

TKI-pilot: D-HYDRO boezemmodel Waternet

17 januari 2022

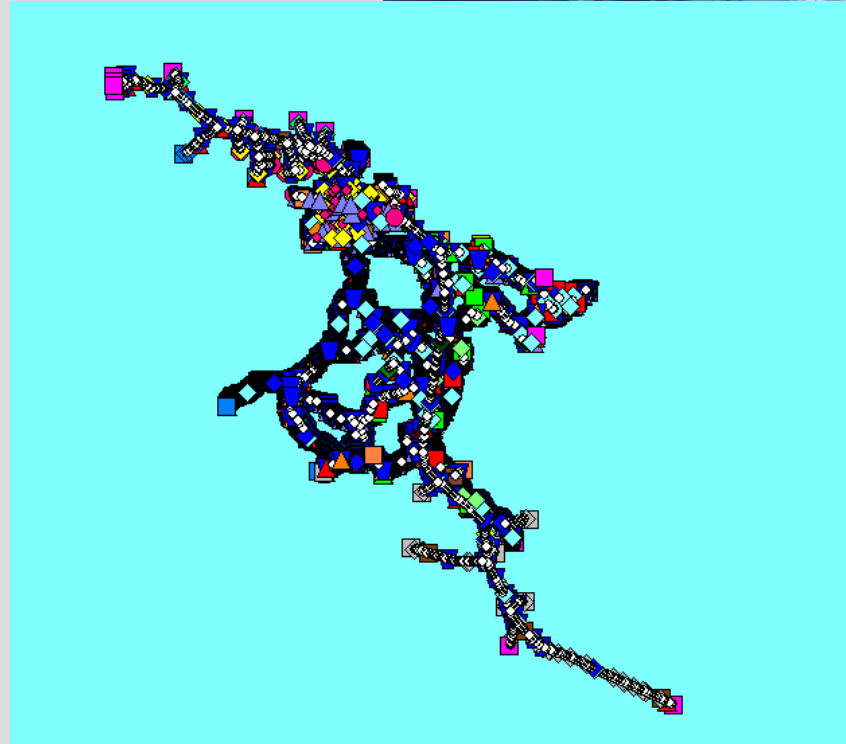
Doelen pilot

- Omzetten boezemmodel
- Beproeven nieuwe/aangepaste functionaliteiten
- Implementatie in FEWS



Boezemmodel Waternet (B14)

- SOBEK CF(-RR)
- Boezemwateren + ARK/NZK
- Voornamelijk CF
- Paar RR-knopen
- Invoer via lateralen met invoer vanaf 2012 (lengte varieert)



SOBEK naar D-HYDRO

1. SOBEK werkt met extrapolatie van tijdreeksen, D-HYDRO (nog) niet.

Verlengen/aanvullen tijdreeksen in SOBEK:

