Deltares

enabling delta life

Deltares

iMOD Suite 06/2023

Backwards compatibility met iMOD5

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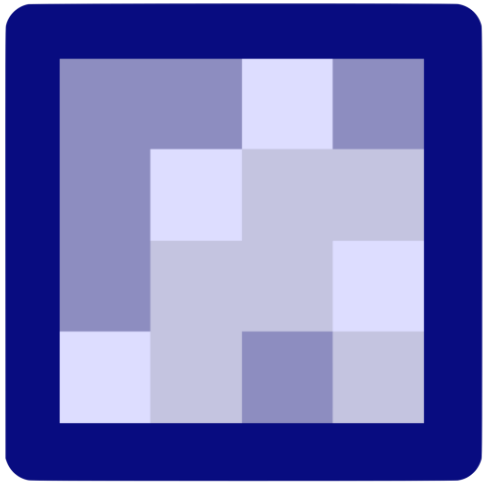
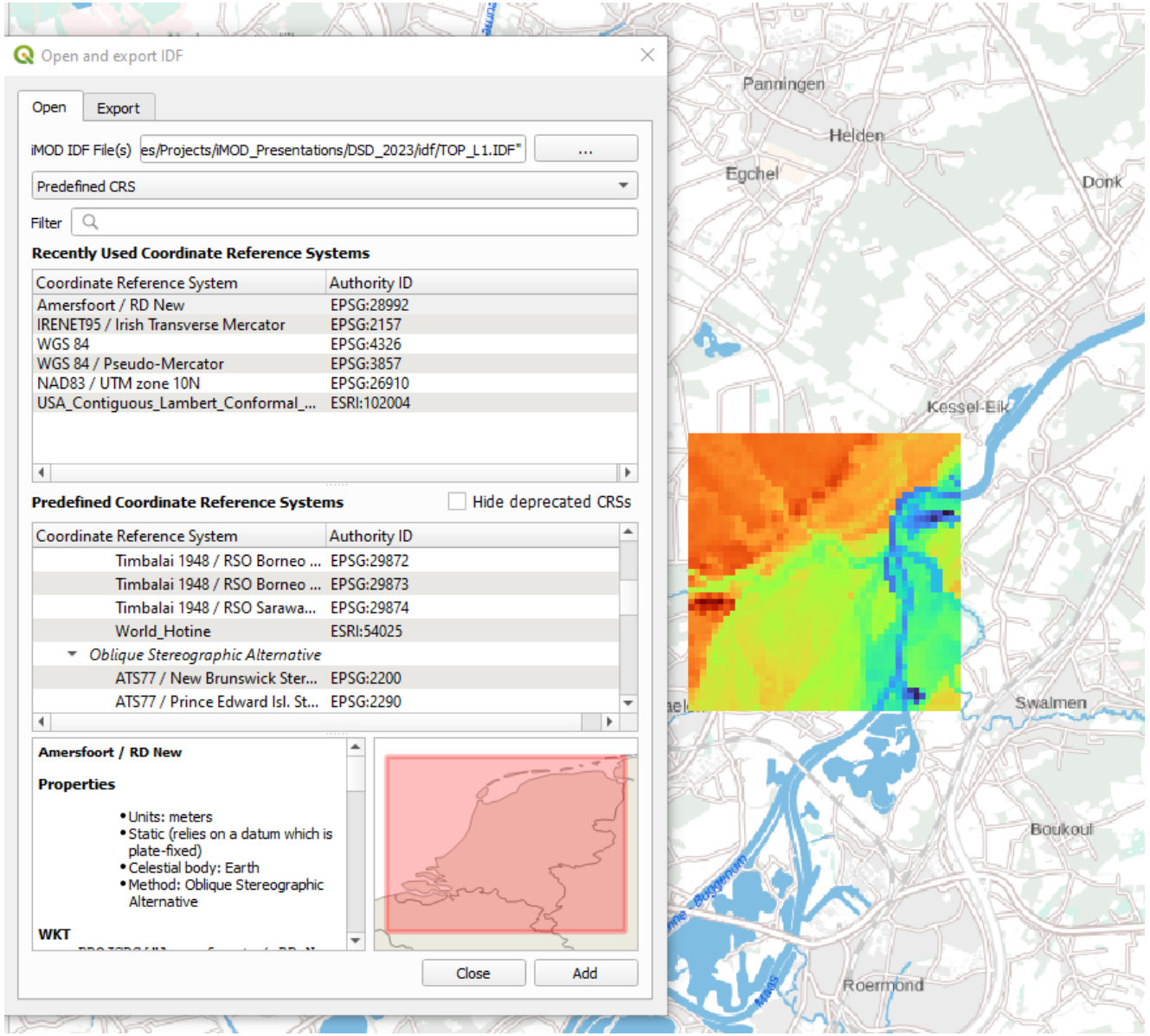
Inhoudsopgave

