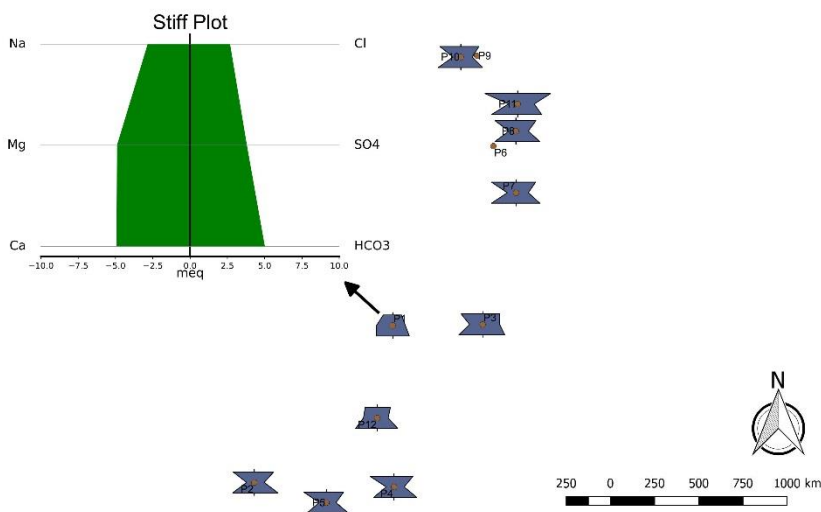
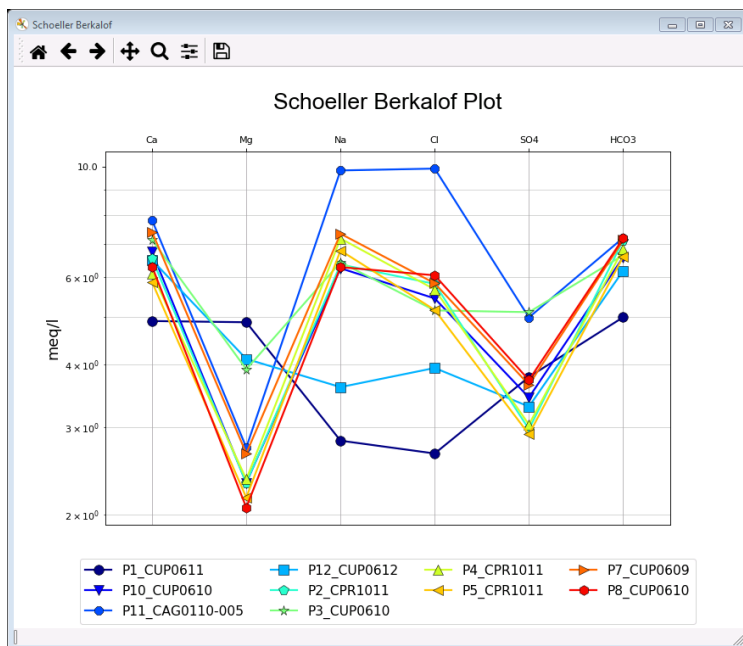
