7 Surface water



Chapter 7: Surface water

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7.1 Supported models

The following surface water models are supported by the triwaco modelling environment:

Modelcode	Developed by	Description	Chapter
SOEBK-CF	WL Delft/Deltares	Hydraulic model for stationary and transient surface water flow	6

7.2 The SOBEK-CF Tutorial: defining a Triwaco project

7.2.1 Introduction

There are several possibilities to get to know **Triwaco**. The most extensive information on the software package can be found in the next chapters of the manual, that includes not only an explanation of how to run the software, but also contains extensive background information of the different modules and supported model codes. This information can also be accessed by the Help function.

This tutorial gives an introduction on how to set up and run a SOBEK-CF surface model in **Triwaco**. It is meant for those who are familiar with SOBEK-CF modelling and wish to get a quick view of the normal method to set up and to run a SOBEK-CF model, and the standard possibilities of **Triwaco**. A complete view is obtained by using the manual.

It is strongly recommended that prior to starting this exercise one first reads through the previous chapters which explain the general philosophy and handling of the Triwaco modelling environment. Especially chapters 3, 4 and 5 is recommended to read first.

The model set up in this tutorial will be located in the directory C:\My Model\TutorialProject1\ All data referred to in the text is available in the directory C:\My Model\TutorialData\. A resulting version of the model is located in the directory C:\My Model\Tutorial\. So when things go wrong or you don't know what to do one can always refer to this working model. Below an overview of the successive steps of building a model in Triwaco is given.

6.2.1 Setting up a triwaco project
6.2.2 Setting up a surface water model
6.2.3 Setting up a discretisation dataset
6.2.4 Setting up a design dataset
6.2.5 Setting up a simulation dataset
6.2.6 Setting up a scenario dataset

Model building starts with the choice of boundaries and collection of data. This is done without the use of the software, and will not be discussed here.

Triwaco works with a clear hierarchical data storage structure. The entry always is a project that can contain several models. Every model consists of different connected datasets that contain different parameters.

7.2.2 The SOBEK-CF Tutorial

Regional – Local database construction

Data of the watersystem is often available in a regional database. The research area is a small part of the regional database. We will show you how to use the regional database to set up a local SOBEK-CF model using Triwaco.

7.2.3 Definition of a Triwaco Project

Now we show you the steps to take for making a SOBEK-CF model using **Triwaco**. We keep to the 'main route'; extra options are mentioned with the letter **E** and shown in *italic*. Important notices are indicated with **NB**.

Modelling with **Triwaco** always starts by defining a project. Choose 'File - New' if you want to set up a new modelling project (otherwise choose 'File - Open' - and look for the location and name of your project). A wizard will pop up which will guide you through setting up de project.

🔜 New Project		- D ×
General Enter general inf	ormation about the new project here	Ð
Project name Location	Tutorial-SOBEKCF C:\My Models\Tutorial\Tutorial-SOBEKCF	Browse
Description		
	< Back Next >	Cancel

After finishing the wizard, you will see the start window of the modelling environment with the new project added in the project list (see figure below). It gives all information of de modelling project, models, datasets and parameters. For more information on the modelling environment see chapter 5. To add or remove windows go to the menu 'View' in the top of the application-window. The modelling environment is fully customizable and each window can be put at any location by simply drag and drop.

🔡 Triwaco Integrated Modelling Enviro	nment - [Project: Tut	orial-SOBEKCF]		
🖳 File Edit View Project Mod	el Tools Windows	Help		
Project 🕂 🕂 🗙	Tutorial-SO	BEKCF		
	i 🕝 👗 🗈 🕰 🕻	у Refresh		
	Model	Code	Gridder	Туре

 It is possible to use your favourite text editor, instead of the standard OpenSource editor that comes with Triwaco, Notepad++. To do this go to 'Tools' in the task bar at the top. Select 'Edit Database'. This will open the database in Access or other database editor. Go to Applications and change the path and location of your favourite text-editor.

7.2.4 Setting up a SOBEK-CF model

If you want to add a new surface water model like SOBEK-CF to the project this is done by: 'Model - Add

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🚂 Triwaco Integrated Modelling Environment - [Project: Tutorial-SOBEKCF] File Edit View Project Model Tools Windows Help 🗋 📂 🔚 Open Đ Add Model Project OBEKCF Ø. Build Tutorial-SOBEKCF 🚯 Refresh Explore Code Properties

Model'. An existing model will already be listed in the project-window.

A wizard will pop up. In the first window select 'Next' to continue. In the second window one can choose the type of model (see figure below). In our case we want to set up a surface water model. So select 'Surface water model' and give it the name **Tutorial-Regional** (since we will start by setting up the regional model first).

🔛 New Model					
General Infor Select the type	mation of model to creat	e and enter the	e name of the m	odel	*
Installed Mode	l Types				
Groundwater model	Surface water model	Unsaturated zone model	Linked model	Effect model	Rainfall-Ru model
Model name Location	Tutorial-Region	al 1961_Triwaco2	2008\Tutorial\Tu	torial-SOBEKCF	\Tutorial-Regiona
			< Back	Next >	Cancel

In the next window one can select the model code to be used for the simulation. Currently **Triwaco** supports only one surface water model, SOBEK-CF (a package for hydraulic modelling developed by Deltares / WLDelft Hydraulics). In this tutorial we will set up a surface water model with the model code SOBEK-CF.

🔜 New Model		_ 🗆 ×
Model Code This page enables you to select the computer co	de for your model	**
Installed Surface water model computer codes		
Parent Model	Parent Model C	ode
	< Back Next >	Cancel

In the window there is also an option for selecting a parent model. This is used when setting up a sub-model or scenario based on a previously created model. For now this option is not used. Select next and finish to create the model.

The SOBEK-CF model with the name **Tutorial-Regional** is now added to the project. The SOBEK-CF model can be opened in several ways. One can open it by double-clicking at its location in the project tree of the project-window or one can select 'Model - Open' in the main menu. The model is currently empty and contains no datasets. In the next paragraphs we will show how to add the necessary datasets to define the Tutorial model. We will start by setting up a discretisation dataset where the calculation grid is defined.

7.3 Setting up a discretisation dataset (regional)

The SOBEK-CF calculation grid is set up in the following steps :

- 1. definition of the discretisation dataset
- 2. definition of the model boundary
- 3. definition of the model attributes (grid parameters)

When the discretisation dataset, model boundary and model attributes have been defined the grid can be generated (final step).

7.3.1 Step 1: Creating a discretisation dataset

The data for the generation of the network (calculation grid) is defined in the discretisation dataset. For the discretisation of the Tutorial model we will use shape files for boundary, rivers and other model attributes (weirs, laterals). All data used in this tutorial is available in the directory My Models\TutorialData\

First we add the discretisation dataset to the model by selecting 'Dataset - Add Dataset' from the main menu. A pop up window will appear similar to that of adding a model. Again in the first window select 'Next' to continue.

