

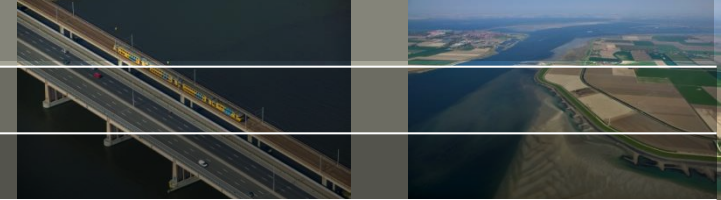


TKI project
D-HYDRO voor Waterschappen

Voortgangsoverleg juli

10 juli 2018

Agenda



1. Stand van zaken softwareontwikkeling
2. Voortgang pilots
3. Ontwikkelingen TKI vervolg
4. Discussie – vragen

Stand van zaken softwareontwikkeling

SOFTWAREONTWIKKELING

1D2D embedded koppeling

- waaronder wordt ontwikkeld aan:*
- Validatie 1D2D koppeling
 - Automatische generatie 1D2D koppeling
 - Inspectie 1D2D koppeling
 - Manipulatie 1D2D koppeling
 - Analyse resultaten 1D2D koppeling

Bresgroei

- waaronder wordt ontwikkeld aan:*
- Ontwikkelen (meegroeiend) bresgroei element (1D2D & 2D2D)
 - Implementatie bresgroeifunctie
 - Aanbrengen, editen en inspectie van bresgroei element in schematisatie
 - Analyse resultaten bresgroei

2D gridgeneratie en verfijning

- waaronder wordt ontwikkeld aan:*
- Automatische gridgeneratie op basis van polygoon/shape
 - Automatische bodeminterpolatie op basis van hoogtemodel / hoogtedata
 - Aanbrengen lokale verfijning op basis van polygons / polylines.

Bresgroei

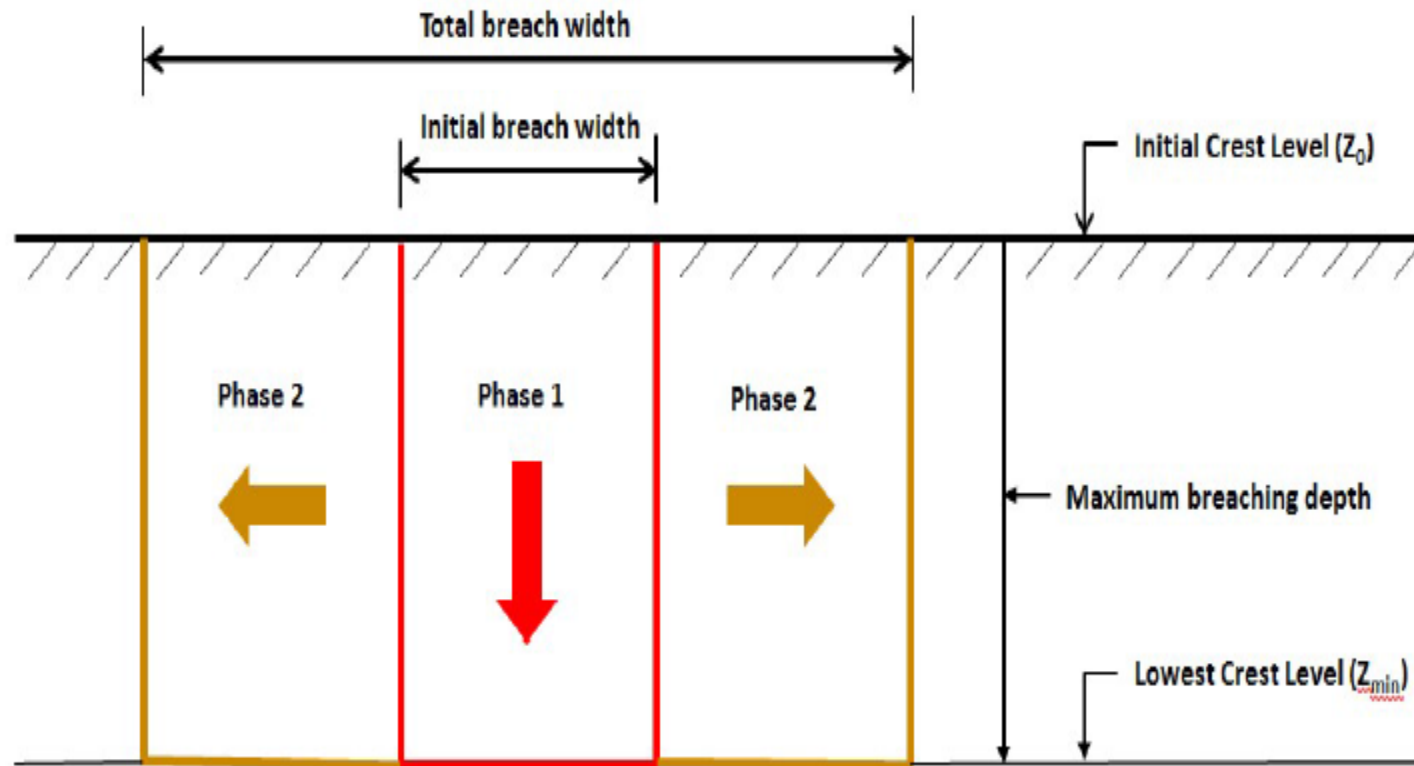
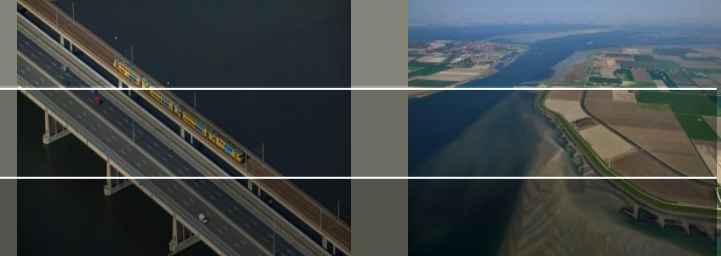
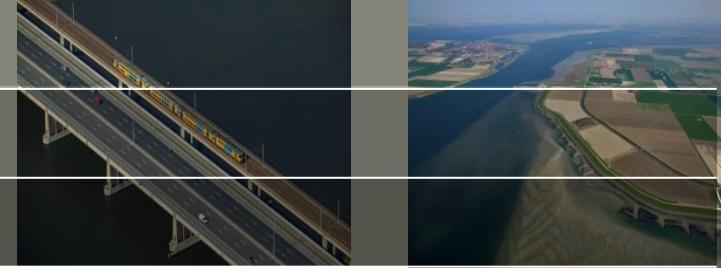
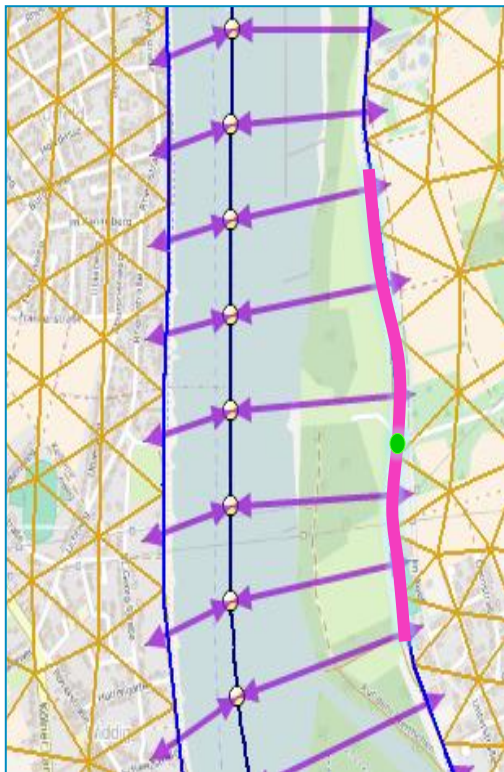