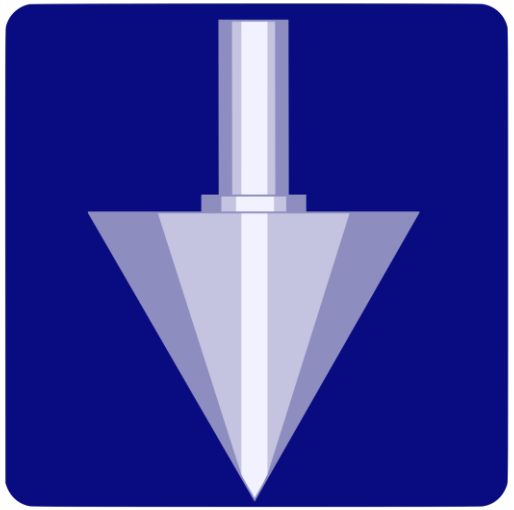
QGIS Plugin: IDF support



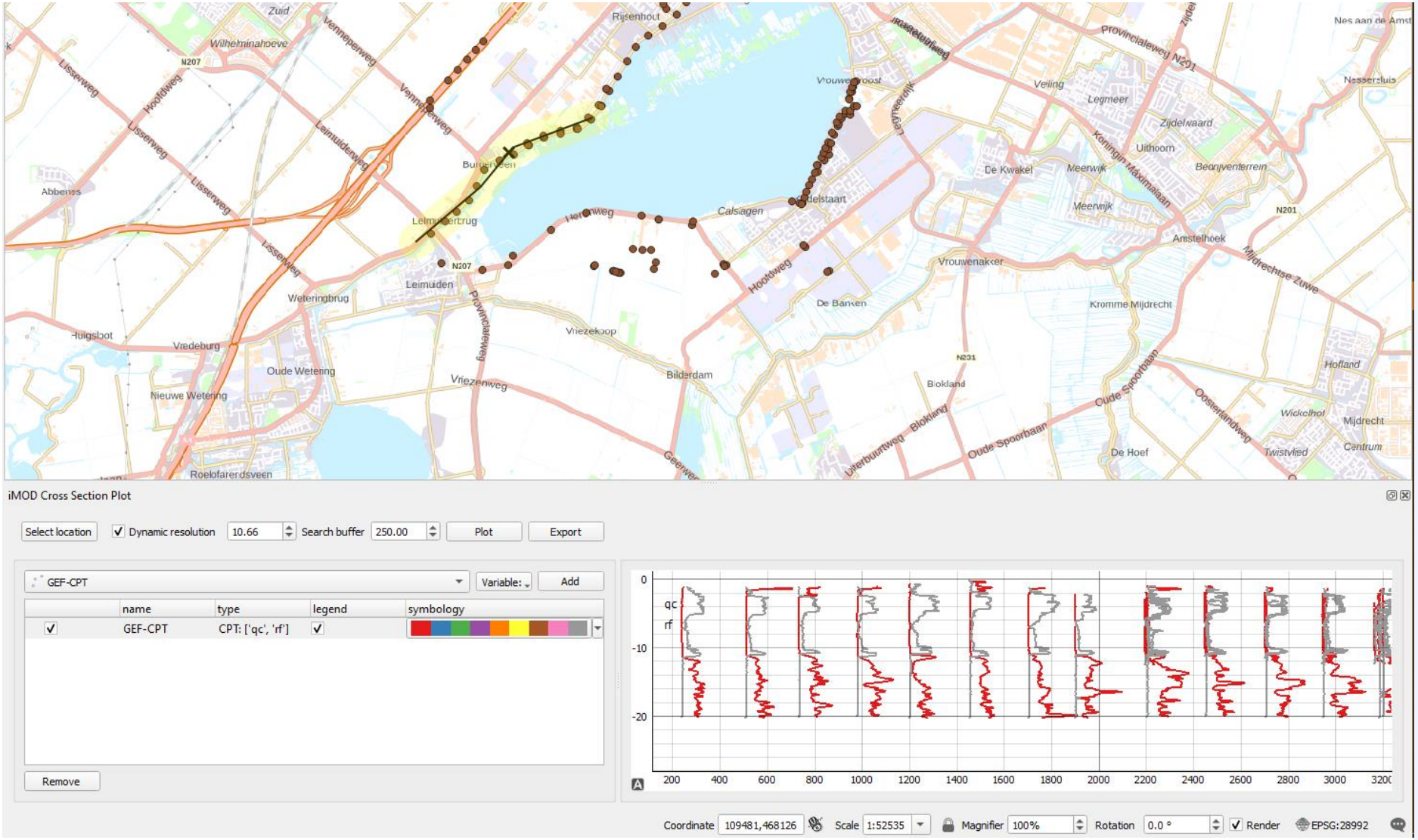
“Open and export IDF”



QGIS Plugin: CPT support



“Open GEF”

