

How to extract data regarding aquitard depth and aquifer pressure from HIP for use in Daisy using on-line tool

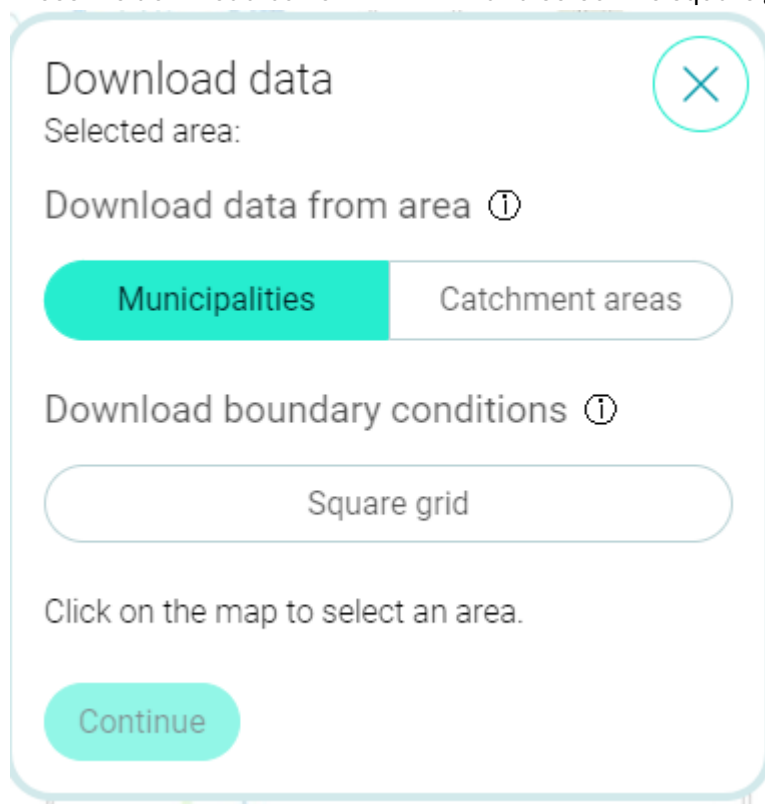
1 Before you start!

You can check directly on <https://hip.dataforsyningen.dk/> whether groundwater is at all an issue in your area, or whether you can use the “free drainage”-option at your site.

2 Prepare your data

- Go to <https://hip.dataforsyningen.dk/>
- Find your area of interest on the map and check the coordinates in the lower left corner of the screen.

- Press the download button:  and select the square grid-button:



Download data

Selected area:

Download data from area ⓘ

Municipalities Catchment areas

Download boundary conditions ⓘ

Square grid

Click on the map to select an area.

Continue

- d. Now you can select the right spot on the map, and after that, the continue-button becomes active. You end up with a new menu with many possibilities:

Download data ✕

Selected area: **10km_617_70**

Data

TIME VARIABLE BOUNDARY CONDITIONS

- Bias corrected climate scenarios ↓
- Potential (6 layers) >>**
- Saturated zone infiltration >>
- Depth to groundwater >>
- Stream discharge ↓
- Cross profile data (watercourse) ↓

PERIOD MEAN BOUNDARY CONDITIONS

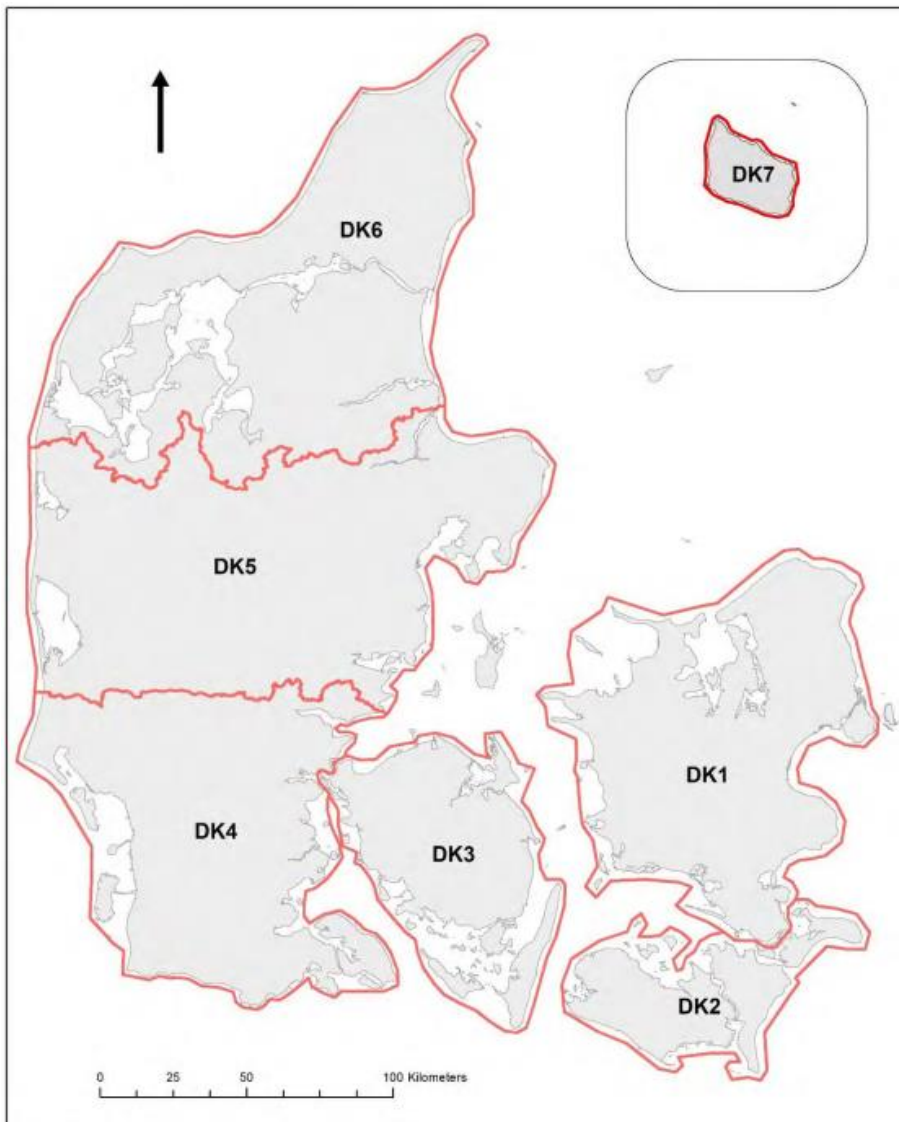
- Potential (6 layers) ↓
- Saturated zone infiltration ↓
- Horizontal groundwater discharge (6 layers) ↓
- Depth to groundwater ↓
- Vertical exchange with deeper layers (6) ↓