Figure 5.211: Development of a bbranch in a "Flow 1D Dam Break Branch"

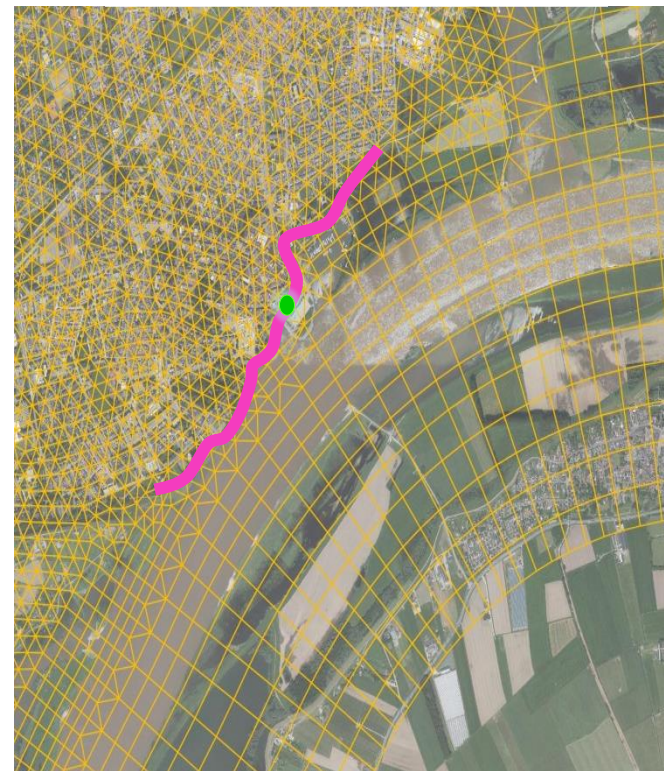
Rekengrid en koppelingen



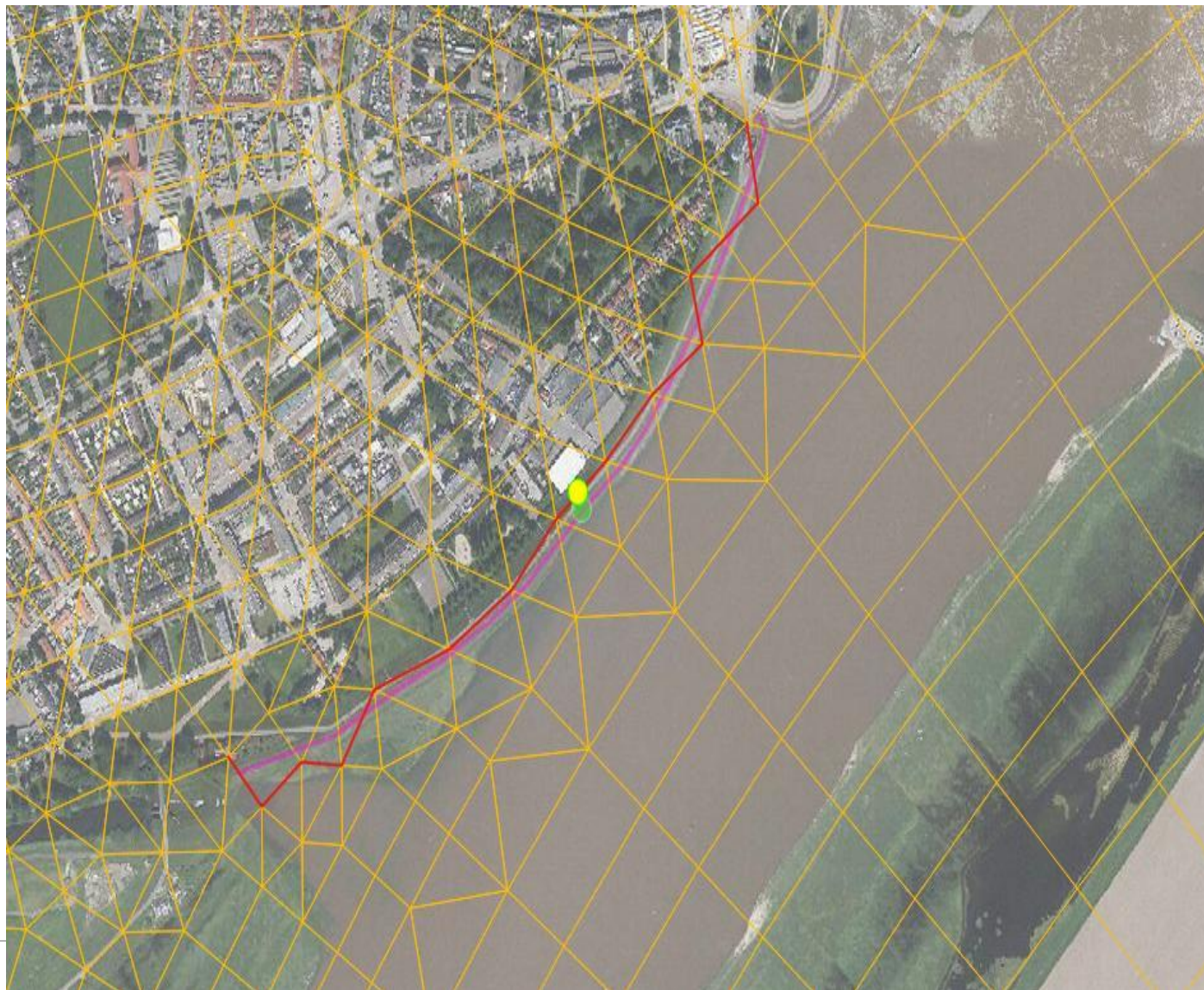
1D-2D



2D-2D



Discretisatie dijkbreuklijn



- Opgegeven dijkbreuklijn
- Gesnapte dijkbreuklijn
- Opgegeven bres startpunt
- Gesnapte bres startpunt