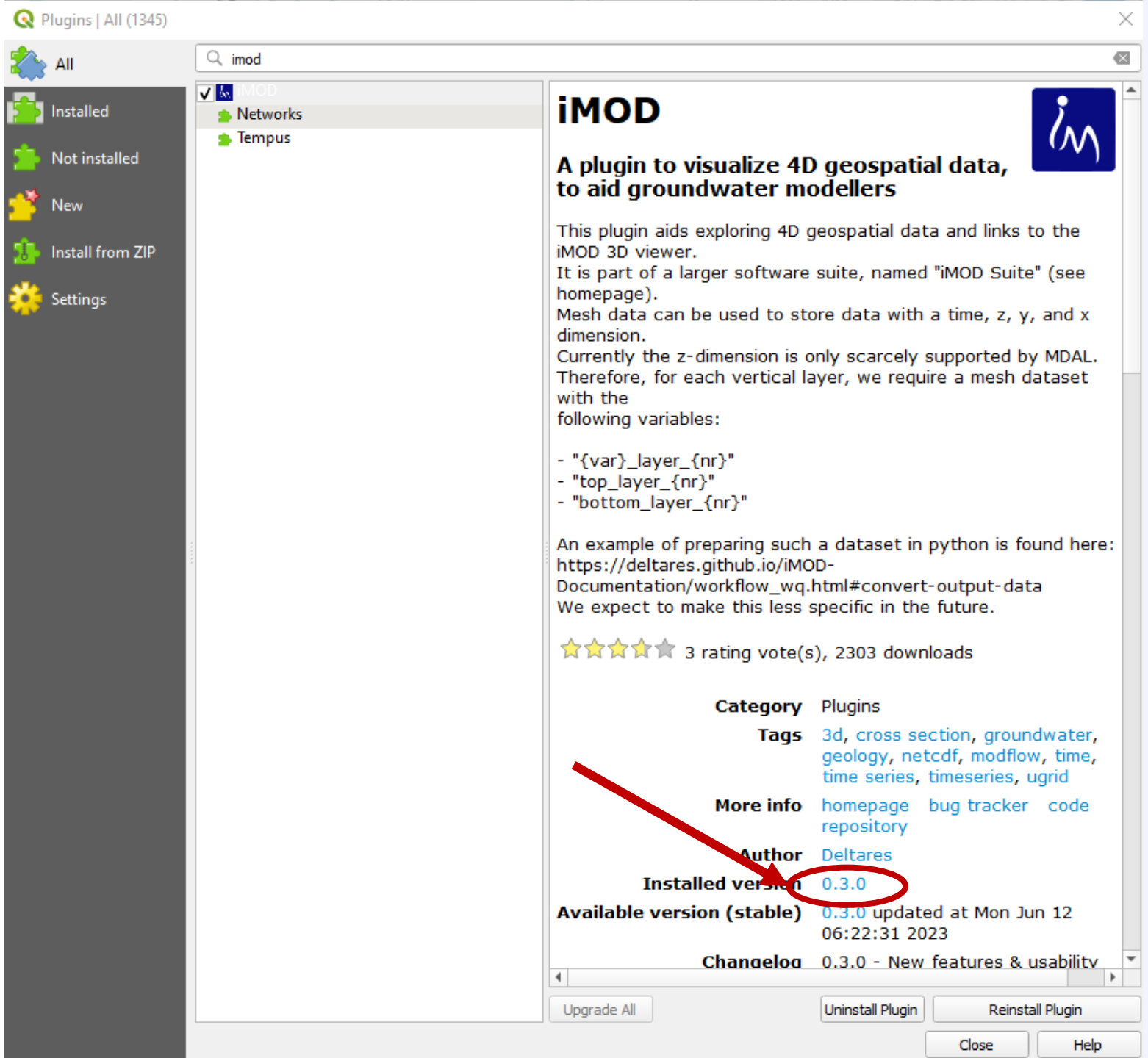


QGIS Plugin

Voor nieuwe functionaliteit:

Installeer plugin versie 0.3.0

QGIS 3.28 of hoger!



iMOD Python: projectfile

imod.formats.prj.read_projectfile

imod.formats.prj.read_projectfile(*path: Union[str, PathLike[str]]*) → Dict[str, Any] [source]

Read an iMOD project file into a collection of nested dictionaries.

The top-level keys are the "topic" entries such "bnd" or "riv" in the project file. An example structure of the dictionaries is visualized below:

```
content
├── bnd
│   ├── active: bool
│   └── ibound: list of dictionaries for each layer
├── riv
│   ├── active: bool
│   ├── conductance: list of dictionaries for each time and layer.
│   ├── stage: idem.
│   ├── bottom_elevation: idem.
│   └── infiltration_factor: idem.
etc.
```

iMOD Python: projectfile

imod.formats.prj.open_projectfile_data

imod.formats.prj.open_projectfile_data(*path: Union[str, PathLike[str]]*) → **Dict[str, Any]** [source]

Read the contents of an iMOD project file and read/open the data present in it:

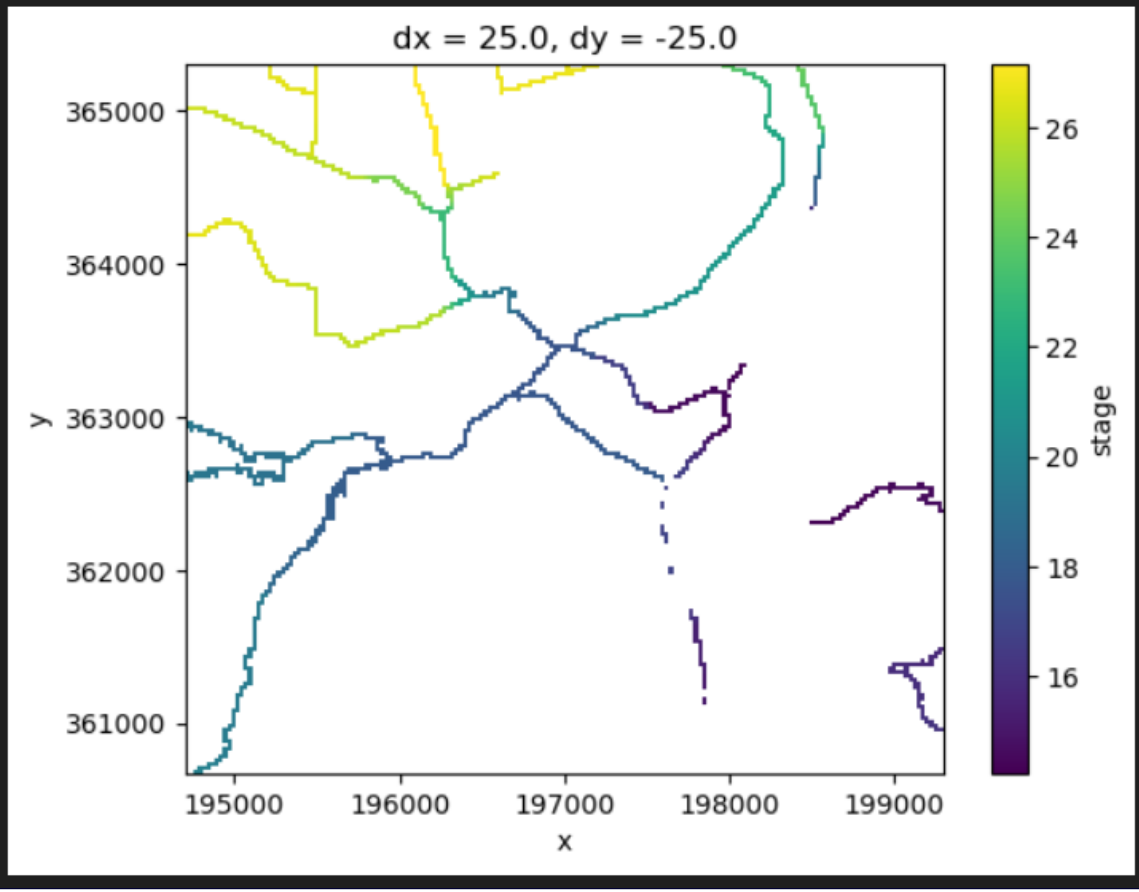
- IDF data is lazily loaded into xarray.DataArrays.
- GEN data is eagerly loaded into geopandas.GeoDataFrames
- IPF data is eagerly loaded into pandas.DataFrames
- Non-file based entries (such as the PCG settings) are kept as a dictionary.

```
prjfile = "c:/path/to/prjfile"
data_prj, repeat_stress = imod.formats.prj.open_projectfile_data(prjfile)

data_prj["riv-1"]["stage"].plot.imshow()
```