- Lateral.dat
- Boundary.dat

Laatste waarde laten doorlopen tot 01-01-2021 d.m.v. scripting



```
%% Edit boundary.dat
end_date = dt.datetime.strptime('2021/01/01', '%Y/%m/%d')
boundary_file = os.path.join(r"\\srv301sbk216_41814_C.ttt3\Boundary.DAT")

def read_file(file):
    result = {}
    with open(file) as f:
        for line in f:
            if 'FLBO id' in line:
                key = line.split()
                key_id = key[2][1:-1]
                result[key_id] = list()
                result[key_id].append(line)

            if 'FLBO id' not in line:
                result[key_id].append(line)
    return result

boundary_file_timeseries = read_file(boundary_file)

# Edit boundary file by extending table with last value until set 'end_date'
for timeseries in boundary_file_timeseries.keys():
    if len(boundary_file_timeseries[timeseries]) > 1:
        # get last value of timeseries
        row = boundary_file_timeseries[timeseries][-2].split()
        timestamp = row[0]

        # Create temporary dataframe from enddate timeseries until set end_date and fill with last value from timeseries
        date_object = dt.datetime.strptime(timestamp, "%Y/%m/%d;%H:%M:%S")
        if date_object.end_date:
            temp_dataframe_index = pd.date_range(start=date_object+dt.timedelta(hours=1), end=end_date, freq='H')
            temp_dataframe = pd.DataFrame(temp_dataframe_index, columns=[timestamp])
            temp_dataframe['Value'] = float(row[1])

        # Append additional timeseries to existing boundary timeseries
        # Clip of last value
        boundary_file_timeseries[timeseries] = boundary_file_timeseries[timeseries][:-1]
        # Append new values
        for row_id, row in temp_dataframe.iterrows():
            boundary_file_timeseries[timeseries].append(f"{row[0].strftime('%Y/%m/%d;%H:%M:%S')} {row[1]} <")

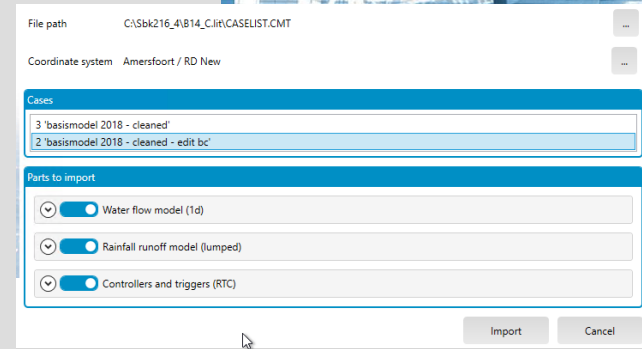
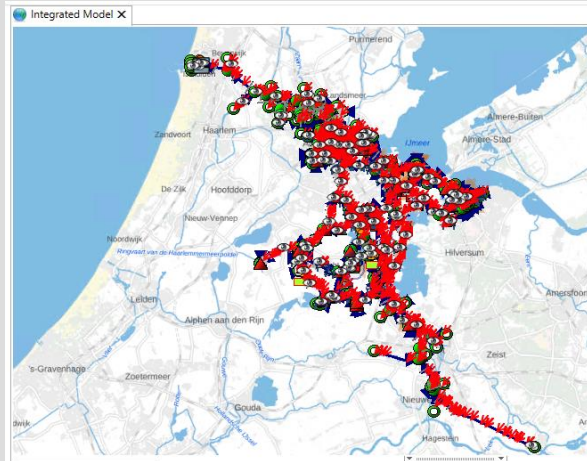
        # Add closing table statement
        boundary_file_timeseries[timeseries].append('tblc flboin')

# Write data to file
textfile = open(os.path.join(work_dir, 'Boundary.DAT'), "w")
for key in boundary_file_timeseries.keys():
    str_add = boundary_file_timeseries[key]
    for element in str_add:
        if 'tblc' in element:
            textfile.write(element)
        else:
            textfile.write(element + "\n")
textfile.close()
```

SOBEK naar D-HYDRO

2. Importeren met de SOBEK 2 import functie

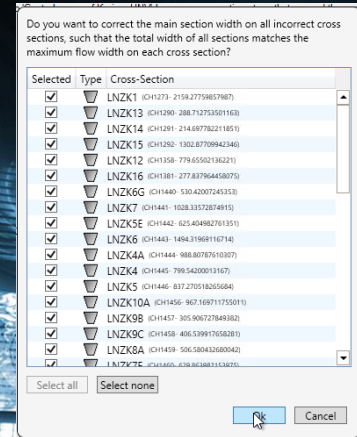
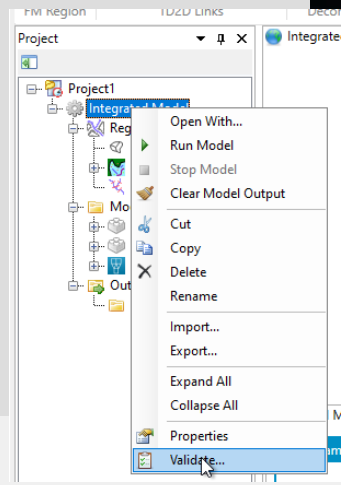
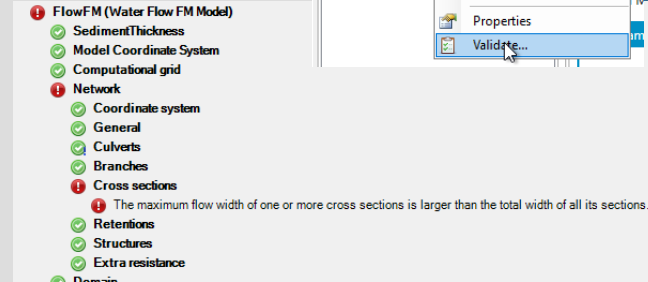
- Door lange tijdreeksen in SOBEK duurt dit ca. 30 min