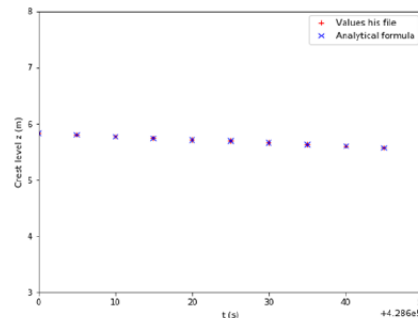
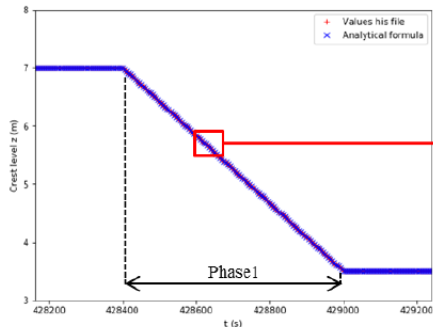
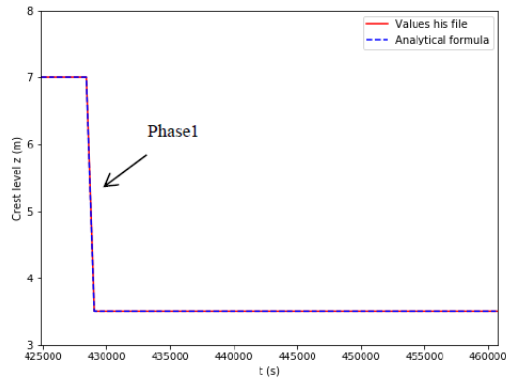
Implementatie in rekenhart, validatie bregroei

Two phases:

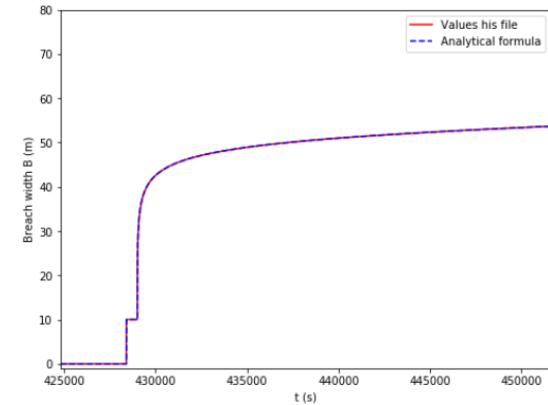
- Phase 1 ($t_{\text{Phase1}}=600\text{s}$): Branch with a constant initial width ($B=10\text{m}$), lowered from its crest level ($Z=7\text{m}$) to its final crest level ($Z_{\text{min}} = 3,5\text{m}$).
- Phase 2: The branch only grows in width.

1. Comparison values computed using analytical formula / values saved in his file

➤ Crest level :

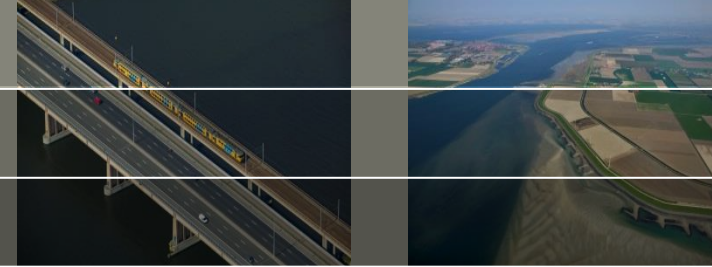


➤ Branch width :



➔ Identical results

Implementatie in Delta Shell



Project1 - Delta Shell

File Home View Developer Tools GIS Map Config DIMR

Generate links Add link Embedded 1D2D Links FM Region

North Arrow Legend Scale Bar Decorations

Zoom Previous Zoom Next Query Features Query Time Series

Show Color Scale

Spatial Operations Edit Grid Profile Network Area Re... Add Load Add Observation Point Find Grid Cell Water Quality

Project testcrop_breach bres_Hoenzadriel testcrop_breach

Project1
testcrop_breach
General
Area
Grid
1D2D Links
Bed Level
Time Frame
Processes
Initial Conditions
Boundary Conditions
Physical Parameters
Sources and Sinks
Numerical Parameters
Output Parameters
Output

Properties WaterFlowFMModel

Run mode
Validate before run True
Show model run cor False
Use RPC True

Validate before run

Messages Time Navigator

General info

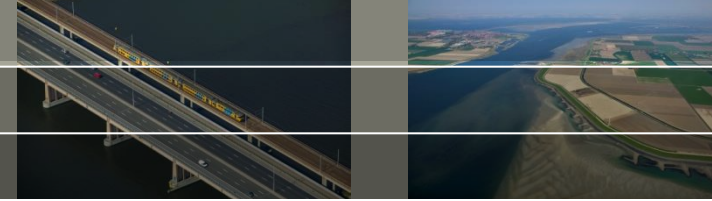
Levee id 0
Levee name bres_Hoenzadriel
Levee length 4635.66 [m]
Breach x-location 151048.93
Breach y-location 418271.14
 Active breach growth
Start breach growth 10-19-2002 23:00:00 [dd/MM/yyyy hh:mm:ss]
Growth formula Verheij - vd Knaap (2002)

Parameters

Initial breach width (B0) 10 [m]
Initial crest level (Z0) 7 [m AD]
Factor 1 (Alfa) 1.3 [-]
Factor 2 (Beta) 0.04 [-]
Lowest crest level (Z min) 3.5 [m AD]
Critical flow velocity (Uc) 0.2 [m/s]
Period to reach z-min 00:10:00 [hh:mm:ss]

A map view showing a breach model overlaid on a satellite-style map. The model consists of a grid of orange squares representing the breach area, with a blue line indicating the breach location. The map shows a river, roads, and buildings. A scale bar at the bottom right indicates distances up to 200 meters.

1D2D koppelingen



Project1 - Delft3D FM Suite 2018.01 HM

File Home View Tools GIS Map Config DIMR

North Arrow Zoom Previous Map Coordinate System Legend Zoom Next Export As Image Scale Bar Query Features Query Time Series

Spatial Operations Edit Grid Profile Network Area Re... Network Coverage An...

Project1

- FlowFM
 - General
 - Area
 - Network
 - Computational 1D Grid
 - Grid
 - Bed Level
 - Time Frame
 - Processes
 - Initial Conditions
 - Boundary Conditions
 - Physical Parameters
 - Sources and Sinks
 - Numerical Parameters
 - Output Parameters
 - Output

Properties Channel

Number of pu 0
Number of cu 0
Number of bri 0
Number of we 0
Number of ga 0
Number of lat 0

General

Name Channel1
LongName
From node Node001
To node Node002
Length 739,77
Geometry lenç 739,77
Is custom lenç False
Attributes (0 attributes)
Order number -1

Attributes
All the (custom) attributes for this object.