[6] ✓ 3.9s

```
<matplotlib.image.AxesImage at 0x14e5fed2980>
```



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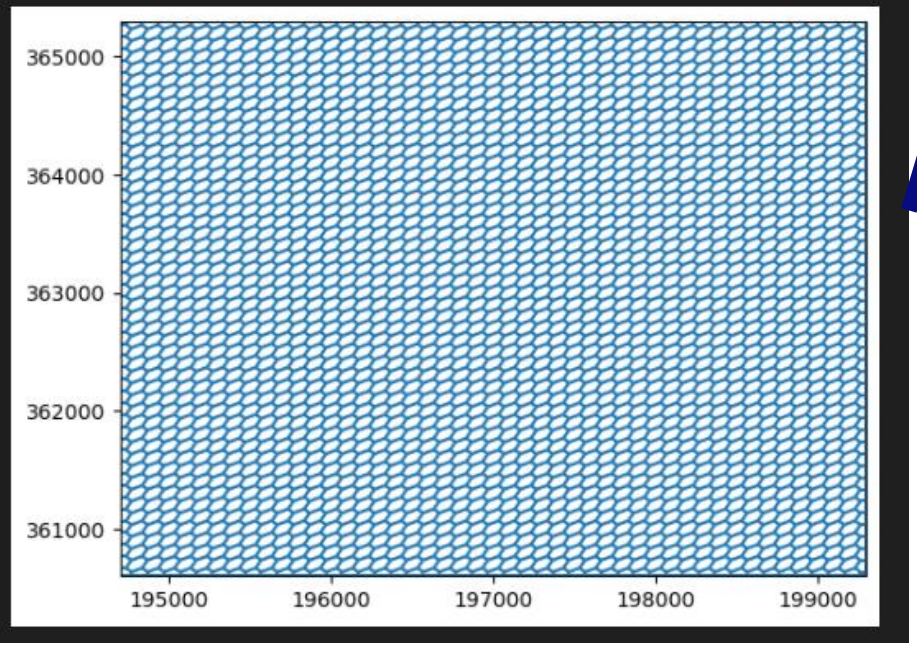
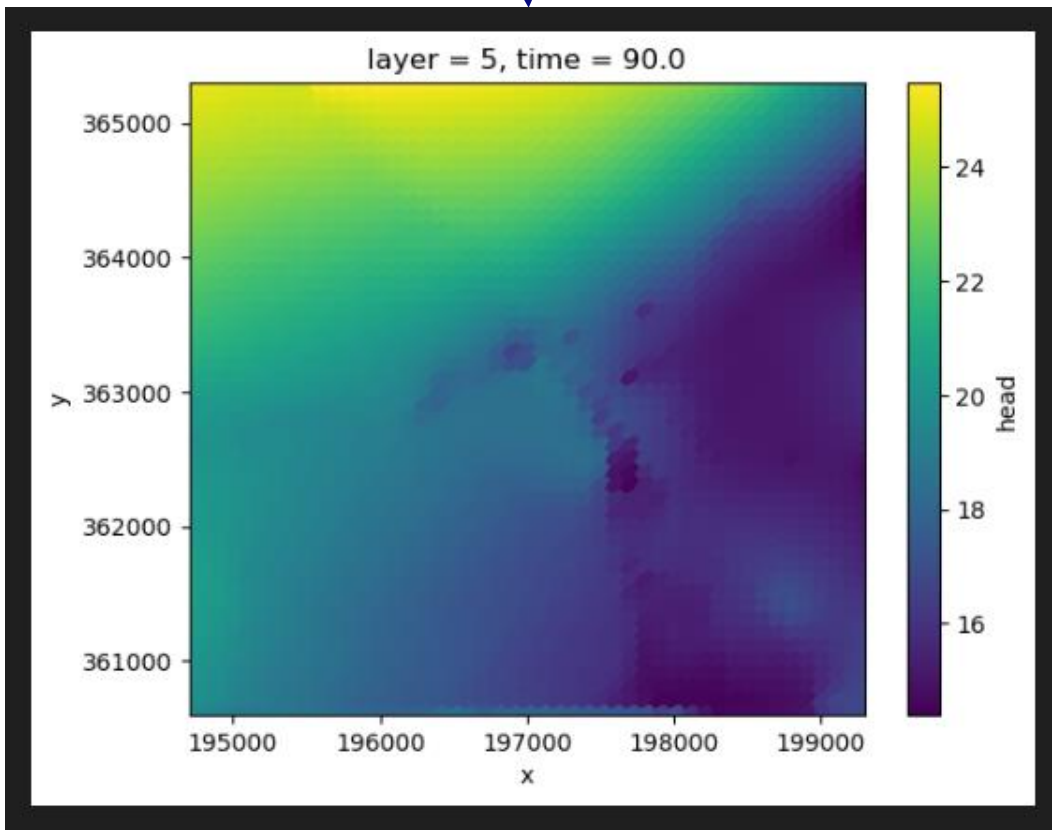
iMOD Python: unstructured grid converter