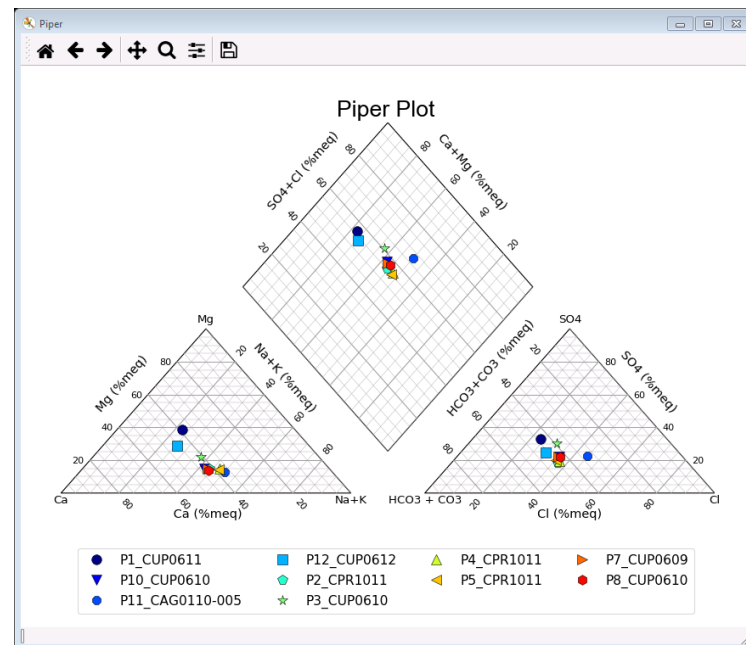
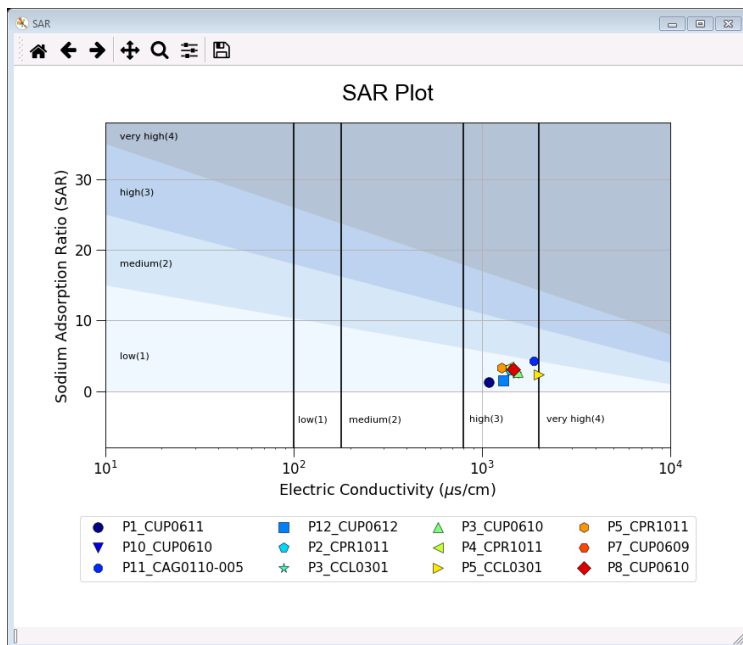
FREEWAT: gallery