🔡 T	riwaco	Integ	rated M	lodelling	Envi	ronm	ent - [M	odel: Tutor	ial-R	egional]
•	File	Edit	View	Model	Dat	aset	Tools	Windows	He	lp
	<u> </u>	-			0	Add	dataset			
Proje	ect					Build				ıal
	📄 Tut	orial-SO	BEKCF	_		Gene	erate) Refresh
L	i	Tutoria	l-Regiona	al		Run				уре
L						View	,		•	
L .						Expl	ore			
L .					3	Refr	esh	F5		
L						Prop	erties	Alt+Enter		

In the second window one can choose the type of dataset. There are four types of datasets each with its own characteristics and purpose:

- **Discretisation**: Defines the network or calculation grid (boundaries and model attributes)
- Design: Defines the conceptual model using GIS maps and tables.
- **Simulation**: Here is where the data from the conceptual model is linked to the calculation grid. The model is now prepared to run with the modelcode.
- Scenario: Is similar to the simulation dataset. It is base upon the simulation dataset or another scenario dataset. The dataset is created with parameters linked to the parent dataset. Only parameters that need to be altered for that scenario have to be specified.

Each of these will be created in this tutorial with exception of the scenario dataset. In surface water modelling the discretiosaint of a scenario is often different in comparsion to the discretisation of the reference model. When defining a new discretisation one have to set up a new simulation dataset. So in surface water modelling the simulation dataset is preferred in fovour of the scenario dataset. This will become clear in the rest of the Tutorial. For now select 'Discretisation' and use the name **Discr-regional** for the dataset. Then select 'Next'.

🔛 New Datase	et			
New Dataset Select type of c	lataset and enter a name	e		*
Installed Datas	et Types			
Design	Discretisation	Simulation	Scenario	
Dataset name	Discr-regional			
Dataset Hame				
Location	D:\Projecten\9T1961_1	Friwaco2008\Tutor	rial\Tutorial-SOBEKCF\	Tutorial-Regiona
			((
		< Back	Next >	Cancel

In the next window one may want to select a parent dataset. This is only of importance when a new grid is created based on an existing discretisation dataset (like a sub-model or scenario). The nice thing about this option is that a new model can be creating based on an existing conceptual model. We will show how this works for a local study area in the XXX-part of this Tutortial. For now we are defining a regional discretisation dataset and will not use a parent dataset; select 'Next'.

🔜 New Dataset	
Associated Datasets The following dataset are related	**
Parent Dataset	
Discretization Dataset	_
Dataset is time dependent	
\square Time discretisation is inherited from parent da	ataset
	< Back Next > Cancel

In the following window it is possible to change the appearing program options. These options describe for example snapping distances for merging rivers and model attributes. In this Tutorial we will only use the default options so select 'Next' to continue without changing the program options.

These program options can be changed at any time by selecting 'Dataset – Properties' and tab 'Options' for the selected dataset.

Royal Haskoning

	New	Dataset			
Pi Ri	rogra eview	m Options or change the pro	gram options here		**
	Option	s for Discretisation	Program 'SonetCF'		
		Section	Option	Value	Description 🔺
		Grid	MinDistInBnd	0	Snap distance f
		Grid	MinDistInRiv	0	Snap distance f
		Grid	MergeRivers	0	0 = no, 1 = yes
		Grid	TolRivMerge	0	Snap distance f
		Grid	TolSobek	10	Tolerance for a
					Advanced
				< Back Next	> Cancel

The next window is used to define parameters for the specified dataset. In the figure below the parameters for model boundary, rivers, calculation grid density, fixed calculation points and lateral discharge points are shown: BND = model boundary

REACH = rivers

CALCPNTDENS = density of the calculation grid FIXEDCALCPNT = fixed calculation points LATDISPNT = lateral discharge points

	Туре	Name	Default	Description
•	Grid	BND	0	boundary polyg
	Grid	REACH	0	CF reach
	Grid	CALCPNTDENS	0	CF calculation p
	Grid	FIXEDCALCPNT	0	CF fixed calculat
	Grid	LATDISPNT	0	CF lateral discha

Usually there is no need to make changes to the specified parameters, so select 'Next' and after that 'Finish'. Now the dataset is created and appears as part of the model. We will show you in the next paragraphs how to remove, use and add parameters to the dataset.

The screen shot below shows all parameters for defining a discretisation dataset that can be used to set up a

SOBEK-CF surface water model. Currently all parameters have a bad status (red colour), in our case meaning the parameter maps still have to be defined as we show in the next paragraph.

Tutorial-R	Tutorial-Regional.Discr-regional									
G 🎓 🕉 🗈	i 😋 🎓 🐰 🖻 🏙 🔇									
Parameter	Туре	Description	Input	Value	Field	Allocator	Default	Dataset		
🔑 BND	Grid	boundary polyg	Vector map	BND	BND	None	0	Discr-regional		
🔑 REACH	Grid	CF reach	Vector map	REACH	REACH	None	0	Discr-regional		
CALCPNTDENS	Grid	CF calculation p	Vector map	CALCPNTDENS	CALCPNTDENS	None	0	Discr-regional		
FIXEDCALCPNT	Grid	CF fixed calculat	Vector map	FIXEDCALCPNT	FIXEDCALCPNT	None	0	Discr-regional		
🔑 LATDISPNT	Grid	CF lateral discha	Vector map	LATDISPNT	LATDISPNT	None	0	Discr-regional		
🔑 MEASPNT	Grid	CF measuremen	Vector map	MEASPNT	MEASPNT	None	0	Discr-regional		
🔑 PROFPNT	Grid	CF profile point	Vector map	PROFPNT	PROFPNT	None	0	Discr-regional		
	Grid	Nodes for conne	Vector map	RRCONNECTIO	RRCONNECTIO	None	0	Discr-regional		
	Grid	Nodes for conne	Vector map	RRCONNECTIO	RRCONNECTIO	None	0	Discr-regional		
🔑 BOUNDARYPNT	Grid	CF Boundary Node	Vector map	BOUNDARYPNT	BOUNDARYPNT	None	0	Discr-regional		
🔑 WEIR	Grid	CF weir	Vector map	WEIR	WEIR	None	0	Discr-regional		
🔑 CULVERT	Grid	CF culvert	Vector map	CULVERT	CULVERT	None	0	Discr-regional		
🔑 PUMP	Grid	CF pump	Vector map	PUMP	PUMP	None	0	Discr-regional		
🔑 UNIVERSALWEI	F Grid	CF Universal weir	Vector map	UNIVERSALWEIR	UNIVERSALWEIR	None	0	Discr-regional		
🔑 BRIDGE	Grid	CF Bridge	Vector map	BRIDGE	BRIDGE	None	0	Discr-regional		
🔑 ORIFICE	Grid	CF Orifice	Vector map	ORIFICE	ORIFICE	None	0	Discr-regional		

7.3.2 Step 2: Defining the model boundary (define a vector map)

A boundary or any map (rivers, weirs, etc.) can directly be defined in Triwaco from several file formats (see text box), like a shape file set up in ArcView or ArcGIS, MapInfo or any other GIS software. For the model boundary we use a shape file generated in ArcView. How to define parameters directly from the different file formats will be explained in other steps of creating the calculation grid and design dataset for the model.

OpenGIS in Triwaco

For definition of parameter the modelling environment follows the specifications provided by the Open GIS Consortium (OpenGIS or Open GeoSpatial) using the Open Source Geospatioal Data Abstraction Library (GDAL).