Experimental feature: Converteer iMOD5 model naar unstructured MF6 model

```
voronoi_grid.plot()
✓ 1.5s
<matplotlib.collections.LineCollection at 0x14e658cba00>
```




```
mf6_model = imod.prj.convert_to_disv(data_prj, voronoi_grid)
```



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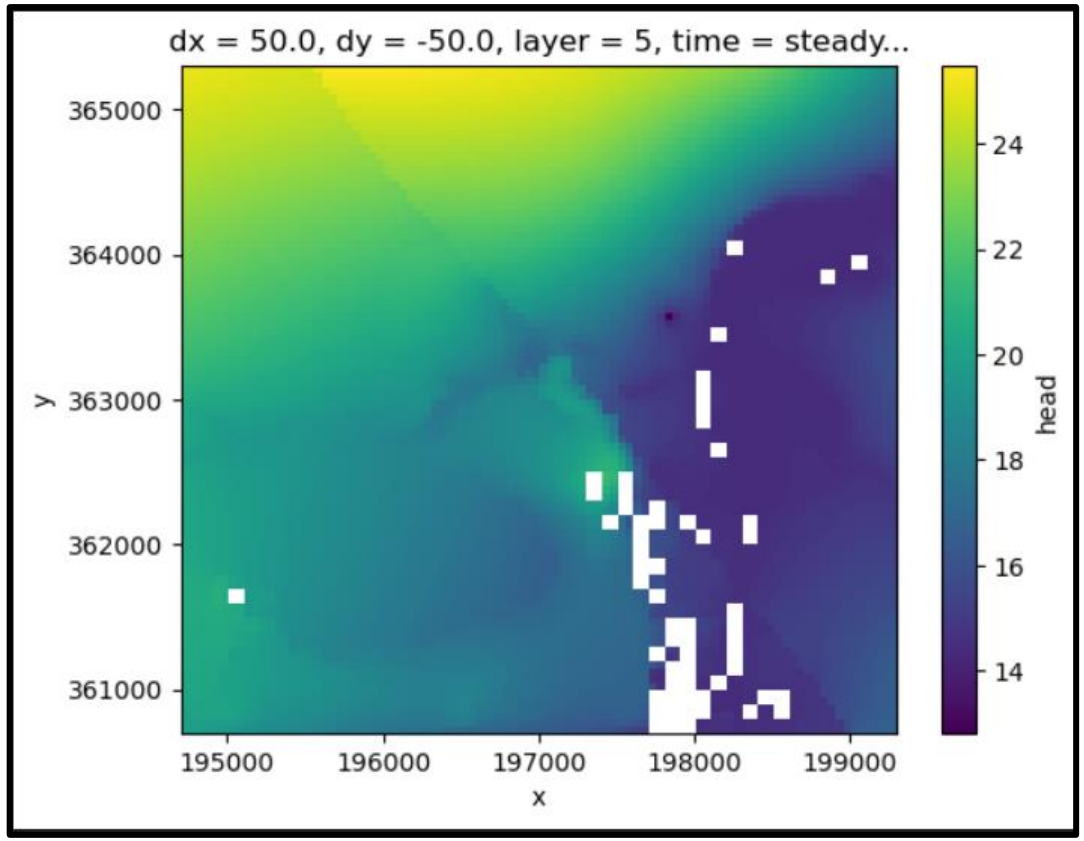
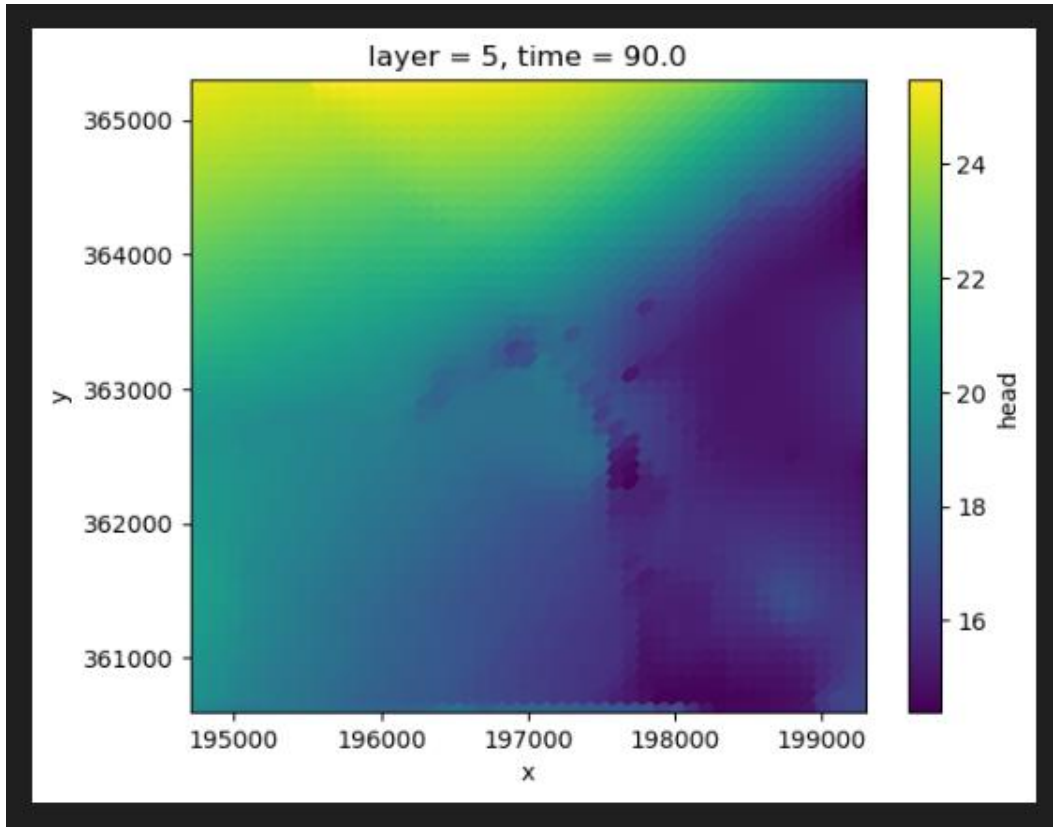
Vergelijking