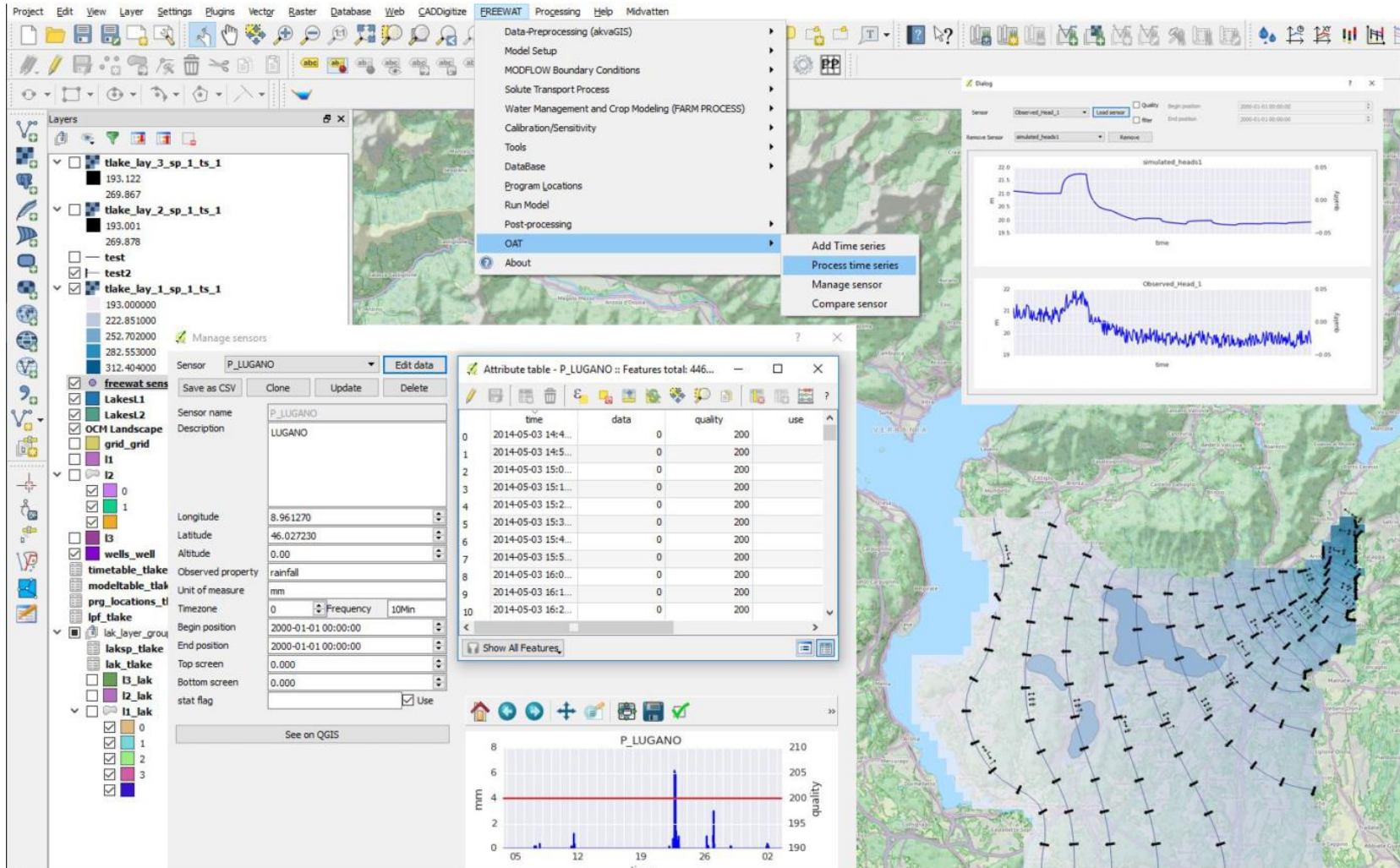
Database
management

Hydrochemical
analysis tools

Hydrogeological
analysis tools



FREEWAT: gallery



FREEWAT: gallery

Run Model

Model Name:

Groundwater Flow Solute Transport Water Management and Crop Modeling Model Calibration

☐ CHD
☒ WEL
☒ RIV
☒ DRN
☒ GHB
☐ MNW
☒ RCH
☐ EVT
☐ LAK

☐ UZF (Unsaturated Zone)
 UZF Layer:
 Surface Layer:
 Recharge Option:
☐ Simulate Evapotranspiration
☐ Use SFR Package

☐ SFR2 (Stream Flow Routing)
 SFR Layer:
 SFR Table:
☐ Simulate Unsaturated Zone
 Conversion Factor (CONSTANT) Weighting Factor (WEIGHT)
 Tolerance Level (DLEAK) Num. of Sub-Time Steps (NUMTIM)
 Streamflow Tolerance (FLWTOL)

☐ Activate Link with MT3DMS (LMT Package)
☒ Transport through Unsaturated zone is not simulated ☐ Transport through Unsaturated zone is simulated