The implementation of GDAL into our software opens the world of all sorts of data file formats that can directly can be read by the modelling environment. It can handle almost all known GIS formats (and the Dutch standards like Aquo, INTWIS and IRIS). The list of supported formats is ever growing, a selection:

- * Raster maps (over 64 formats ; Idrisi, ESRI grids, Erdas, ...)
- * Vector maps (over 16 format ; ESRI-shape, MapInfo, AutoCAD, ...)
- * Data bases such as Oracle, MySQL en Access;
- * Other well known formats such as Excel, txt en csv.
- * Data processing in the modelling environment using expressions and Spatial Queries

Data files in one of these formats can be used as model input without any conversion prior to use in the modelling environment. The modelling environment also supports the conversion of model results to several data file formats

Select the parameter BND (model boundary) and open a context menu (right-click mouse) and select 'Properties'. The parameter properties window has two tabs, General and Input. The General tab gives general information which is also shown in the dataset. For now you can leave this tab as it is. Note that the Status of the parameters says the parameter does not exist.

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Tut	Tutorial-Regional.Discr-regional											
G	1	ሯ 🗈 🛍	3									
Para	meter	Тура	e D	escription	Input	Value	Field	Allocator	Default	Dataset		
🔑 В		Edite		···· ry polyg	Vector map	BND	BND	None	0	Discr-regional		
🕕 R	6		T	h	Vector map	REACH	REACH	None	0	Discr-regional		
() c	•	Add Paramet	er Ins	ulation p	Vector map	CALCPNTDENS	CALCPNTDENS	None	0	Discr-regional		
🕕 F		View		d calculat	Vector map	FIXEDCALCPNT	FIXEDCALCPNT	None	0	Discr-regional		
🕕 L		Explore		ral discha	Vector map	LATDISPNT	LATDISPNT	None	0	Discr-regional		
🔑 M		Clean		suremen	Vector map	MEASPNT	MEASPNT	None	0	Discr-regional		
🔑 Р		Allocate		ile point	Vector map	PROFPNT	PROFPNT	None	0	Discr-regional		
		Build		or conne	Vector map	RRCONNECTIO	RRCONNECTIO	None	0	Discr-regional		
		Modify		or conne	Vector map	RRCONNECTIO	RRCONNECTIO	None	0	Discr-regional		
🔑 в	Ж	Cut	Ctrl+X	ndary Node	Vector map	BOUNDARYPNT	BOUNDARYPNT	None	0	Discr-regional		
🔑 W	Da I	Сору	Ctrl+C		Vector map	WEIR	WEIR	None	0	Discr-regional		
() c	8	Delete	Ctrl+Del	ert	Vector map	CULVERT	CULVERT	None	0	Discr-regional		
🔑 Р	œ.	Paste	Ctrl+V	P	Vector map	PUMP	PUMP	None	0	Discr-regional		
🔑 U		Rename	F2	versal weir	Vector map	UNIVERSALWEIR	UNIVERSALWEIR	None	0	Discr-regional		
🔑 в		Select All	Ctrl+A	lge	Vector map	BRIDGE	BRIDGE	None	0	Discr-regional		
🕕 o	0	Refresh	F5	се	Vector map	ORIFICE	ORIFICE	None	0	Discr-regional		
		Properties	Alt+Enter									

🔛 Parameter P	roperties	×
General Input	1	
Name	BND Type Grid	
Description	boundary polygon at which model is clipped	
Input	Vector Map Value BND	
Allocator	None Options	
Modified	08/12/2008 14:55:50	
Status	The File D:\Projecten\9T1961_Triwaco2008\Tutorial\Tutorial-SOBEKCF\Tutorial-Regional\Dis	
		_
	Close	

Select the tab 'Input' and in the 'Type of Input' pull down menu choose 'Vector Map' for defining a shape-file. Then use the 'Browse' button to select the boundary of the regional model (bound-regional.shp) in the directory /My models/TutorialData/Modeldata/. After selecting the right shape-file it is obvious that the fields 'Filename' 'Datasource' and 'Layer' are automatically filled. The fields Filename and Datasource will now be the same as shown in the figure. Select from the pull down menus of the fields 'Ids' and 'Values' the attribute ID. Notice that this attribute is a field from the selected shape file bound-regional.shp. Leave the field 'Filter' empty en click 'Close'.

📙 Parameter Proj	perties				×
General Input					
Type of Input	Vector map			•	
Filename	Expression				Browse
Datasource	None Raster map			· · · ·	Join
	Table Vector map				Befrech
Layer					Chambella
					Show table
Values	IBND			_	
Filter	J				
					Close
Open					? ×
Look in	: 🔁 Modeldata		- 🔇 💋	• 🖭 🥙	
2	bnd-points.shp				
Recent	bound_local.sh	p I.shp			
	🗟 cal-points.shp				
	🔤 laterals.shp	Type: SHP File Date Modified: 08/12	/2008 14:40		
Desktop		Size: 396 bytes			
My Documents					
My Computer					
My Network	File name:	bound_regional.shp		-	Open
Places	Files of type:	ESRI Shapefiles (*.shp)		•	Cancel
					///

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🔜 Parameter Pro	perties		X
General Input			
Type of Input	Vector map		
Filename	D:\Projecten\9T1961_Triwaco2008\Tutorial\Modeldata\bound_reg	Browse	
Datasource	D:\Projecten\9T1961_Triwaco2008\Tutorial\Modeldata\bound_reg	Join	
Layer	bound_regional	Refresh	
lds	ID	Show table	
Values	ID 💌		
Filter			
		Close	

Note that the status bullet in the dataset for the boundary parameter is now green. You can check to see if the files are stored in the right directory (the name of which must be the same as the name of the grid dataset). Select and open the context menu for the parameter BND (Right hand mouse button) select 'Explore'. The windows explorer is opened in the directory where the file should be located.

7.3.3 Step 3: definition of the model attributes (grid parameters)

As mentioned before we can define parameters directly from several file formats (see text box), like a shape file set up in ArcView or ArcGIS, MapInfo or any other GIS software. In this Tutorial we will define all grid parameters directly using a shape file which is provided in the directory My Models\TutorialData\Modeldata\. There is no need for copying the files in this directory to the project. You could even leave it there for use in a GIS project in the same time.

In the same manner as the definition of the model boundary we will define the location and source data of all parameters. Use the figure and information below to define all parameters.

REACH: rivers (My Models\TutorialData\Geodata\rivers.shp) WEIR: weirs (My Models\TutorialData\Geodata\weirs.shp) PROFPNT: profile points (My Models\TutorialData\Geodata\profile-points.shp) LATDISPNT: lateral discharge points (My Models\TutorialData\Modeldata\laterals.shp) FIXEDCALCPNT: fixed calculation points (My Models\TutorialData\Modeldata\cal-points.shp) BOUNDARYPNT: boundary points (My Models\TutorialData\Modeldata\bnd-points.shp)

The remaining parameters will not be used in this Tutorial model and should therefore be set on 'None' in the input information. After defining all parameters the discretisation dataset is finished and should look like the dataset in the figure below.