SOBEK naar D-HYDRO

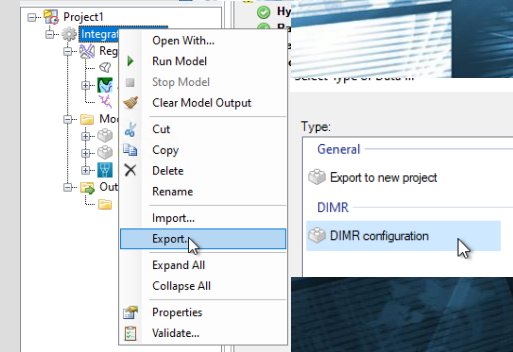
3. Validatie van model

- Incorrecte profielen, eenvoudig te corrigeren in GUI
- Helaas niet op te slaan



4. Model exporteren als DIMR

- Modelconfiguratie aanpassen m.b.v. scripting

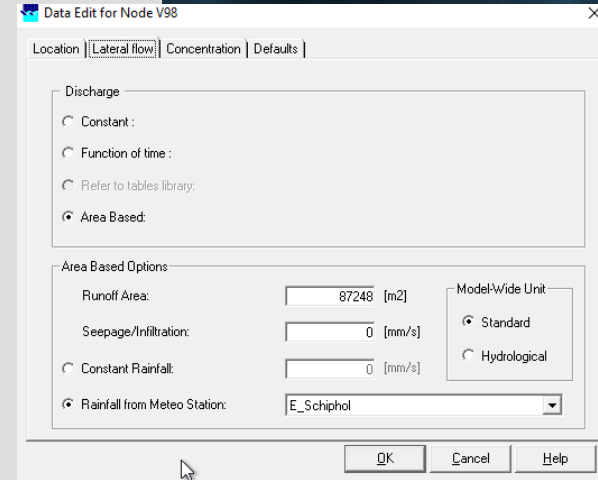


Omzetten SOBEK - D-HYDRO

5. Laterale knopen met 'rational method' voor neerslag en verdamping worden in FlowFM (nog) niet ondersteund

→ Workaround:

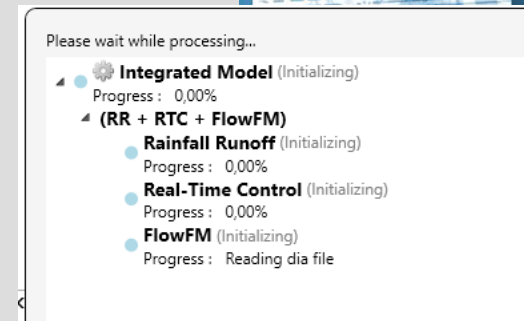
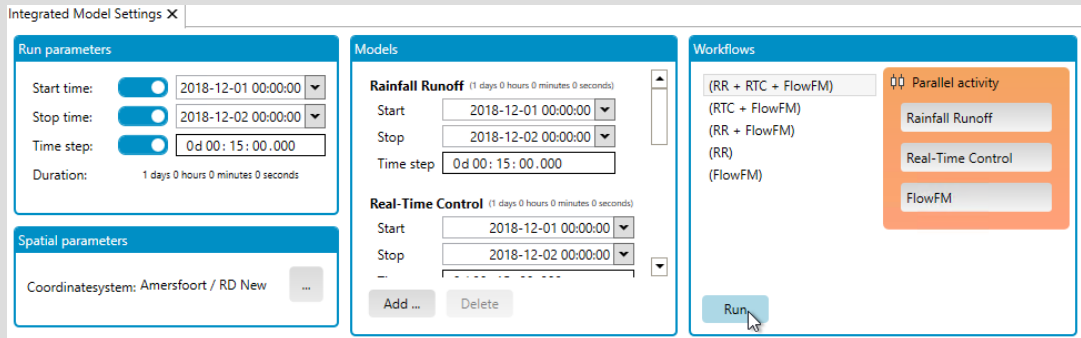
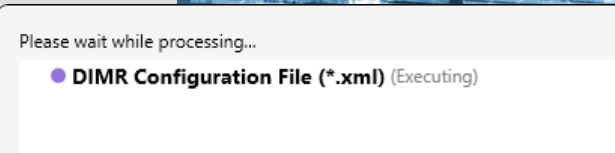
Alle laterale oppervlaktes in rr schematiseren als 'Open Water Basin' en koppelen aan originele SOBEK laterale knopen