Messages

- New channel command: <Back> remove last point, <S> toggle snapping, L decrease step, R increase step 4/16/2018 1:49:45 PM
- Adding welcome page ... 4/16/2018 1:48:46 PM
- Main window created. 4/16/2018 1:48:46 PM
- Hiding splash screen ... 4/16/2018 1:48:46 PM
- Started in 7,44 sec 4/16/2018 1:48:46 PM

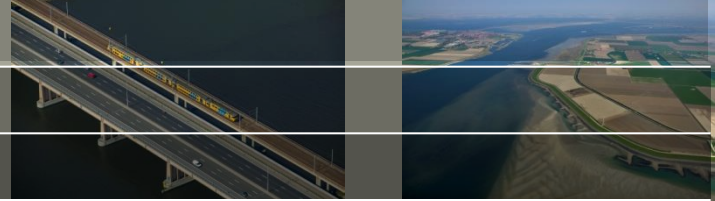
Chart Regi... Map Ope... Tool...

Gridgeneratie: nut en noodzaak



1. 2D gridgeneratie is noodzakelijk voor 1D2D berekeningen
2. Keuze in 2D grid generatie zijn bepalend voor uitkomsten, denk aan, gridresolutie, griduitlijning, gridvorm.
3. Keuzes in het 2D grid beïnvloeden sterk de rekensnelheid.
4. Het gemakkelijk (automatisch) kunnen genereren van een gewenst 2D grid is essentieel om D-HYDRO succesvol te kunnen inzetten voor overstromingsstudies.

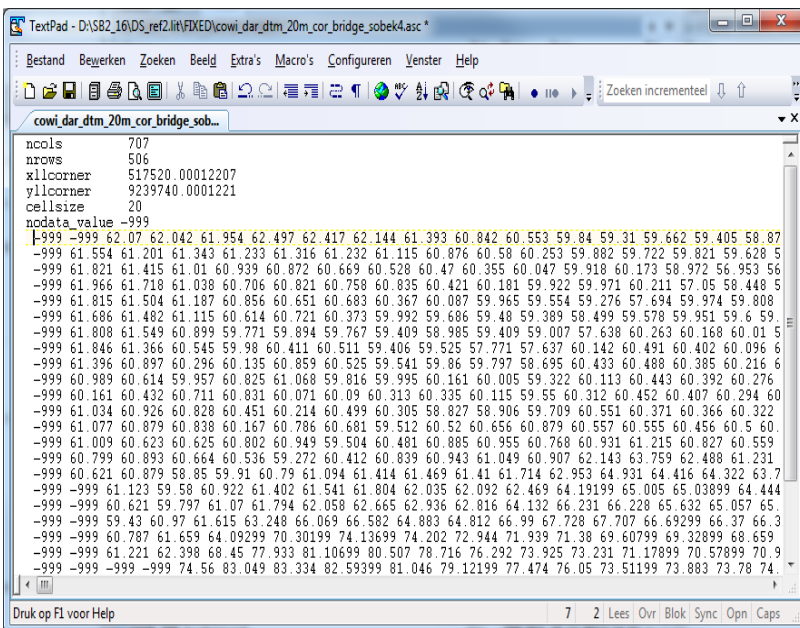
Doel gridgeneratie



1. Eenvoudige opzetten van 2D rekengrid met lokale verfijningen
2. Eenvoudige koppelen rekengrid aan hoogtedata

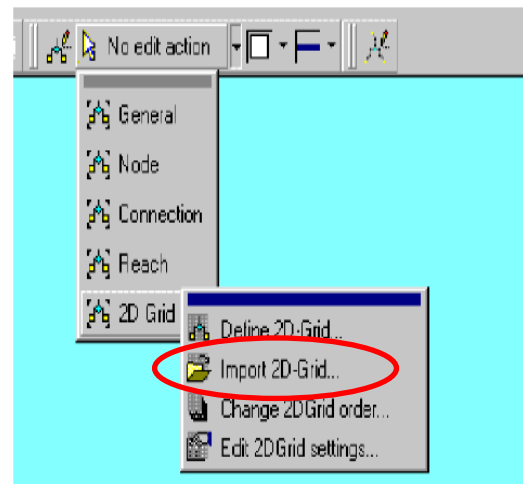
Reference: SOBEK gridgeneratie

- SOBEK 2D grid is altijd een rechthoekig grid (vierkantjes)
- Het 2D grid is één op één gekoppeld aan een ASCII file.
- De ASCII file beschrijft de celgrootte en bodemhoogte per cel

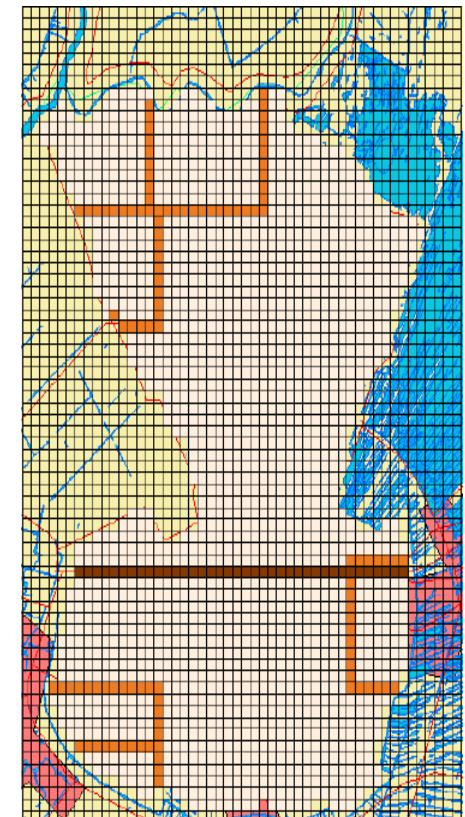


```
TextPad - D:\S82_16\DS_ref2.lrt\FIXED\cowi_dar_dtm_20m_cor_bridge_sobek4.asc*
Bestand  Begerken  Zoeken  Beeld  Extra's  Macro's  Configureren  Venster  Help
Zoeken incrementeel
cowi_dar_dtm_20m_cor_bridge_sob...
ncols      707
nrows     506
yllcorner  517520 00012207
yllcorner  9239740 0001221
cellsize   20
nodata_value -999
-999 -999 62.07 62.042 61.954 62.497 62.417 62.144 61.393 60.842 60.553 59.84 59.31 59.662 59.405 58.87
-999 61.554 61.201 61.343 61.233 61.316 61.232 61.115 60.876 60.58 60.253 59.882 59.722 59.821 59.628 5
-999 61.821 61.415 61.01 60.939 60.872 60.669 60.528 60.47 60.355 60.047 59.918 60.173 58.972 58.953 56
-999 61.966 61.718 61.038 60.706 60.821 60.758 60.835 60.421 60.181 59.922 59.971 60.211 57.05 58.448 5
-999 61.815 61.504 61.187 60.856 60.651 60.883 60.367 60.007 59.965 59.554 59.276 57.694 59.974 59.808
-999 61.686 61.482 61.115 60.614 60.721 60.373 59.392 59.686 59.48 59.389 58.499 59.578 59.951 59.6 59
-999 61.808 61.549 60.899 59.771 59.894 59.767 59.409 58.985 59.409 59.007 57.638 60.263 60.168 60.01 5
-999 61.846 61.366 60.545 59.98 60.411 60.511 59.406 59.525 57.771 57.637 60.142 60.491 60.402 60.096 6
-999 61.396 60.897 60.296 60.135 60.859 60.525 59.541 59.86 59.797 58.695 60.433 60.488 60.385 60.216 6
-999 60.989 60.614 59.957 60.825 61.068 59.816 59.995 60.161 60.005 59.322 60.113 60.443 60.392 60.276
-999 60.161 60.432 60.711 60.831 60.071 60.09 60.313 60.335 60.115 59.55 60.312 60.452 60.407 60.294 60
-999 61.034 60.926 60.828 60.451 60.214 60.499 60.305 58.827 58.906 59.709 60.551 60.371 60.366 60.322
-999 61.077 60.879 60.838 60.167 60.786 60.681 59.512 60.52 60.656 60.879 60.557 60.555 60.456 60.5 60
-999 61.009 60.623 60.625 60.802 60.949 59.504 60.481 60.885 60.955 60.768 60.931 61.215 60.827 60.559
-999 60.799 60.893 60.664 60.536 59.272 60.412 60.839 60.943 61.049 60.907 62.143 63.759 62.488 61.231
-999 60.621 60.879 58.85 59.91 60.79 61.094 61.414 61.469 61.41 61.714 62.953 64.931 64.416 64.322 63.7
-999 -999 61.123 59.58 60.922 61.402 61.541 61.804 62.035 62.092 62.469 64.19199 65.005 65.03899 64.444
-999 -999 60.621 59.797 61.07 61.794 62.058 62.665 62.936 62.816 64.132 66.231 66.228 65.632 65.057 65
-999 -999 59.43 60.97 61.615 63.248 66.069 66.582 64.883 64.812 66.99 67.728 67.707 66.69299 66.37 66.3
-999 -999 60.787 61.659 64.09299 70.30199 74.13699 74.202 72.944 71.939 71.38 69.60799 69.32899 68.659
-999 -999 61.221 62.398 68.45 77.933 81.10699 80.507 78.716 76.292 73.925 73.231 71.17899 70.57899 70.9
-999 -999 -999 -999 74.56 83.049 83.334 82.59399 81.046 79.12199 77.474 76.05 73.51199 73.883 73.78 74.
```