Structured grid



Unstructured grid



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iMOD Python: modelinvoer validatie

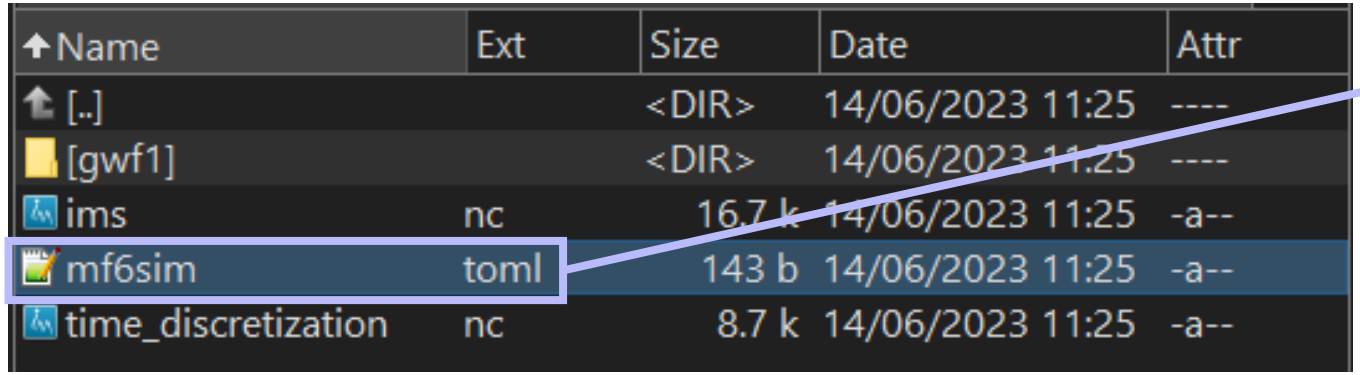
Valideer Modflow6 modelinvoer, alle invoerfouten in 1 boodschap:

```
ValidationError:
Simulation validation status:
        * gwf1 model:
                * npf package:
                        * k:
                                * not all values comply with criterion: > 0.0
                * shd package:
                        * start:
                                * nodata is not aligned with idomain
                * rch package:
                        * rate:
                                * dtype int64 ≠
```

iMOD Python: Tussentijds opslaan model

```
mf6_sim.dump("path/to/dir")
```

Creates



Name	Ext	Size	Date	Attr
[..]		<DIR>	14/06/2023 11:25	----
[gwf1]		<DIR>	14/06/2023 11:25	----
ims	nc	16.7 k	14/06/2023 11:25	-a--
mf6sim	toml	143 b	14/06/2023 11:25	-a--
time_discretization	nc	8.7 k	14/06/2023 11:25	-a--

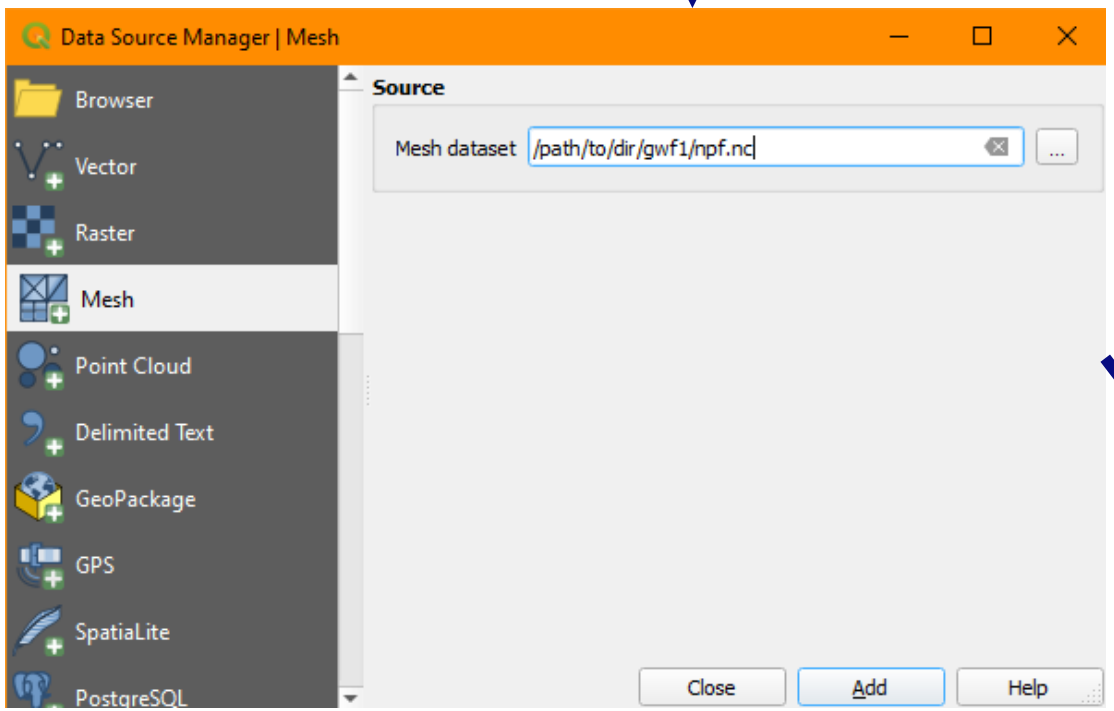
```
[NodePropertyFlow]
npf = "npf.nc"

[VerticesDiscretization]
disv = "disv.nc"

[OutputControl]
oc = "oc.nc"

[InitialConditions]
shd = "shd.nc"

[Drainage]
riv-1-drn = "riv-1-drn.nc"
riv-2-drn = "riv-2-drn.nc"
drn-1 = "drn-1.nc"
drn-2 = "drn-2.nc"

[River]
riv-1 = "riv-1.nc"
riv-2 = "riv-2.nc"
```