Omzetten SOBEK - D-HYDRO

6. Aangepaste DIMR importeren in D-HYDRO GUI

- Valideren van model
 - Aantal incorrecte profielen, eenvoudig te corrigeren in GUI
- Doorrekenen van model

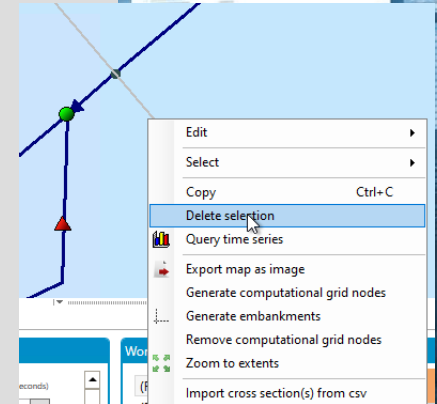


Omzetten SOBEK - D-HYDRO

- Model crashed en via 'Dimr Run Log':
 - Meerdere profielen op zelfde locatie

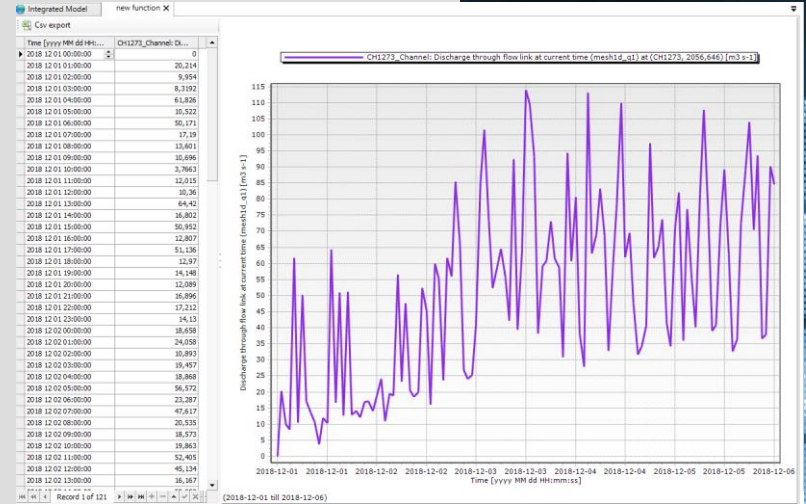
```
Dimr [2022-01-12 11:14:28.456] #0 >> kernel: Cross section 'L14913' and 'L14986' are exactly at the same location.  
Dimr [2022-01-12 11:14:28.489] #0 >> kernel: Cross section 'L07_910' and 'L910' are exactly at the same location.  
Dimr [2022-01-12 11:14:28.497] #0 >> kernel: Cross section 'L07_13953' and 'L07_4158' are exactly at the same location.  
Dimr [2022-01-12 11:14:28.498] #0 >> kernel: Cross section 'L07_4156' and 'L07_13951' are exactly at the same location.  
Dimr [2022-01-12 11:14:28.503] #0 >> kernel: Cross section 'L07_14072' and 'L07_14142' are exactly at the same location.
```

- Handmatig verwijderen van dubbele profielen



Omzetten SOBEK - D-HYDRO

Model rekent succesvol!



Vergelijking SOBEK en D-HYDRO - control velocity

Boezemmodel - D-HYDRO Suite 1D2D (1.0.0.53506)

File Home View Tools Chart

Export as Image

Project

- Control Groups
 - Control group of PG_IJmuidB3
 - Control group of PG_IJmuiden_U
 - Control group of OSp_IJmuiden_U
 - Control group of PSI_Proostdij
 - Control group of PSI_Pondsk
 - Control group of PSI_Oudshuisz
 - Control group of PSI_SilberP_U
 - Control group of Oia_SilberP_U
 - Control group of PG_Zeeburg2
 - Control group of SI_Tolhuissle_U
 - Control group of KSL00004
 - Control group of KSL00008
 - Control group of KSL00009
 - Control group of KSL00010
 - Control group of KSL00011
 - Control group of KSL00012
 - Control group of KSL00013
 - Control group of KSL00014
 - Control group of KSL00016
 - Control group of KSL00019
 - Control group of KSL00026
 - Control group of KSL00032

Properties

Interval rule

Long name

Interpolation / Extrapolation

Interpolation Constant

Extrapolation Constant

Limits

Interval type	Variable
Maximum speed	0
Fixed interval	0
Output above deadband	-3.4
Output below deadband	-9.25
Deadband around setpoint	0.02
Deadband type	Fixed

Constant set point

The constant reference value for the PID input.