ASCII file (geopend in text editor)

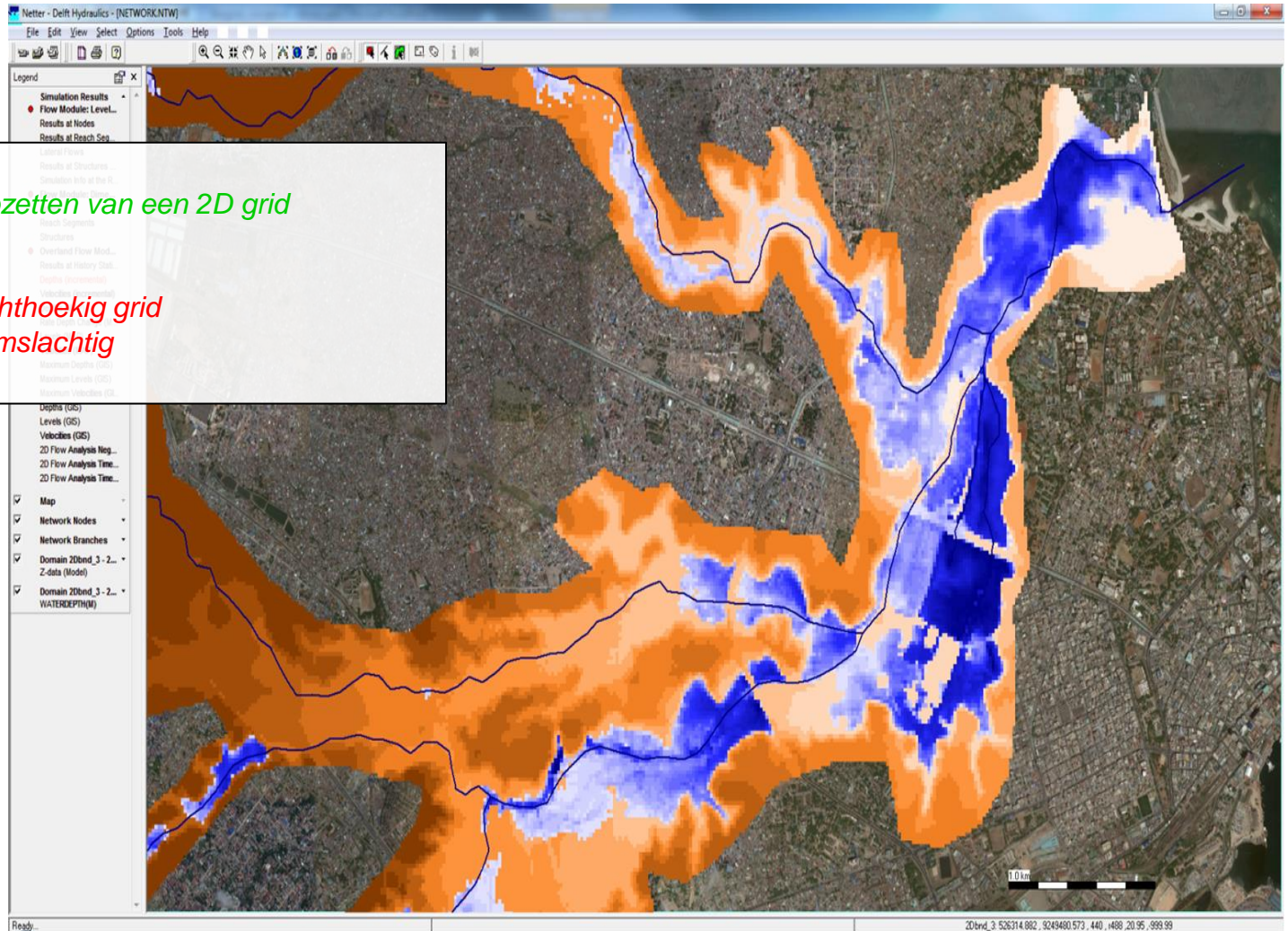


Import ASCII file in SOBEK Netter)



SOBEK 2D model based on ASCII file

SOBEK 2D Gridgeneratie samenvattend



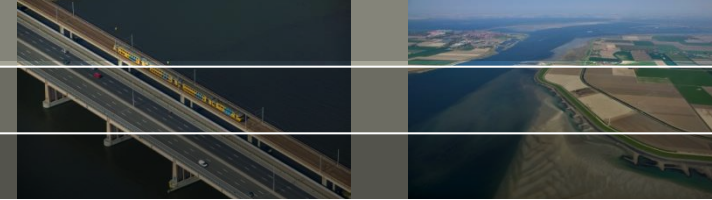
Voordeel:

+ *Eenvoudig en snel opzetten van een 2D grid*

Nadeel:

- *Vast aan uniform rechthoekig grid*
- *Lokale verfijning is omslachtig*

Gridgeneratie in D-HYDRO



- Model set up in Delta Shell interface,
- Grid generatie en editing in RGF Grid (opent bij dubbel klik op “Grid” in Delta Shell)