OBSERVATIONS

☐ HOB ☐ GBOB
☐ RVOB ☐ DROB ☐ CHOB

Rewetting Parameters

WETFACT IHDWET
 IWETIT

PCG Solver parameters

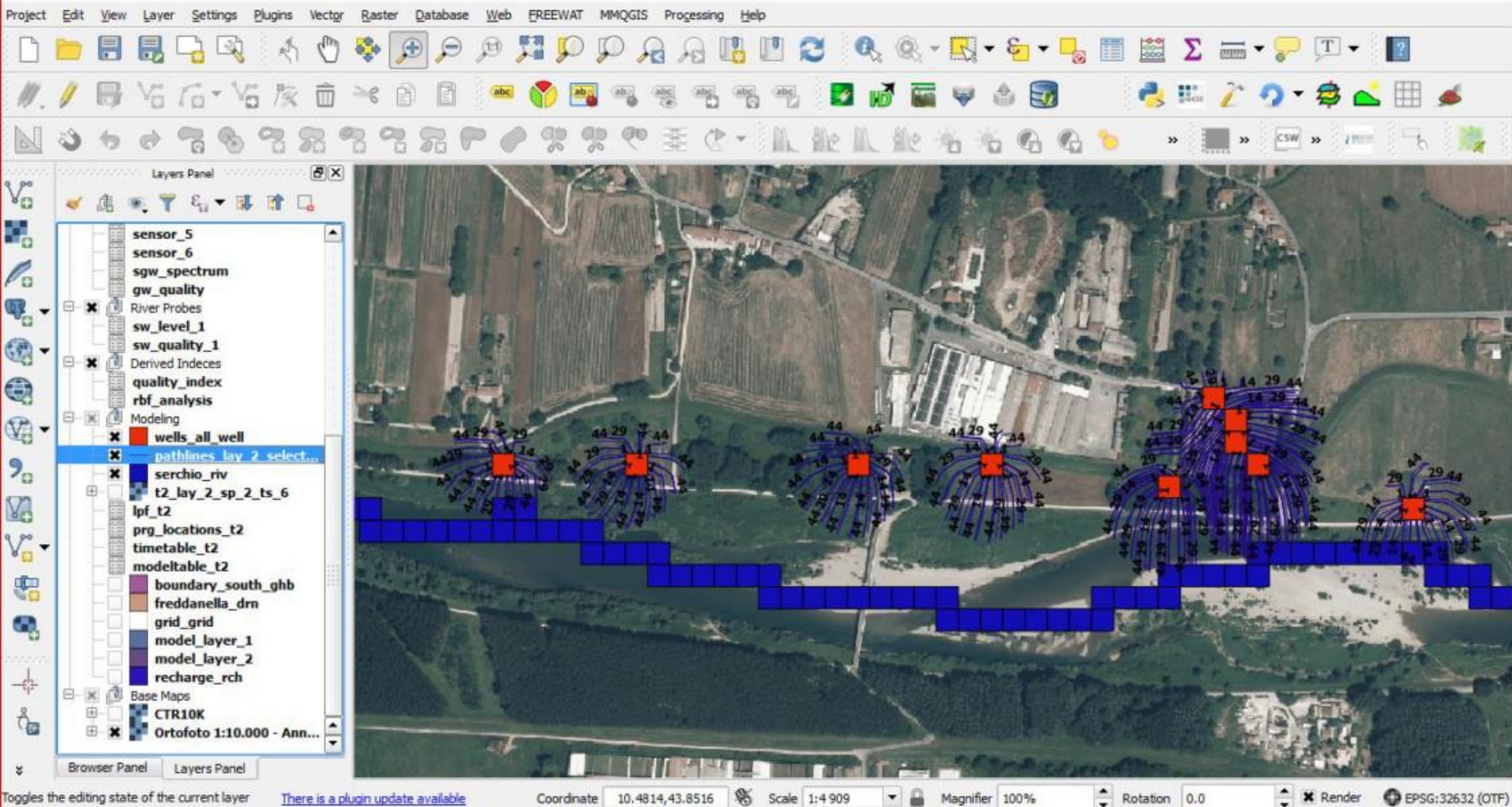
Outer Iteration Inner Iteration

HCLOSE IPRPCG
 RCLOSE DAMP
 RELAX
 MUTPCG

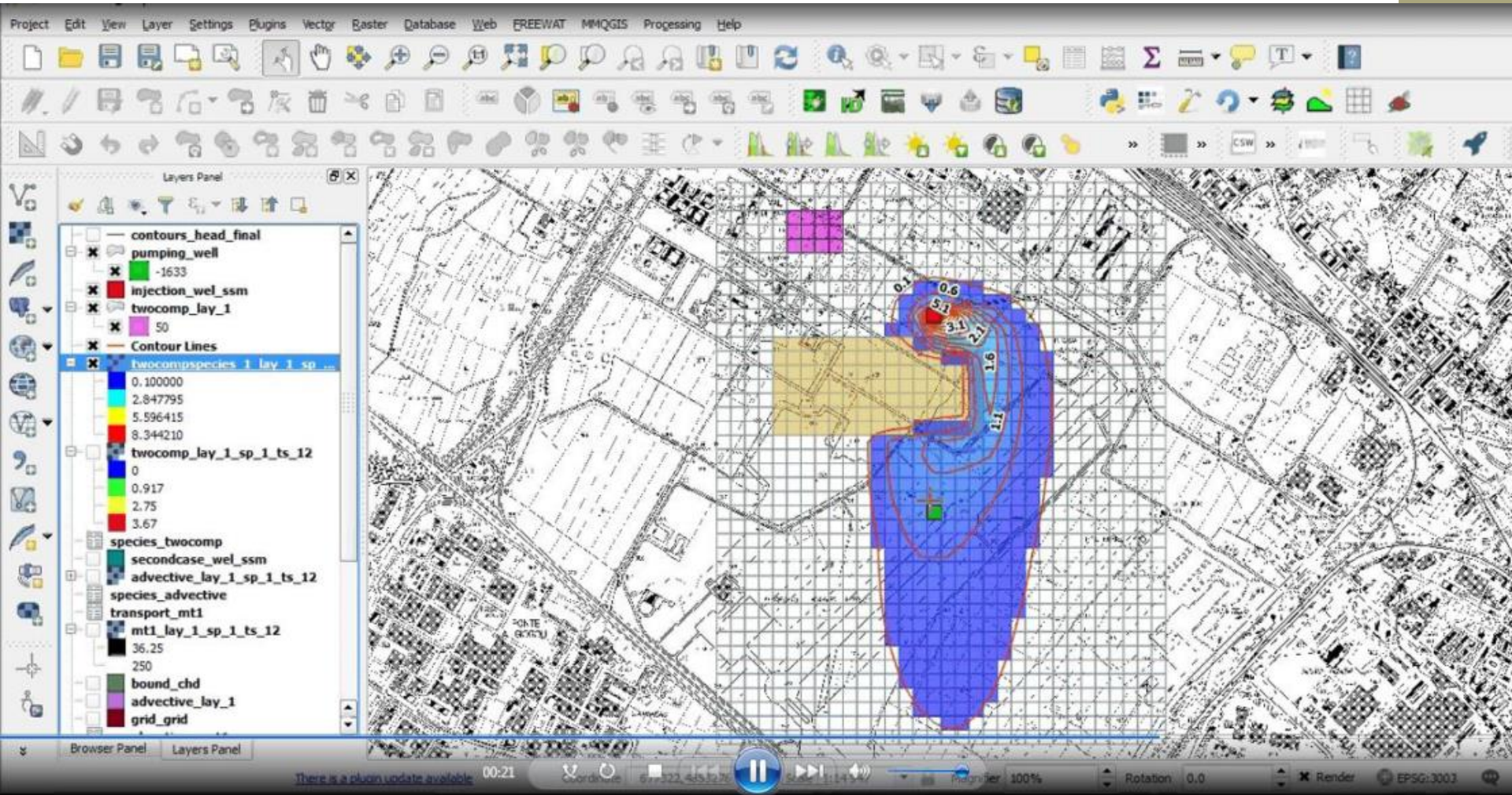
☐ Only Write Input Files

Run Open Report Cancel

FREEWAT: gallery



FREEWAT: gallery



FREEWAT: state of play

- Large stakeholder involvement (>> 500)
- Growing network:
 - LinkedIn group: > 700 followers
 - Twitter: > 865 followers (@h2020freewat)
- > 3000 downloads

Downloads per continent

Download purposes





FREEWAT: connect!








- Download code, manuals and tutorials from
 - <http://www.freewat.eu/download-information>
- Q&A in Google groups:
 - Uses, application, bug reporting:
 - <https://groups.google.com/forum/#!forum/freewat-users-group>
 - Development:
 - <https://groups.google.com/forum/#!forum/freewat-developers-group>

FREEWAT: connect!



← → ↻ Veilig | https://gitlab.com/freewat/freewat







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F freewat



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Files (62.7 MB) Commits (927) Branches (27) Tags (13) Readme GNU GPLv2

develop ▾ freewat /  ▾ History 🔍 Find file  ▾

 **Updating addres of repos** 72591101 
Iacopo authored 3 months ago

Name	Last commit	Last update
 akvaGIS	removed resources	5 months ago
 crop_growth	first *backup* commit for cropGrowth module	a year ago
 csv_templates	Updating CSV templates - Thanks Giovanna!	6 months ago
 dialogs	Cleaning print commands in Dialogs and mdoCreate_...	4 months ago
 floppyaddon	Small bug fix in TemplateWriter when applied to EVT ...	6 months ago


⏪ Collapse sidebar

FREEWAT: what 's next?

- Desiderata:
 - Python 2 → 3
 - Computational grid: new architecture + management
 - Database interaction: include more DBMS
 - Managing time-dependent data: new architecture
 - Additional packages of MT3D-USGS
 - Extend Farm Process package
 - Couple with other QGIS plugins
 - Docs
 - Unit-tests
 - ...
 - And of course your ideas!

FREEWAT: what 's next?

- Project continuation after Horizon2020:
→ **community development!**



Join the FREEWAT family!



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