Integrated Model Gate lower edge level of orifice (orifice_gate_lower_edge_level) at OSp_IJmuiden_U X Real-Time Control/Control group of OSp_IJmuiden_U

Csv export

Time [yyyy-MM-dd HH:mm:ss]	OSp_IJmuiden_U_Orifice: Gate lowe...
2018-12-01 00:00:00	-9.25
2018-12-01 01:00:00	-9.25
2018-12-01 02:00:00	-3.4
2018-12-01 03:00:00	-9.25
2018-12-01 04:00:00	-4
2018-12-01 05:00:00	-3.4
2018-12-01 06:00:00	-9.25
2018-12-01 07:00:00	-9.25
2018-12-01 08:00:00	-3.4
2018-12-01 09:00:00	-9.25
2018-12-01 10:00:00	-3.4
2018-12-01 11:00:00	-9.25
2018-12-01 12:00:00	-9.25
2018-12-01 13:00:00	-3.4
2018-12-01 14:00:00	-3.4
2018-12-01 15:00:00	-9.25
2018-12-01 16:00:00	-3.4
2018-12-01 17:00:00	-9.25
2018-12-01 18:00:00	-9.25
2018-12-01 19:00:00	-3.4
2018-12-01 20:00:00	-3.4
2018-12-01 21:00:00	-3.4
2018-12-01 22:00:00	-3.4
2018-12-01 23:00:00	-3.4
2018-12-02 00:00:00	-3.4
2018-12-02 01:00:00	-3.4
2018-12-02 02:00:00	-9.25
2018-12-02 03:00:00	-9.25
2018-12-02 04:00:00	-3.4
2018-12-02 05:00:00	-3.4

Gate lower edge level of orifice (orifice_gate_lower_edge_level) [m]

December 2018 December 2018 December 2018 December 2018

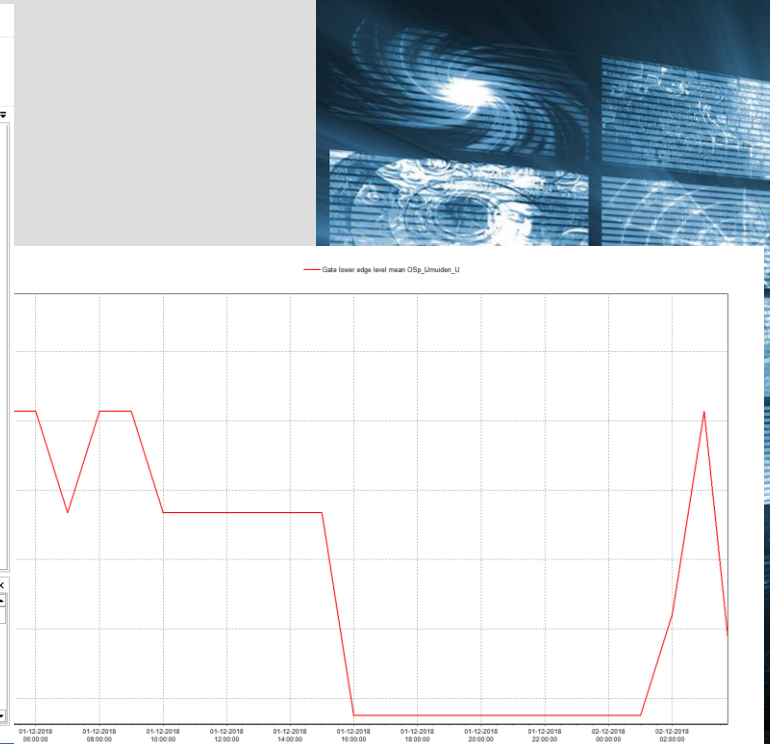
Time [yyyy-MM-dd HH:mm:ss]