Tutorial-Regional.Discr-regional

G 🎓 🐰 🗈	🔾 🎓 🐰 🗈 🛍 🕄											
Parameter	Туре	Description	Input	Value	Field	Allocator	Default	Dataset				
🤣 BND	Grid	boundary polyg	Vector map	bound_regional	ID	None	0	Discr-regional				
🤡 REACH	Grid	CF reach	Vector map	river	ID_SOBEK	None	0	Discr-regional				
CALCPNTDENS	Grid	CF calculation p	None	None		None	0	Discr-regional				
S FIXEDCALCPNT	Grid	CF fixed calculat	Vector map	cal-points	ID_SOBEK	None	0	Discr-regional				
LATDISPNT	Grid	CF lateral discha	Vector map	laterals	ID_SOBEK	None	0	Discr-regional				
MEASPNT	Grid	CF measuremen	None	None		None	0	Discr-regional				
🥝 PROFPNT	Grid	CF profile point	Vector map	profile-points	ID_SOBEK	None	0	Discr-regional				
RRCONNECTION OCFBRANCH	Grid	Nodes for conne	None	None		None	0	Discr-regional				
RRCONNECTION OCFNODE	Grid	Nodes for conne	None	None		None	0	Discr-regional				
🥝 BOUNDARYPNT	Grid	CF Boundary Node	Vector map	bnd-points	ID_SOBEK	None	0	Discr-regional				
🤡 WEIR	Grid	CF weir	Vector map	weir	ID_SOBEK	None	0	Discr-regional				
🥝 CULVERT	Grid	CF culvert	None	None		None	0	Discr-regional				
🧿 PUMP	Grid	CF pump	None	None		None	0	Discr-regional				
🥝 UNIVERSALWEI	Grid	CF Universal weir	None	None		None	0	Discr-regional				
🤡 BRIDGE	Grid	CF Bridge	None	None		None	0	Discr-regional				
🥝 ORIFICE	Grid	CF Orifice	None	None		None	0	Discr-regional				

7.3.4 Generating the calculation grid (river network)

Now all data is entered (all status bullets are green), the grid can be generated. This is done in two steps. First the grid input file is generated after which the grid is created. To generate the grid input file: 'Dataset - Generate'. This will create the input file for the grid generator. Triwaco will show in the Jobs pane (if not available do so by 'View - Jobs' the progress of generating the grid input file. In the Output pane the log of the grind generator is shown.

🛃 Triwaco Integrated M	🖁 Triwaco Integrated Modelling Environment - [Dataset:Tutorial-Regional.Discr-regional]												
🖳 File Edit View	Dat	aset F	arameti	er Tools	W	Vindows Help							
i 🗋 📂 📕		Build											
Project		Genera	te			eaion	al I	Discr-regio	mal				
🖃 🔛 Tutorial-SOBEKCF		Explore	Gener	ate the input	for	the model o	ode	Siser regie	ritari				
Tutorial-Region	۲	Run				Туре		Description	Input				
Discr-region	View			w 🕨				boundary polyg	Vector				
		Propert	ies	Alt+Enter		Grid		CF reach	Vector				
				CALCPNTDE	NS	Grid		CF calculation p	None				
				FIXEDCALC	NT	Grid		CF fixed calculat	Vector				
				LATDISPNT		Grid		CF lateral discha	Vector				
				MEASPNT		Grid		CF measuremen	None				
				PROFPNT		Grid		CF profile point	Vector				

To create the grid: 'Dataset - Run' Again information is provided in the Jobs and Output pane. When an error occurs this is mentioned in the job pane or an error message may appear due to incorrect input. To find out where it went wrong look into the log file. To view the log file: 'Dataset - View – Print'. To view the resulting grid: 'Dataset – View – Output'.

Royal Haskoning

🔜 Triwaco Integrated Mo	odelling Ei	nvironment	- [Datase	t:Tutorial	-Regional.Discr-regiona	1]
🖳 File Edit View	Dataset	Parameter	Tools	Windows	Help	
i 🗋 💕 🛃	Build					
Project	Gene	erate		eaio	nal Discr-regi	nal
🖃 🔛 Tutorial-SOBEKCF	Explo	ore			and the second sec	snar
🗄 🔽 Tutorial-Region	🕨 Run			Type	Description	Input
i 🤯 Discr-region	View)	Grid	boundary polyg	Vector r
	Prop	erties Alt	+Enter	Grid	CF reach	Vector r
		1 💟 CA	ALCPNTDEN	IS Grid	CF calculation p	None
		💽 FI	XEDCALCPI	VT Grid	CF fixed calculat	Vector n
		LA 📀	TDISPNT	Grid	CF lateral discha	Vector r
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		PR	OFPNT	Grid	CF profile point	Vector r

Jobs							□ ₽ ×
Job	Path	Arguments	Status	Started	Elapsed	Stopped	
gensoni.exe	C:\Program Files\R	D:\Projecten\	Comple	15:18	0.203s	15:18	
SonetCF	C:\Program Files\R		Comple	15:18	0.125s	15:18	
J							



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7.4 Setting up design dataset, the conceptual model set up

The conceptual model is defined in the Design data set. This data set contains the input parameters needed to run the model. The data in this data set is independent from the grid and consists of data like vector maps (ArcGIS, mapinfo), raster files, excel sheets, etc. The characteristics of each parameter are entered using maps which may contain point values, polygons, lines or constants or a combination. The parameters may also depend on each other using expressions. The default length and time units are meters and days.

7.4.1 Creating a Design data set

Go back a higher level to the level of the model Tutorial-Regional. This can be achieved by double clicking on it in the project tree or by opening the context menu of the model Tutorial-Regional and selecting 'Open'. The Design data set is created by: 'Dataset - Add Dataset' or selecting 'Add Dataset' from the context menu (right click in the project-tree). A pop up window will appear the same as when we created the discretisation data set. Again in the first window select next to continue. In the second window one can choose the type of dataset. This time we select 'Design', name it **Design1** (default name) and select 'Next'.



The following window that appears is for the definition of program options. In this window one can change parameters which describe the properties of water and the environment (gravitational constant and density of water). There is no reason to change these parameters so we will keep the default settings, click 'Next'. In the following window all parameters that are added to the design dataset are shown. More experienced users can add and remove parameters to specify the model. For now we want to add the default parameters so there is no need to make changes, click 'Next' and 'Finish'.

New rogra	Dataset am Options				- 🗆 >					
Review or change the program options here										
Model	l code 'SobekCF'									
	Section	Option	Value	Description	-					
•	CF Parameters	g	9.81							
	CF Parameters	Theta	0.55							
	CF Parameters	Psi	0.5							
	CF Parameters	Rho	1000							
	CE Darameters	Delay	1		-					
				Advanc	:ed					
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ne fol	lowing parameters	*		
	Туре	Name	Default	Description
►	Boundary	🗾 boundary_TY	0	Grid-data: type
	Boundary	boundary_FORM	0	Grid-data: 0=co
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	Boundary	boundary_TF	0	Grid-data: Table
•∣□	Boundary	boundary_TP	0	Grid-data: Use T
				Reset