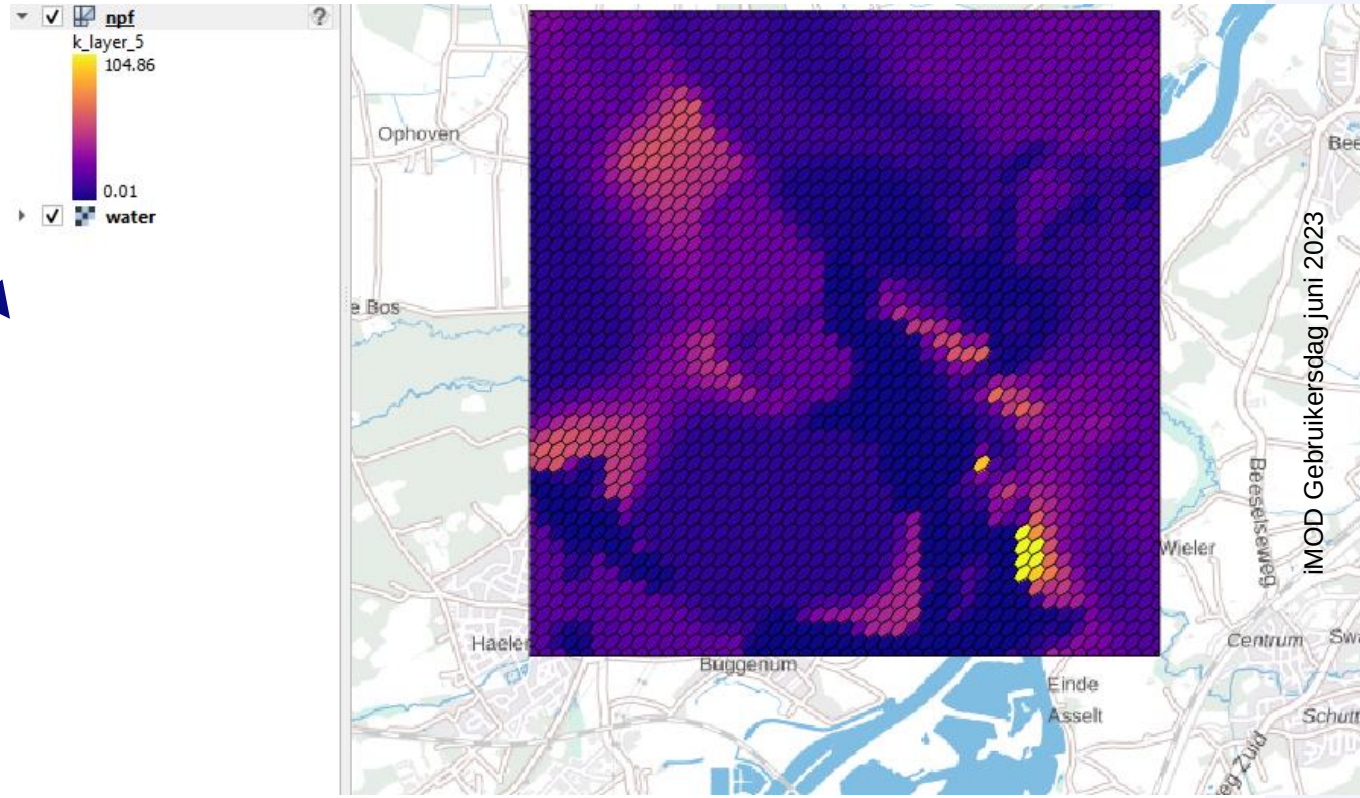
Import again

```
mf6_sim_continue = imod.mf6.Modflow6Simulation.from_file("path/to/dir/toml_file")
```

iMOD Python: sla model op en bekijk in QGIS

```
mf6_sim.dump("path/to/dir", mdal_compliant=True)
```





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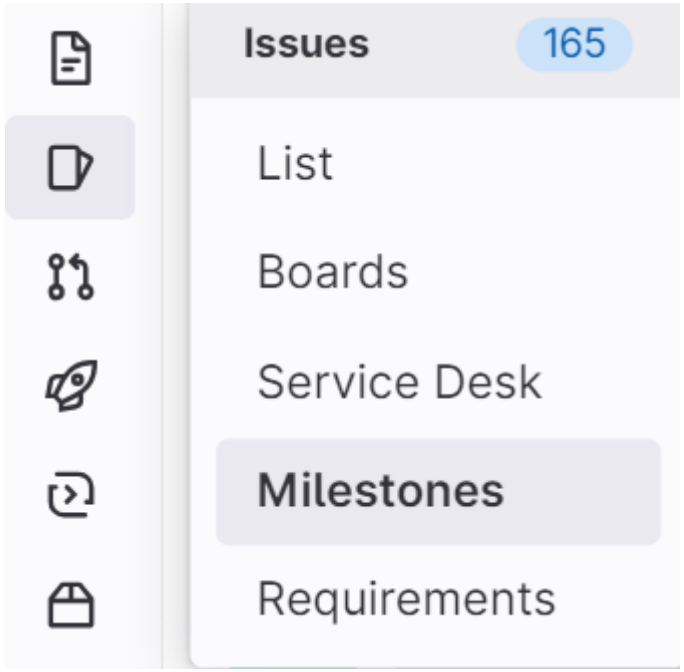
Roadmap