Record 1 of 745

Messages

- Loaded project D:\Work\Project\P1302\05_Analysis\D-HYDRO\20220112\Boezemmodel.dproj 2022-01-12 14:29:48.270
- Could not find Delaunay mesh file version type with their version higher than 0.10 in the file D:\Work\Project\P1302\05_Analysis\D-HYDRO\20220112\Boezem... 2022-01-12 14:29:47.477
- Creating database session ... 2022-01-12 14:29:36.565
- Creation of configuration took 119 ms 2022-01-12 14:29:36.552
- Loading project D:\Work\Project\P1302\05_Analysis\D-HYDRO\20220112\Boezemmodel.dproj ... 2022-01-12 14:29:36.424
- Project closed 2022-01-12 14:29:36.336
- Closing current project ... 2022-01-12 14:29:36.236
- Hiding splash screen ... 2022-01-12 14:29:24.447
- Started in 1136 sec 2022-01-12 14:29:24.447

Time Navigator

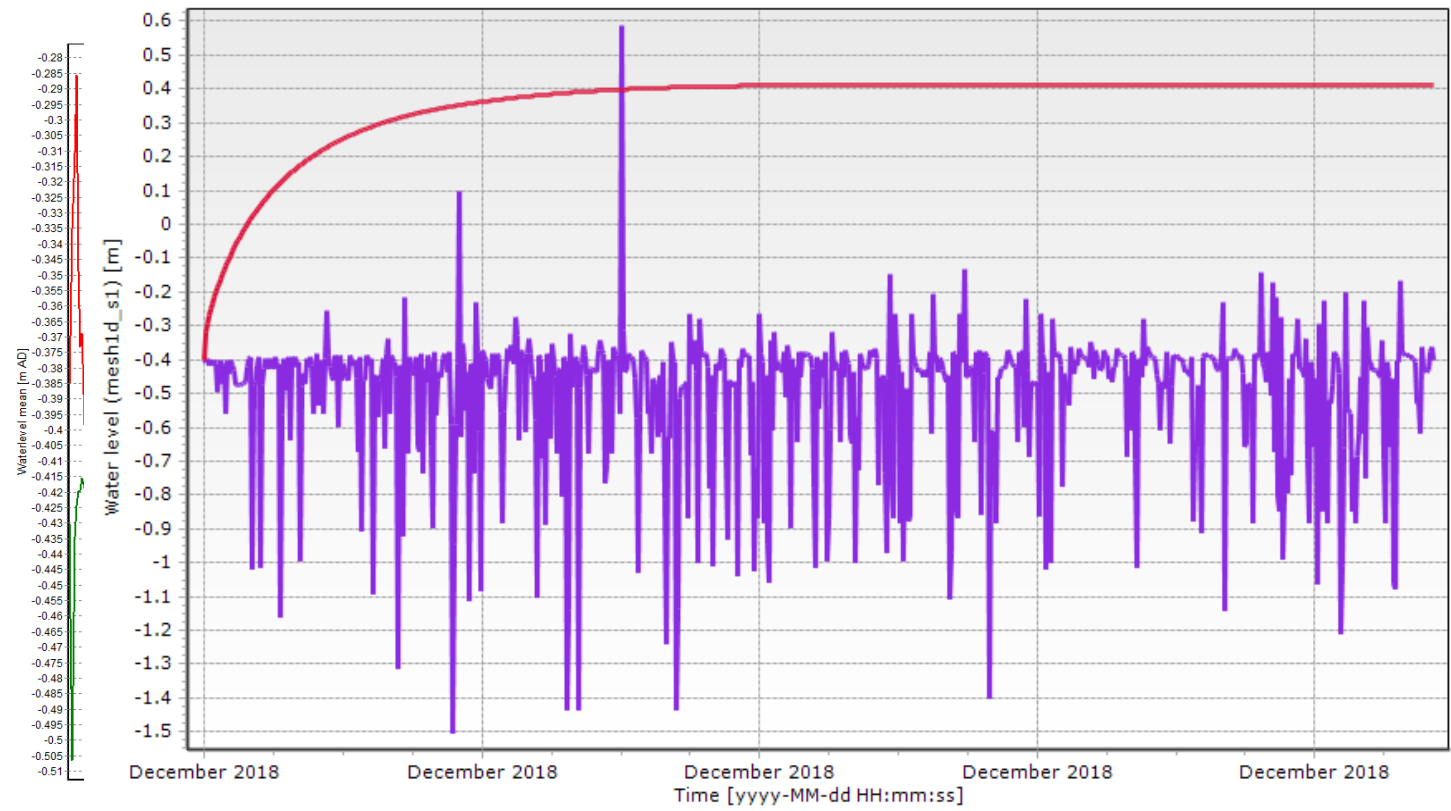


```

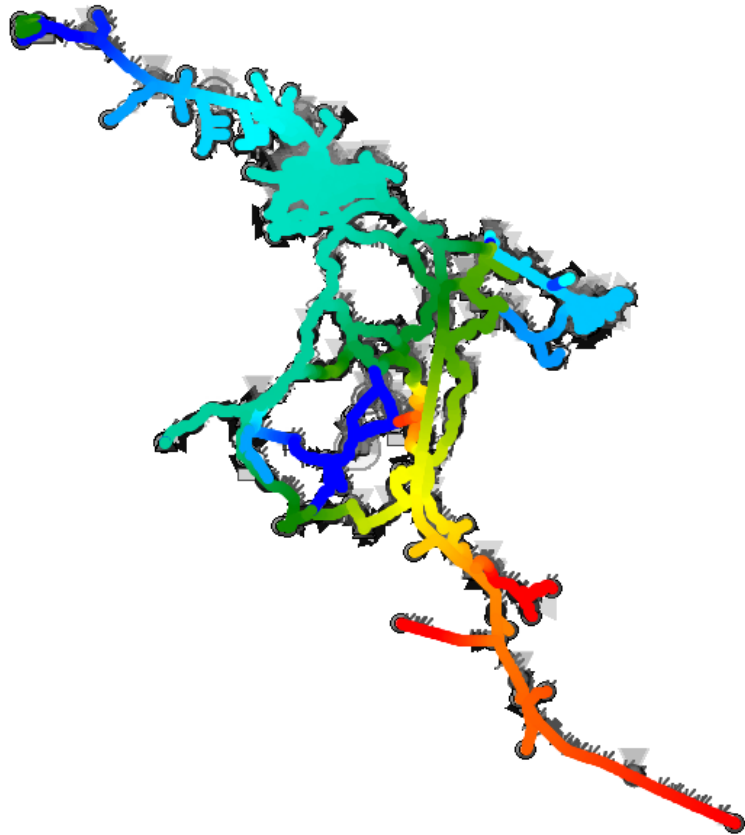
1 CNTL id 'PG_IJmuidB3' nm 'nieuwe pompen IJmuiden' ct 2 ac 1 ca 3 cf 1 ml 'RWS_IJmui_binn' cp 0 ui 0 ua 100 cn 1 du 0 cv 1000 dt 0 d_0.04 bl 1 sp tc 0 -
2 CNTL id 'PG_IJmuiden_U' nm 'IJmuiden oude pompen' ct 2 ac 1 ca 3 cf 1 ml 'RWS_IJmui_binn' cp 0 ui 0 ua 160 cn 1 du 0 cv 100 dt 0 d_0.04 bl 1 sp tc 0 -
3 CNTL id 'OSp_IJmuiden_U' nm 'spuisluis IJmuiden' ct 2 ac 1 ca 2 cf 1 ml 'RWS_IJmui_binn' cp 0 ui -9.25 ua -3.4 cn 1 du 0 cv 1 dt 0 d_0.02 bl 1 sp tc 0 -
    
```