Delta Shell

Project - D-HYDRO Suite 2018.01

RGF Grid

Messages

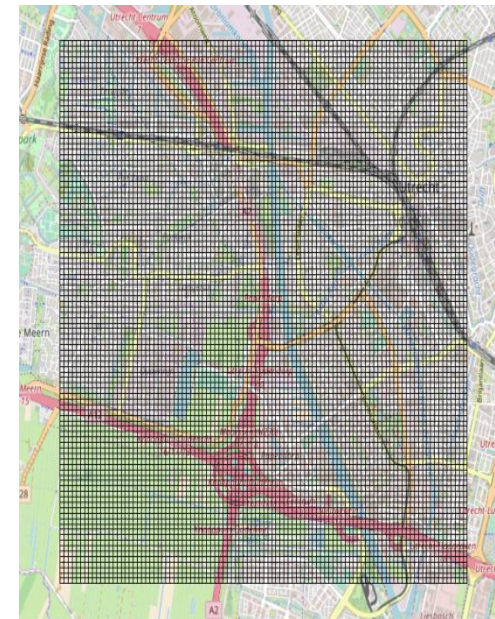
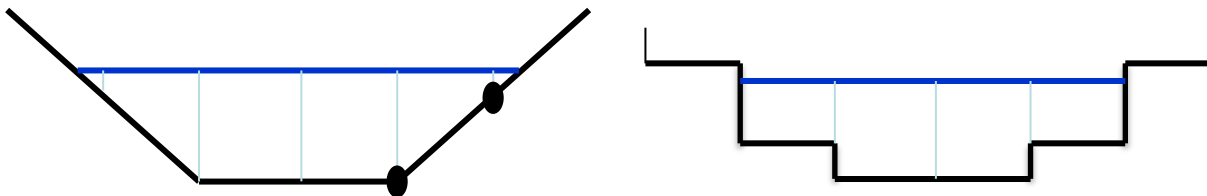
- ⚠ The model may not run. Spatial varying quantity bedlevel could not be imported because the prefix does not match initializer for Tracers or initialiseffac for Spatial Varying Sediments. 5/7/2018 1:50:50 PM
- ⚠ The model may not run. Spatial varying quantity bedlevel could not be imported because the prefix does not match initializer for Tracers or initialiseffac for Spatial Varying Sediments. 5/7/2018 1:50:50 PM
- ⚠ The model may not run. Spatial varying quantity bedlevel could not be imported because the prefix does not match initializer for Tracers or initialiseffac for Spatial Varying Sediments. 5/7/2018 1:50:43 PM
- 🔔 Start importing data
- 🔔 Adding welcome page...

Workflow 1: Import vanuit DTM bestand

- Inlezen .asc file of .tiff file vanuit **DeltaShell**
- Automatisch aanmaken grid één op één vanuit DTM file, (dus geen RGF Grid nodig)
- Automatisch toekennen hoogtes ('bed levels'). kopie sample set x,y,z wordt in DeltaShell opgeslagen

Let op!

2D model settings; keuze voor hoogte op cell centers of op hoekpunten.



Workflow 2: Genereer grid binnen area

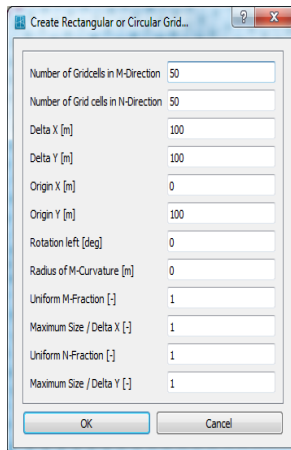
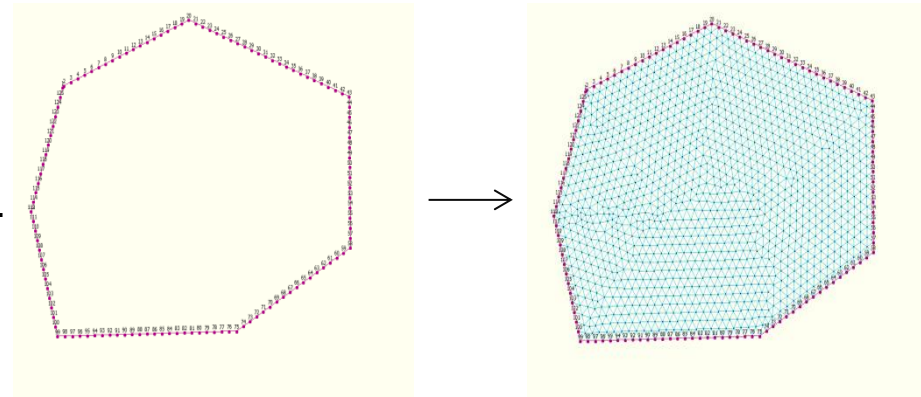
Genereer uniform grid o.b.v. geometrie.

Binnen **RGF Grid**

Import geometrie vanuit .pol file of .shp file in RGF Grid.

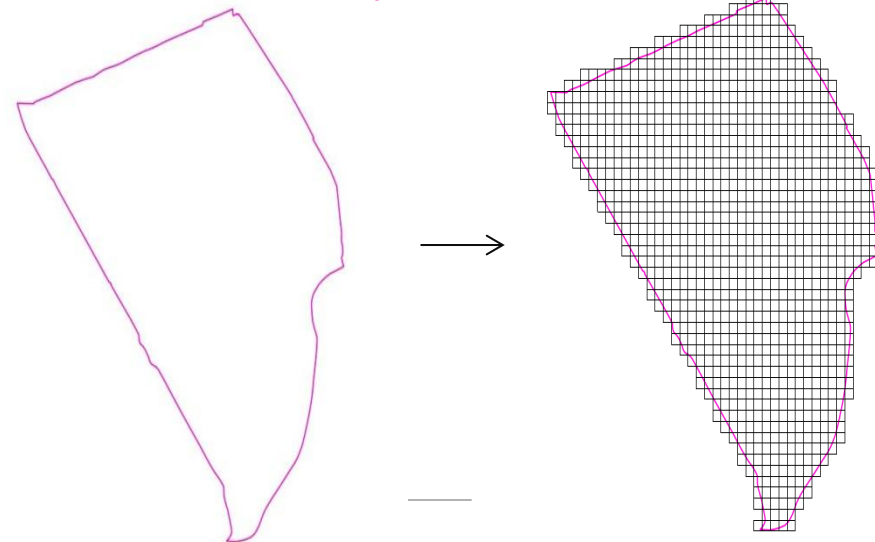
Gebruiker geeft op celgrootte (delta x, y)

Gridgeneratie met driehoeken



Grid generatie optie binnen RGF Grid

Gridgeneratie met vierkanten



Vervolgens toekennen hoogtedata in DS

The screenshot displays the D-Suite software interface for a hydrodynamic simulation project. The main window shows a 3D visualization of a riverbed, with a color gradient indicating elevation. The interface includes a menu bar, toolbars, and several panels. Key elements are circled in pink:

- Bed Level**: A dropdown menu in the top toolbar.
- Import**: A button in the top toolbar.
- Interpolate**: A button in the top toolbar.
- Spatial Operations**: A button in the top toolbar.