MISCELLANEOUS

- Model uncertainty (shallow groundwater) ↓
- Model uncertainty (stream discharge) ↓
- Calibration and validation data (shallow groundwater) ↓
- Calibration and validation data (stream discharge) ↓
- Hydrostratigraphic model ↓**
- Terrain model, 10 m and 100 m grid ↓

Back

- e. You need to download the two files marked with read. They are large, so it takes time. The first file is an *.nc-file for your selected grid, while the other is a zip-file that includes all the hydrostratigraphic models used in the DK-model. You only need the one of relevance for your area. The naming is as follows:



From <https://hip.dataforsyningen.dk/pages/help.html> and Stisen et al. (2019).

So you need to unpack the zip-file and find the relevant file.

- f. Now you need to find your Google-drive, make a folder called Daisy/HIP, and place the *.nc-file and the correct hydrostratigraphic model in the folder. You are now ready to do the data extraction.

3 The extraction tool

1. Go to:
https://colab.research.google.com/drive/1MyaN1seA2qmhnX9rM_kx2wISJqON667a?usp=sharing
2. Pass the cursor around, and you will see some black circles with white arrows. These are the action lines. They appear inside square brackets.

```
[ ] from google.colab import drive
drive.mount('/content/drive')
```

3. is the first one you press. It will connect the script to your google drive. It only worked for me if I gave access to everything 😞.

```
%cd /content/drive/MyDrive/Daisy/HIP
!ls
```

4. The next script is this one: , which will tell you what files it can find on your drive.

5. This script:

```
!pip uninstall -y daisy_tools
!pip install git+https://github.com/daisy-model/tools.git@hip
```

installs the scripts you require to do the extraction.

6. This script:

```
!prepare_hip_data_for_daisy --help
```

 provides you with a help-text about what you require for the extraction. In short, it is the names of the two files you placed at the google drive and the coordinates for the site you are interested in.

7. Now to the actual work! This script:

```
[ ] !prepare_hip_data_for_daisy DK1_2020_100m_layers.nc dk1_2020_100m_head_10km_617_70.nc --x 708050 --y 6174520 --unit m
```

is where you specify the names of your files and the coordinates required. Substitute the present text with the right names and coordinates and press the arrow. Text should appear on the screen with the information about the layers in the hydrostratigraphic model and some head elevation data.

8. The next line:

```
!prepare_hip_data_for_daisy DK1_2020_100m_layers.nc dk1_2020_100m_head_10km_617_70.nc --x 708050 --y 6174520 --outdir out --unit cm --truncate
```

requires the same input, but will create an output directory at your google drive with the extracted information.

9. The next lines allow you to extract part of the information.

4 Interpretation

To understand better, what you have extracted, you may read here:

<https://hip.dataforsyningen.dk/pages/help.html> . You should be aware that:

- i. The layers extracted here are layers with a height of more than 0.5 m. All layers in the DK-model extend across the entire models, and they are set to 0.5 m if they are not there in reality.

- ii. Layers marked with l (kl1, kl2 etc.) are clay layers and will work as aquitards. Layers with s (ks1, ks2 etc.) are sand layers and aquifers. Data will be extracted from the top-most aquifer. You can see the depth of the layers in the extracted data.
- iii. pressure data are extracted in a pressure_table.ddf-file that can be used directly with Daisy.
(Groundwater aquitard
 (K_aquitard 0.050 [cm/h])
 (Z_aquitard 200 [cm])
 (pressure_table table (file "pressure_table.ddf")))
- iv. The hydraulic conductivity used in the DK-model for the aquitard is also included in the data. As one value is applied all over the area of the model for the given layer, this value may not be reasonable for your location.
- v. If there is no aquitard above your aquifer, you may need to choose a different boundary condition than the one shown above.