ico incegracea i loaciing	invironment - [Dataset.rutoria	r-Keylonali.Design1										
e Edit View Dataset	Parameter Tools Windows	Help										
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Tutorial-SOBEKCF	i 😋 🎓 🐰 🗈 🛍 (
Tutorial-Regional	Parameter Type	Description	Input	Value	Field	Allocator	Default	Datas				
Discr-regional	🔑 boundary_TY	Grid-data: type	Vector map	boundary_TY	boundary_TY	Sobado	0	Design				
Design1	🔑 boundary_FORM	Grid-data: 0=co	Vector map	boundary_FORM	boundary_FORM	Sobado	0	Design				
	🔑 boundary_VALU	Grid-data: const	Vector map	boundary_VALUE	boundary_VALUE	Sobado	0	Design				
	🔑 boundary_TF	Grid-data: Table	Vector map	boundary_TF	boundary_TF	Sobado	0	Design				
	🔑 boundary_TP	Grid-data: Use T	Vector map	boundary_TP	boundary_TP	Sobado	0	Design				
	boundary_timet es	Def-data: table	Table	boundary_timet	boundary_timet	SobTab	0	Design				
	Soundary_hqtat	Def-data: table	Table	boundary_hqtab	boundary_hqtab	SobTab	0	Design				
	bedfriction_MF River	Grid-data: main	Vector map	bedfriction_MF	bedfriction_MF	Sobado	3	Design				
	bedfriction_MTC ALLE	Grid-data: const	Vector map	bedfriction_MTC	bedfriction_MTC	Sobado	33	Design				
	HILF	Grid-data: const	Vector map	bedfriction_MRC	bedfriction_MRC	Sobado	33	Desig				
	edfriction_SF River	Grid-data: groun	Vector map	bedfriction_SF	bedfriction_SF	Sobado	3	Desig				
	bedfriction_STCI River	Grid-data: const	Vector map	bedfriction_STC	bedfriction_STC	Sobado	50	Desig				
	HILF	Grid-data: const	Vector map	bedfriction_SRC	bedfriction_SRC	Sobado	50	Desig				
	🔑 initialbranch_NM River	Grid-data: name	Vector map	initialbranch_NM	initialbranch_NM	Sobado	0	Desig				
	🔑 initialbranch_CI River	Grid-data: carrie	Vector map	initialbranch_CI	initialbranch_CI	Sobado	0	Desig				
	initialbranch_Q_ VALUE	Grid-data: value	Vector map	initialbranch_Q	initialbranch_Q	Sobado	0	Desig				
	initialbranch_TY River	Grid-data: type	Vector map	initialbranch_TY	initialbranch_TY	Sobado	0	Desig				
	ALLE	Grid-data: value	Vector map	initialbranch_LVL	initialbranch_LVL	Sobado	0	Desig				
	😱 structure_NM Structu	ure Grid-data: name	Vector map	structure_NM	structure_NM	Sobado	0	Desigr				
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	🔑 structure_CA Structu	ure Grid-data: indica	Vector map	structure_CA	structure_CA	Sobado	-1	Desig				
	🔑 structure_CJ Structu	ure Grid-data: contr	Vector map	structure_CJ	structure_CJ	Sobado	-1	Desigr				
	🔑 controltime_NM Structu	ure Def-data: name	Vector map	controltime_NM	controltime_NM	SobDef	0	Desigr				
	🔑 controltime_AC Structu	ure Def-data: Contr	Vector map	controltime_AC	controltime_AC	SobDef	0	Desigr				
	🔑 controltime_CA Structu	ure Def-data: contr	Vector map	controltime_CA	controltime_CA	SobDef	0	Desigr				
	🔑 controltime_CF Structu	ure Def-data: contr	Vector map	controltime_CF	controltime_CF	SobDef	1	Design				
	🔑 controltime_BL Structu	ure Def-data: interp	Vector map	controltime_BL	controltime_BL	SobDef	0	Design				
	s controletime_tat	ure Def-data: table	Table	controletime_ta	controletime_ta	SobTab	0	Design				
	M controlhydraulic Structu	ure Def-data: name	Vector map	controlhydraulic	controlhydraulic	SobDef	0	Design				
	C controlhydraulic Structu	ure Def-data: contr	Vector map	controlhydraulic	controlhydraulic	SobDef	0	Design				
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The design data set Design1 is now created and filled with the parameters (see figure above). Each SOBEK-CF model is different and uses different kinds of river, boundary and structure definitions. Therefore different TRIWACO parameters are needed to define the model. For this Tutorial model it is already know which parameters should be used and which can be deleted. We will define them step-by-step in the following paragrapahs but for now we need to delete all parameters. Select all, open the context menu (right click) and select 'Delete' and in the pop up window 'Remove'.

🔜 Triwaco Integrated Modelling Enviro	Triwaco Integrated Modelling Environment - [Dataset:Tutorial-Regional.Design1]											
🖳 File Edit View Dataset Para	ameter Tools	Windows Help										
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Project 🕂 🕂 🗸	Tutorial-F	Regional	Design1									
🖃 🐏 Tutorial-SOBEKCF	🔾 🎓 🐰 ங 🖏 🕄											
🗄 🚽 Tutorial-Regional	Parameter	Tune	Description Input		Value	Field	Allocator	Default	Datacet			
Discr-regional		Туре	Crid data: tuge	Vector map	boundary TY	boundary TY	Sobado	O	Design1			
	🚇 boundar	Edit		Vector map	boundary FORM	boundary FORM	Sobado	0	- Design1			
	🚺 boundar 😳	Add Parameter	Ins st	Vector map	boundary_VALUE	boundary_VALUE	Sobado	0	Design1			
	😱 boundar	View		Vector map	boundary_TF	boundary_TF	Sobado	0	Design1			
	😱 boundar	Explore	· T	Vector map	boundary_TP	boundary_TP	Sobado	0	Design1			
	S boundar	Clean	e	Table	boundary_timet	boundary_timet	SobTab	0	Design1			
	Soundar	Allocate	e	Table	boundary_hqtab	boundary_hqtab	SobTab	0	Design1			
	🔑 bedfricti	Build	n	Vector map	bedfriction_MF	bedfriction_MF	Sobado	3	Design1			
	Dedfricti	Modify	st	Vector map	bedfriction_MTC	bedfriction_MTC	Sobado	33	Design1			
	ALUE	Cut	Ctrl+X st	Vector map	bedfriction_MRC	bedfriction_MRC	Sobado	33	Design1			
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	ALUE 63	Delete	Ctrl+Del st	Vector map	bedfriction_STC	bedfriction_STC	Sobado	50	Design1			
	ALUE	Paste	Ctrl+V st	Vector map	bedfriction_SRC	bedfriction_SRC	Sobado	50	Design1			
	🔑 initialbra	Rename	F2 1e	Vector map	initialbranch_NM	initialbranch_NM	Sobado	0	Design1			
	🔑 initialbra	Select All	Ctrl+A	Vector map	initialbranch_CI	initialbranch_CI	Sobado	0	Design1			
		Refresh	E5 Je	Vector map	initialbranch_Q	initialbranch_Q	Sobado	0	Design1			
	🔑 initialbra 🎽	albra Properties	Alt+Enter	Vector map	initialbranch_TY	initialbranch_TY	Sobado	0	Design1			
	ALUE		anu-uata, vaide	Vector map	initialbranch_LVL	initialbranch_LVL	Sobado	0	Design1			
	structure_NM	Structure	Grid-data: name	Vector map	structure_NM	structure_NM	Sobado	0	Design1			
	structure_DD	Structure	Grid-data: id of t	Vector map	structure_DD	structure_DD	Sobado	0	Design1			
	structure_CA	Structure	Grid-data: indica	Vector map	structure_CA	structure_CA	Sobado	-1	Design1			
	<pre>structure_CJ</pre>	Structure	Grid-data: contr	Vector map	structure_CJ	structure_CJ	Sobado	-1	Design1			
	🔑 controltime_N	M Structure	Def-data: name	Vector map	controltime_NM	controltime_NM	SobDef	0	Design1			
	😱 controltime_A	C Structure	Def-data: Contr	Vector map	controltime_AC	controltime_AC	SobDef	0	Design1			
	😱 controltime_C	A Structure	Def-data: contr	Vector map	controltime_CA	controltime_CA	SobDef	0	Design1			
	😱 controltime_C	F Structure	Def-data: contr	Vector map	controltime_CF	controltime_CF	SobDef	1	Design1			
	Controltime_Bl	L Structure	Def-data: interp	Vector map	controltime_BL	controltime_BL	SobDef	0	Design1			
		Structure	Def-data: table	Table	controletime_ta	controletime_ta	SobTab	0	Design1			
	M	Structure	Def-data: name	Vector map	controlhydraulic	controlhydraulic	SobDef	0	Design1			
		Structure	Def-data: contr	Vector map	controlhydraulic	controlhydraulic	SobDef	0	Design1			
		Structure	Def-data: contr	Vector map	controlhydraulic	controlhydraulic	SobDef	0	Design1			
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I	Timenced Parame	eters boundary i	River i Structure i V	veir i Onnice i Pump	i cuivert i universal M	ieir i bridge i Latera	uischarge point i Pr	unie i Connection po	IIIC I			