The interface also shows a list of simulation parameters on the left, a project tree on the right, and a message log at the bottom. The message log contains several error messages:

```
Messages
[!] The model may not run. Spatial varying quantity bedlevel could not be imported because the prefix does not match initialtracer for Tracers
[!] The model may not run. Spatial varying quantity bedlevel could not be imported because the prefix does not match initialtracer for Tracers
[!] The model may not run. Spatial varying quantity bedlevel could not be imported because the prefix does not match initialtracer for Tracers
[!] Start importing data
[!] Adding welcome page ...
```

The bottom status bar shows the current map coordinates: 150134.282596311, 437768.591560726.

Workflow 3: Genereer grid met lokale verfijning

Eerste stap: in RGF Grid genereer uniform grid met grofste resolutie (als in Workflow 2)

dan:

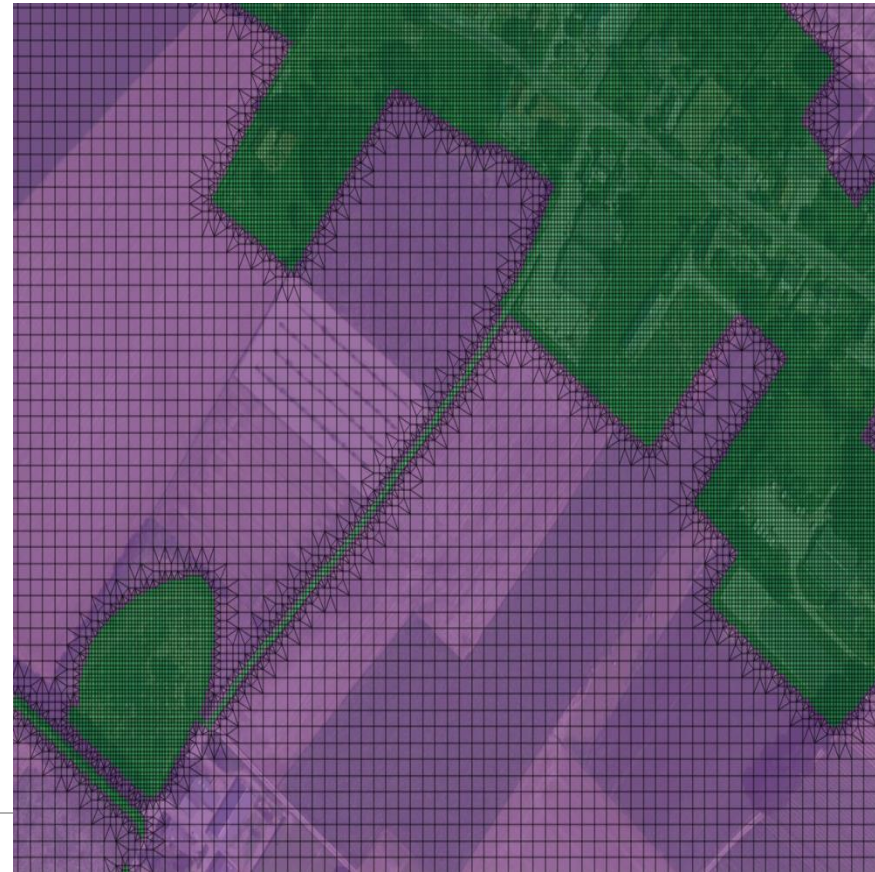
Import raster verfijnings file (.asc of .tiff) in **RGF Grid**.

Resolutie raster is o.b.v. kleinste gewenste gridgrootte

Raster bevat integer waarden :1, 2, 3,..., etc, met aantal verfijningslagen. (1 is fijn, elke hogere waarde is 2 maal zo grof)

Overgangen gevormd door driehoeken.

Hoogste verfijnings waarde is maatgevend



Vervolgens toekennen hoogtedata in DS

The screenshot displays the D-HYDRO Suite 2018.01 software interface. The main window shows a 2D model of a river channel with a central orange bed level area and purple channel boundaries. The interface includes a menu bar, toolbars, a project tree on the left, a properties panel, and a messages window at the bottom. Several menu items like 'Bed Level', 'Import', 'Interpolate', and 'Spatial Operations' are circled in pink. A second window in the foreground shows a top-down view of the same model with a green mesh and a red channel boundary.

Project: D-HYDRO Suite 2018.01

Operations:

- Bed Level
- Bed Level
- set 1
- set 2
- Import samples 2
- output
- Import samples 3
- input
- output

Messages:

- The model may not run. Spatial varying quantity bedlevel could not be imported because the prefix does not match initialtracer for Tracers
- The model may not run. Spatial varying quantity bedlevel could not be imported because the prefix does not match initialtracer for Tracers
- The model may not run. Spatial varying quantity bedlevel could not be imported because the prefix does not match initialtracer for Tracers
- Start importing data
- Adding welcome page ...