- July 2023:
  - Afronden iMOD5 backwards compatibility (bijv. support MetaSWAP)

- November 2023 (international iMOD day!):
  - iMOD Python ondersteuning om modellen naar submodellen te partitioneren
  - Parallel Modflow 6 tutorial

- 2024
  - HydroMT iMOD plugin
  - Nog nader te bepalen

Work in progress



Deltares › iMOD › imod-python › Milestones

Open 7 Closed 4 All 11 Filter by milestone name

sprint 3
May 30, 2023–Jun 9, 2023
Expired Deltares / iMOD / imod-python
35 Issues · 2 Merge requests 31% complete

Epic: TOML file and regridding/clipping models; backwards compatibility with iMOD 5
Jan 26, 2023–Sep 1, 2023
Open Deltares / iMOD / imod-python
28 Issues · 2 Merge requests 39% complete

Epic: Multi-model support - MF6
Jan 26, 2023–Nov 1, 2023
Open Deltares / iMOD / imod-python
2 Issues · 0 Merge requests 0% complete

Epic: v1.0 release
Open Deltares / iMOD / imod-python
4 Issues · 0 Merge requests 0% complete

Epic: Modflow 6: Differentiate Package objects into low-level and

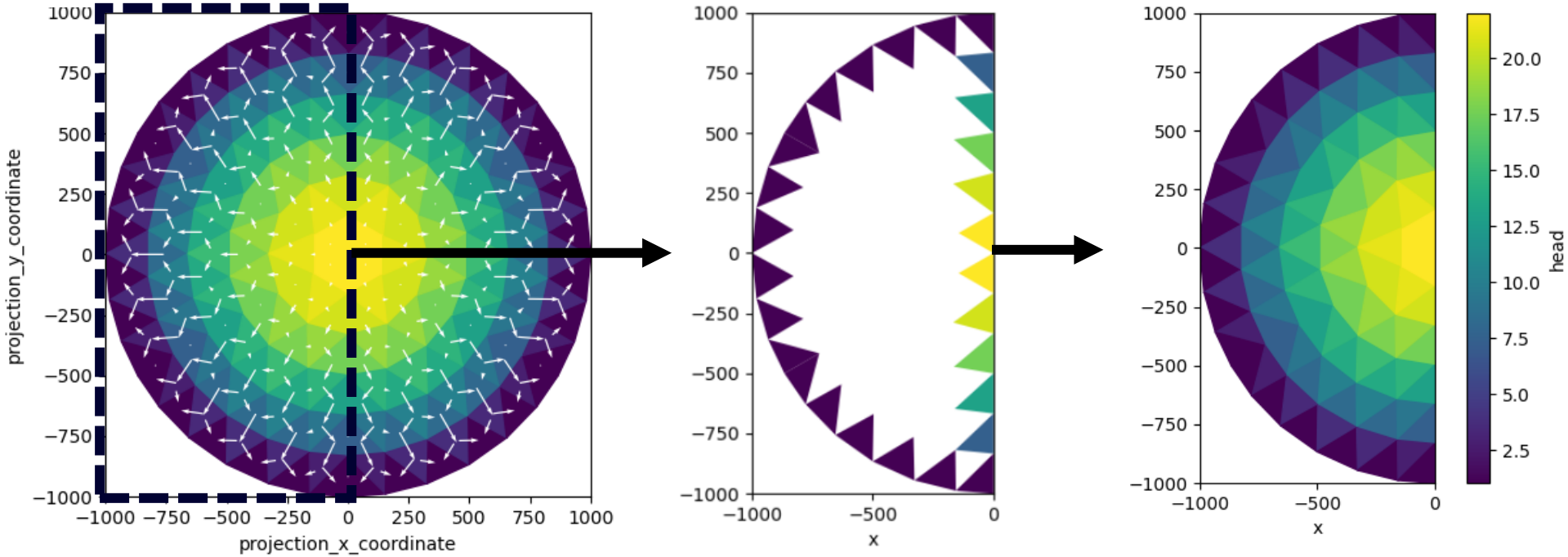
https://gitlab.com/deltares/imod/imod-python/-/milestones

iMOD Python: model clippen, randvoorwaarden toevoegen

Original model

CHD boundary

Clipped model



iMOD Python vergelijking Flopy

Functionaliteit	Flopy	iMOD Python
Modelcodes	7 USGS modelcodes	iMODFLOW, iMOD-WQ, Modflow 6, MetaSWAP
Alle Modflow 6 functionaliteit ondersteunt?	Ja	Nee
Datastucturen	Numpy	Xarray
Package afhankelijkheden	Weinig	Veel
Gelimiteerd door beschikbaar werkgeheugen?	Ja	Nee

iMOD Python vergelijking Flopy

- Voorbeeld:
  - Modflow 6 heads inladen
  - Selecteer punt op x, y locatie
  - Bereken gemiddelde over tijd op dit punt

```
import flopy

hds = flopy.utils.binaryfile.HeadFile("GWF_1/GWF_1.hds")
head = hds.get_alldata()

simulation = flopy.mf6.MFSimulation.load(sim_ws=".")
model = simulation.get_model("GWF_1")
grid = model.modelgrid
row, column = grid.intersect(50_000.0, 30_000.0)
selection = head[:, :, row, column]

mean_head = head.mean(axix=0)
```

```
import imod

head = imod.mf6.open_hds("GWF_1/GWF_1.hds", "GWF_1/GWF_1.grb")

selection = head.sel(x=50_000.0, y=30_000.0, method="nearest")
mean_head = head.mean("time")
```

Rijke datastructuur (xarray) zorgt voor minder regels code, en verbetert leesbaarheid!

Contact

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