Within this design data set all parameter information is stored. In other words this data set is your meta database for maps which are independent from the modelling grid. For definition of parameter the modelling environment follows the specifications provided by the Open GIS Consortium (OpenGIS or Open GeoSpatial) using the Open Source Geospatioal Data Abstraction Library (GDAL). The implementation of GDAL into our software opens the world of all sorts of data file formats that can directly can be read by the modelling environment. It can handle almost all known GIS formats (and the Dutch standards like Aquo, INTWIS and IRIS). The list of supported formats is ever growing, a selection:

- * Raster maps (over 64 formats ; Idrisi, ESRI grids, Erdas, ...)
- * Vector maps (over 16 format ; ESRI-shape, MapInfo, AutoCAD, ...)
- * Data bases such as Oracle, MySQL en Access;
- * Other well known formats such as Excel, txt en csv.
- * Data processing in the modelling environment using expressions and Spatial Queries

Data files in one of these formats can be used as model input without any conversion prior to use in the modelling environment.

The design dataset is now empty and will be filled with parameters that define the Tutorial model. Parameters in Triwaco can be divided in different types, accordingly to the type of structure, network-point or attribute in SOBEK-CF.

The parameters for this Tutorial model can be divided in 5 types:

- **River**: parameters defining river properties (e.g. friction)
- Profile: parameters defining the dimensions of the river
- **Boundary points**: parameters defining the model boundary conditions

- Lateral discharge points: parameters defining lateral discharge properties
- Weirs: parameters defining weir properties

It is important to notice that these 5 types are specifically for this Tutorial model. In a different model also other structures can be used in the model for example culverts, controllers, orifices, etc. Successively other parameters and parameter-types should be defined. All parameters that are selected in the parameter.xls spreadsheet (program file). This spreadsheet should be used to understand the link between Triwaco and SOBEK but may not be changed.

For the Tutorial model we will now show how and which parameters must be added to the design dataset. After that we give a step-by-step description of the parameters definition.

7.4.2 Adding the parameters of the Tutorial model to the design dataset

The design dataset is empty so we will add the necessary parameters to the dataset. Make sure the Design1 dataset is activated and open the context window (right click) in the list window. Select the option 'Add parameter' and a new window will appear. For now we will only fill in the name and type of all parameters and define it later.



Triwaco User's Manual

🔡 New Parameter		🔀 🔛 New Param	eter			
General Enter general information about the parameter to creat	te 🔮	General Enter general in	formation about the paramet	er to create		-
Name Param1 Datase	et Design1	Name	bedfriction_MF	Dataset	Design1	V
Description Param1		Description	bedfriction_MF			
Type Unknown 💌 Allocato	or Constant 💌	Туре	River	Allocator	Constant	•
Input Constant Value	0	Input	Constant 💌	Value	ol	
_	< Back Next > Cancel			< B	Back Next >	Cancel



For the Tutorial model we will use a total of 19 parameters (see below):

bedfriction MF type: river type: river bedfriction_MTCPVALUE type: river bedfriction_MRCPVALUE initialbranch_TY type: river initialbranch LVLLVALUE type: river boundary_TY boundary_FORM type: boundary point type: boundary point boundary_ID type: boundary point boundary_hqtables type: boundary point profile_TY type: profile profyz_NM type: profile profyz_tables type: profile weir_NM type: weir weir_CL type: weir weir_CW type: weir weir RT type: weir lateralflbr ID type: lateral type: lateral lateralflbr DCLT lateralflbr_tables type: lateral

Add these parameters to the design dataset and make sure that he name and type of the parameter is defined.

Tutorial-Regional.Design1									
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Parameter	Туре								
🤣 bedfriction_MF	River								
🤣 bedfriciton_MTCPVALUE	River								
bedfriciton_MRCPVALUE	River								
🥺 initialbranch_TY	River								
🥺 initialbranch_LVLLVALUE	River								
🤡 boundary_TY	Boundary point								
🤡 boundary_FORM	Boundary point								
🤡 boundary_ID	Boundary point								
🧭 boundary_hqtables	Boundary point								
🧭 profile_TY	Profile								
🥝 profyz_NM	Profile								
🥝 profyz_tables	Profile								
🧭 weir_NM	Weir								
🧭 weir_CL	Weir								
🧭 weir_CW	Weir								
🤡 weir_RT	Weir								
🤡 lateralflbr_ID	Lateral discharge point								
🤡 lateralflbr_DCLT	Lateral discharge point								
Iateralflbr_tables	Lateral discharge point								

The parameters are automatically sorted per type (see figure below). It is possible to select only the parameters defining a special type by clicking on the tab of for example 'River'. In the tab 'Parameters' all parameters of the dataset are listed (like figure above). The tab 'Inherited' shows all listed parameters that are inherited from a parent dataset. This dataset has been set up without a parent dataset so the list of inherited parameters is empty.

		_
Inherited Parameters	River Boundary point Profile Weir Lateral discharge point	

7.4.3 Input of parameters Profile type

In this paragraph we define the parameters for the profile points. Three parameters have been added to the dataset: profile_TY, profyz_NM and profyz_tables. These parameters describe the SOBEK-CF profile point with a y-z cross section definition.

With the parameter prof_TY one can define the type of the cross section definition. This parameter can have several value which represent different types of cross section definitions. In this case we use the value 10 for a y-z cross section definition. So open the context menu (right click on the parameter profile_TY) and select the tab 'Input' of the pop up window. Choose 'Constant' from the pull down menu of the field 'Type of Input' and fill in 10 in the 'Value' field.