Current map coordinates: 150134.282596311, 437768.591560726

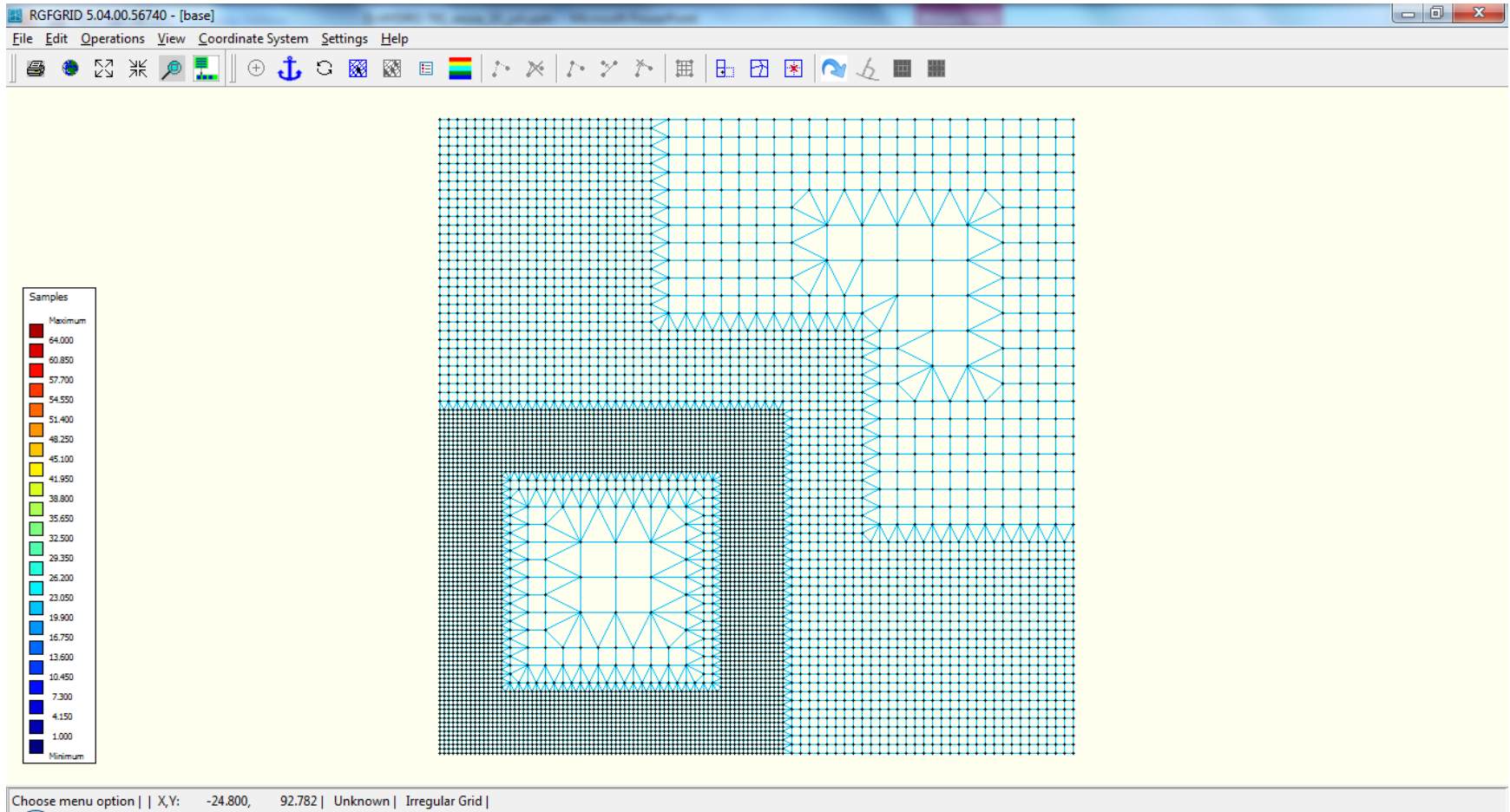
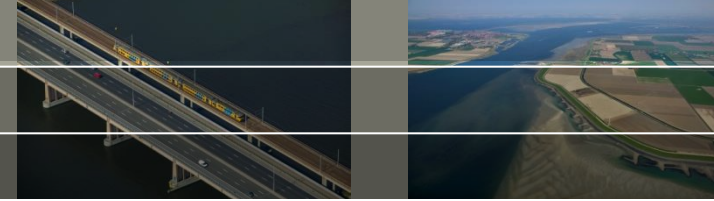
Workflow 4: Combinatie curvilineair en uniform

Combinatie van grigeneratie technieken → meer handwerk

The screenshot displays the Deltaware software interface for a hydrodynamic model. The central map view shows a 2D mesh grid, which is a combination of uniform and curvilinear elements. The grid is yellow and covers a plan view of a water body. The interface includes a top menu bar with options like File, Home, View, Tools, Map, and Config. Below the menu bar is a toolbar with various tools for map manipulation and data handling. On the left side, there is a Project tree showing the model structure, including 'Project1', 'trel2', 'General', 'Area', 'Grid', 'Bed Level', 'Time Frame', 'Processes', 'Initial Conditions', 'Boundary Conditions', 'Physical Parameters', 'Sources and Sinks', 'Numerical Parameters', 'Output Parameters', and 'Output'. The Properties panel at the bottom left shows the current selected element's properties. The Message log at the bottom contains several error messages:

- The model may not run. Spatial varying quantity bedlevel could not be imported because the prefix does not match initialtracer for Tracers or initialisedfrac for Spatial Varying Sediments. 5/7/2018 1:50:50 PM
- The model may not run. Spatial varying quantity bedlevel could not be imported because the prefix does not match initialtracer for Tracers or initialisedfrac for Spatial Varying Sediments. 5/7/2018 1:50:50 PM
- The model may not run. Spatial varying quantity bedlevel could not be imported because the prefix does not match initialtracer for Tracers or initialisedfrac for Spatial Varying Sediments. 5/7/2018 1:50:50 PM
- Start importing data 5/7/2018 1:50:43 PM
- Adding welcome page ... 5/7/2018 1:50:31 PM

Ontwikkelingen in RGFGGrid



Planning softwareontwikkeling

SOFTWAREONTWIKKELING

1D2D embedded koppeling

- waaronder wordt ontwikkeld aan:
- Validatie 1D2D koppeling
 - Automatische generatie 1D2D koppeling
 - Inspectie 1D2D koppeling
 - Manipulatie 1D2D koppeling
 - Analyse resultaten 1D2D koppeling

Bresgroei

- waaronder wordt ontwikkeld aan:
- Ontwikkelen (meegroeiend) bresgroei element (1D2D & 2D2D)
 - Implementatie bresgroeifunctie
 - Aanbrengen, editen en inspectie van bresgroei element in schematisatie
 - Analyse resultaten bresgroei

2D gridgeneratie en verfijning

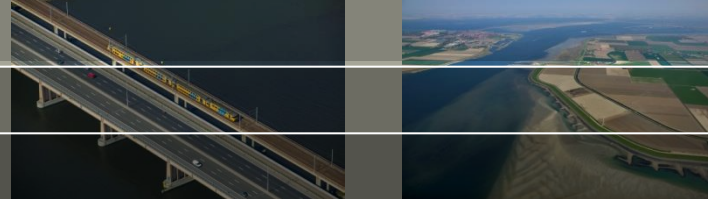
- waaronder wordt ontwikkeld aan:
- Automatische gridgeneratie op basis van polygoon/shape
 - Automatische bodeminterpolatie op basis van hoogtemodel / hoogtedata
 - Aanbrengen lokale verfijning op basis van polygons / polylines.

	2018					DSD 2018						2018					af bij DSD 2019	
	jan	feb	mrt	april	mei	juni	juli	aug	sept	okt	nov	dec	jan	feb	mrt	april	mei	juni
1D2D embedded koppeling																		
Bresgroei																		
2D gridgeneratie en verfijning																		
<i>PILOTS</i>																		



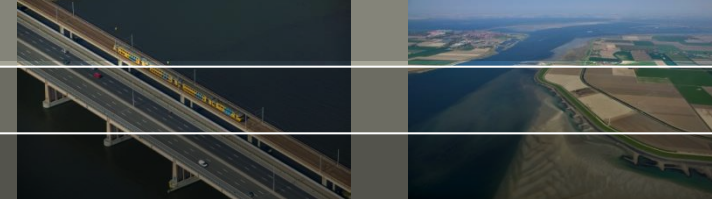
1e oplevering GUI functionaliteit aan adviesbureau

Pilots De Dommel



- Netwerk gegenereerd voor pilot gebied De Dommel:
→ *vragen over schematisatie*
- Onderdoorgangen van kades
- Hoeveel koppelpunten zijn er nodig tussen 1D en 2D
- Aan welke kant van het dwarsprofiel gaat het eruit
- Dubbeltelling volume

1. TKI-2: Hydrologie in D-HYDRO



UW WATERSCHAP



Onderwerpen

Hydrologie

1D basisfunctionaliteit (incl sturing)

Modelgeneratie

Visualisatie



Deltares