Vergelijking SOBEK en D-HYDRO - verband

— NOD135_HydroNode: Water level (mesh1d_s1) at (CH1273, 4113.292) [m]
— BSI_Irene_I_HydroNode: Waterlevel (mesh1d_s1) at (CH1525, 0) [m]



Vergelijking SOBEK en D-HYDRO - verhang



Use focused layer

Infiltration

Sources and Sinks

1D/2D links

Output 1D (map file)

- network1
- computational grid
- Number of times flow element was Cour
- Water depth at pressure points (mesh1d
- Water level (mesh1d_s1)
 - Locations
 - 0.4
 - 0.3273
 - 0.2545
 - 0.1818
 - 0.1091
 - 0.03636
 - 0.03636
 - 0.1091
 - 0.1818
 - 0.2545
 - 0.3273
 - 0.4
 - Cells
- Velocity at velocity point, n-component (
- Flow element center velocity vector, x-co
- Flow element center velocity vector, y-co
- Flow element center velocity magnitude
- Discharge through flow link at current tir

Vervolgstappen

- Controle sturing van kunstwerken
- Nader onderzoek verhang
- Verdere vergelijking uitkomsten SOBEK en D-HYDRO
- Toetsing invloed van parallel doorrekenen componenten op rekensnelheid
- Implementatie in FEWS



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