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Parameter Type Description Input Value Field Allocator Default	Dataset
😒 profile_TY Profile profile_TY Constant 0 Constant 0	Design1
📀 profyz_NM 🔡 Parameter Properties 0	Design1
Seneral Input 0	Design1
Type of Input Constant	
Value 10	

The parameter profyz_NM links a ID (name) to a y-z cross section definition. We have used a shape-file with profile points in the discretisation dataset. Per profile point a ID has been defined and we will use the same ID's for the cross section definition.

Open the context menu of the parameter profyz_NM (right click) and select the function 'Properties'. In the pop up window choose the tab 'Input' and select the input type 'Vector map'. Next browse for the shape-file profpoints.shp in the directory XXX. The field for Filename, Datasource and Layer are automatically filled in. The fields Ids and Values must link to the attribue ID_SOBEK in the shape-file. Now there is a link between the ID of the profile point at the network (discritsation dataset) and the name (ID) of the cross section definition. Click on 'Close' to exit the input screen.

The final step in defining this parameter is to change its allocator. This should be done in the column 'Allocator' of the parameter in the list window. Use the allocator 'Sobado' which is being used for shape-files and vector maps.

Triwaco User's Manual

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	Parameter	Туре	Description	Input	Value	Field	Allocator	Default	Dataset
	📀 profile_TY	Profile	profile_TY	Constant	10		Constant	10	Design1
	🥏 profyz_NM	Profile	profyz_NM	Constant	0		Constant	0	Design1
	R profun tabl	loc Drofilo	profug. tables	Constant	0		Constant	0	Design1
en el	arameter Prop	oerties				×			
Ge	neral Input								
	Type of Input	Vector map			•				
	Filename	D:\Projecten\9T19	161_Triwaco2008\Tu	torial\Geodata\profile-	-points Browse				
	Datasource	D:\Projecten\9T19	161_Triwaco2008\Tu	torial\Geodata\profile-	-points Join				
	Layer	profile-points			Refresh				
	lds	ID_SOBEK			Show tabl	e			
	Values	ID_SOBEK			•				
	Filter								
					Class				
						<u> </u>			

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Parameter Ty	уре	Description	Input	Value	Field	Allocator	Default	Dataset
🥝 profile_TY 🛛 Pr	rofile	profile_TY	Constant	10		Constant	10	Design1
🤣 profyz_NM 🛛 Pr	rofile	profyz_NM	Vector map	profile-points	ID_SOBEK	Constant 🗾 💌	0	Design1
🥝 profyz_tables 🛛 Pri	rofile	profyz_tables	Constant	0		Parado 🔺	0	Design1
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Now we have define the y-z cross section profile definition (see figures below). This is executed by the parameter profyz_tables. We have the profile definitions of the four profiles of the Tutorial model listed in a excel workbook (profile.xls) in directory XXX. Open the context menu (right click) of the parameter profyz_tables and select 'Properties'. In the pop up window select the tab 'Input' and use the input type 'Table'. In the appeared field 'Provider' select 'Microsoft Excel' because we have the profile definitions in an excel spreadsheet. 'Connect' the right data source by browsing for the location (XXX)of the file profile.xls. In the field 'Table' one can select the right worksheet. Use the pull down menu to choose the 'Tutorial' worksheet. Now it is possible to look at the connected table by 'Show table' function. The table has three columns ID_SOBEK, Y and Z. The first column is necessary for identifying the profile definition and link it to the discretisation. Therefore select 'ID_SOBEK' from the pull down menu next to the lds field. The Value field cannot be defined using the pull down menu because we have to declare two columns, namely Y and Z. Therefore fill in 'Y,Z' manually.

The final step for this parameter definition is to define its allocator. Allocation is translating parameter values defined by maps or tables to a calculation grid and is carried out by allocators. Allocation is the spatial or temporal interpolation or up/down scaling. Transformation to model parameter input is, usually, in the triwaco file format (.ado or .adx). The reason for using this standard file format is that data can easily be exchanged between models, all tools and processors can access it, automatic calibration tools will always work with any model, etc. Also very important is that all transformed input data can be visualised with the built in viewers.

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Close the input window en use the Allocator column in the List window. Make sure you set the allocator of the parameter profyz_tables to 'SobTab'.

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Parameter	Туре	Description	Input	Value	Field	Allocator	Default	Dataset
🥝 profile_TY	Profile	profile_TY	Constant	10		Constant	10	Design1
🥝 profyz_NM	Profile	profyz_NM	Vector map	profile-points	ID_SOBEK	Sobado	0	Design1
🤣 profyz_tables	Profile	profyz_tables	Constant	0		Constant	0	Design1
€	Parameter Pro Ineral Input Type of Input Provider M Datasource D Table P Ids D Values P Filter D	Table Constant Expression None Raster map Vector map rofyz_tables			Conr Ju Show Ref	× nect oin i Table fresh		

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arameter	Туре	Description	Input	Value	Field	Allocator	Default	Dataset
profile_TY	Profile	profile_TY	Constant	10		Constant	10	Design1
) profyz_NM	Profile	profyz_NM	Vector map	profile-points	ID_SOBEK	Sobado	0	Design1
profyz_tables	Profile	profyz_tables	Table	profyz_tables	profyz_tables	Constant	0	Design1
Ge	Parameter Pr neral Input Type of Input Provider	operties			•	X		
	Datasource Table Ids Values	MysiqL Microsoft Access dBase <u>Microsoft Excel</u> CSV Files Tim Files ODBC Oledb			Connec Join Show T- Refres	able		
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🧿 profyz_NM	Profile	profyz_NM	Vector map	profile-points	ID_SOBEK	Sobado	0	Design1		
🣀 profyz_tabl	es Profile	profyz_tables	Table	profyz_tables	profyz_tables	Constant	0	Design1		
v protyz_tabl	es Profile General Input Type of Input Provider Datasource Table Ids Values Filter	prolyz_tables roperties Table Microsoft Excel D:\Projecter\9T196 prolyz_tables prolyz_tables	1_Triwaco2008\Tutor	ial/Tutorial-SOBEKCF		Constant Workboy Passwor Connect Drivered Dopen Loo Recent Wy Document My Document	Excel Connection ok d ion String Microsoft Excel Driv k in: C Geodata	Design1	Browse	<u>, 1</u> ×]•
						My Comput	er			
						My Network Places	k File name:	profile-yz.xls	•	Open
Inherited Para	meters River B	oundary point Profile	e Weir Lateral disc	harge point			Files of type:	Excel files (*.xls)	•	Cancel

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🥝 profyz_NM	Profile	profyz_NM	Vector map	profile-points	ID_SO	BEK	Sobado	0	Design1			
🤣 profyz_table	s Profile	profyz_tables	Table	profyz_tables	profyz	_tables	Constant	0	Design1			
	Parameter P	roperties					×					
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	Ids				•	Show Table	, P	river={Microsoft Excel I	Driver (".xls)};dbq=D:\P	rojecten\9T1961_1	/riwaco200	
	Values	profyz_tables			•	Refresh	1					
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Parameter	Туре	Description	Input	Value	Field	Allocator	Default	Dataset
🥝 profile_TY	Profile	profile_TY	Constant	10		Constant	10	Design1
🥝 profyz_NM	Profile	profyz_NM	Vector map	profile-points	ID_SOBEK	Sobado	0	Design1
🥏 profyz_tables	Profile	profyz_tables	Table	profyz_tables	profyz_tables	Constant	0	Design1
Ge	Parameter Prop Ineral Input Type of Input Provider M Datasource D Table T Ids Si Values P Filter S	Perties	Triwaco2008\Tutoria	I\Geodata\profile-yz.	✓ ✓			

Tutorial-	-Regional	l.Design1									
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Parameter	Туре	Description	Input	Value	Field	A	llocator	Default	Dataset		
🥝 profile_TY	Profile	profile_TY	Constant	10		Co	onstant	10	Design1		
🥝 profyz_NM	Profile	profyz_NM	Vector map	profile-points	ID_SO	BEK So	bado	0	Design1		
🤣 profyz_table	es Profile	profyz_tables	Table	Tutorial\$	profyz	_tables Co	onstant	0	Design1		
_											
ļ	🚽 Parameter Pi	roperties					×				
	General Input]					🔛 Da	ata Table			_ 🗆 🗙
							Tuto	rial\$			$\triangleleft \triangleright \times$
	Type of Input	Table			•			ID_SOBEK	Y	Z	_
							+	prof_Tutorial01	0	25.5	
	Provider	Microsoft Excel			•			prof_Tutorial01	7	21.5	
	Datasource	D:\Projecten\9T1961	_Triwaco2008\Tut	torial\Geodata\profile-yz.>	ds	Connect		prof_Tutorial01	10	21.501	
	Table	Tutorial\$			•	Join		prof_Tutorial01	16.99825	25.5	
	lds	, 			-	Show Table		prof_Tutorial02	0	24.5	
	Mahara	l				Defeat		prof_Tutorial02	7	20.5	
	values	proryz_tables				Herresh		prof_Tutorial02	10	20.501	
	Filter	ļ						prof_Tutorial02	16.99825	24.5	
								prof_Tutorial03	0	23.5	
								prof_Tutorial03	7	19.5	
								prof_Tutorial03	10	19.501	
								prof_Tutorial03	16.99825	23.5	
								prof_Tutorial04	0	22.5	
								prof_Tutorial04	7	18.5	
						Close		prof_Tutorial04	10	18.501	
								prof Tutorial04	16.99825	22.5	-

Tutorial	l-Regiona	I.Design1						
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Parameter	Туре	Description	Input	Value	Field	Allocator	Default	Dataset
📀 profile_TY	e_TY Profile profile_TY Constant 10		Constant	10	Design1			
📀 profyz_NM	1 Profile	profyz_NM	Vector map	profile-points	nts ID_SOBEK Soba		0	Design1
🥏 profyz_tab	oles Profile	profyz_tables	Table	Tutorial\$	profyz_tables	Constant	0	Design1
	Parameter f General Input Type of Input Provider Datasource Table Ids Values Filter	Properties Table Microsoft Excel D:\Projecten\9T196 Tutorial\$ ID_SOBEK ID_SOBEK Z	:1_Triwaco2008\Tu	torial\Geodata\profile:	yz.xls Conne yz.xls Show T Refre	ct able sh		

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Tutorial-F	Regional.	Design1						
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Parameter	Туре	Description	Input	Value	Field	Allocator	Default	Dataset
🧭 profile_TY	e_TY Profile profile_TY Constant 10		Constant	10	Design1			
🥝 profyz_NM	Profile	profyz_NM	Vector map	profile-points	oints ID_SOBEK Sob		0	Design1
🤣 profyz_tables	Profile	profyz_tables	Table	Tutorial\$	profyz_tables	Constant	0	Design1
G	Parameter Pro eneral Input Type of Input Provider M Datasource D Table T Ids II Values Y Filter [perties Table Table ticrosoft Excel t:\Projecten\971961_ utorial\$ D_SOBEK Z	Triwaco2008\Tutoria	al\Geodata\profile-yz.				

Tutorial-Regional.Design1											
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Parameter	Туре	Description	Input	Value	Field	Allocator	Default	Dataset			
🥝 profile_TY	Profile	profile_TY	Constant	10		Constant	10	Design1			
🥝 profyz_NM	Profile	profyz_NM	Vector map	profile-points	ID_SOBEK	Sobado	0	Design1			
🤣 profyz_tables	Profile	profyz_tables	Table	Tutorial\$	Y,Z	Constant 💌	0	Design1			
						Regado Sobado SobDef SobTab Stiboka Surfer Tin Trend ▼					

The parameters for the profile points are finished and your List window screen (tab profile points) should be look like the figure below.

Tutorial-Regional.Design1										
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Parameter	Туре	Description	Input	Value	Field	Allocator	Default	Dataset		
🥝 profile_TY	Profile	profile_TY	Constant	10		Constant	10	Design1		
🥝 profyz_NM	Profile	profyz_NM	Vector map	profile-points	ID_SOBEK	Sobado	0	Design1		
🤣 profyz_tables	Profile	profyz_tables	Table	Tutorial\$	Y,Z	SobTab	0	Design1		

7.4.4 Input of remaining parameters

We show you how to change the input settings of parameters. From now on we expect you are able to change the input of the parameters yourself.

Weirs in the Tutorial model will be defined by four parameters: weir_NM, weir_CL, weir_CW and weir_RT. The first three parameters should be linked to the shapefile XXX weirs.shp. The parameter weir_NM should be linked to ID_SOBEK (ID of weir), weir_CL must link tot the attribue CRESTLEVEL and weir_CW to CRESTWIDTH. The parameter weir_RT defines the flow direction and the value of 0 represents flow possible in both directions. Make sure all parameters are define as shown in the figure below.

Tutorial-Regional.Design1										
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Parameter	Туре	Description	Input	Value	Field	Allocator	Default	Dataset		
🥝 weir_NM	Weir	weir_NM	Vector map	weir	ID_SOBEK	Sobado	0	Design1		
🥝 weir_CL	Weir	weir_CL	Vector map	weir	CRESTLEVEL	Sobado	0	Design1		
🥝 weir_CW	Weir	weir_CW	Vector map	weir	CRESTWIDTH	Sobado	0	Design1		
🤣 weir_RT	Weir	weir_RT	Constant	0		Constant	0	Design1		

The parameters that define river properties represent friction of the riverbed and initial water depths. Dimensions of the river have already been defined by the profile point parameters. Information about the different parameters can be found in the parameter.xls spreadsheet. For now we only show you the input values of the river parameters (see figure below).

Tutorial-Regional.Design1										
🕒 🎓 X 🗈 🛍 🔇										
Parameter	Туре	Description	Input	Value	Field	Allocator	Default	Dataset		
bedfriction_MF	River	bedfriction_MF	Constant	7		Constant	7	Design1		
bedfriciton_MTCPVALUE	River	bedfriciton_MTC	Vector map	river	FRIC_BB	Sobado	0	Design1		
bedfriciton_MRCPVALUE	River	bedfriciton_MRC	Vector map	river	FRIC_BB	Sobado	0	Design1		
🥝 initialbranch_TY	River	initialbranch_TY	Constant	0		Constant	0	Design1		
🤣 initialbranch_LVLLVALUE	River	initialbranch_LVL	Vector map	river	INI_WDEPTH	Sobado	0	Design1		

The figure below shows the parameters for the boundary points. The Tutorial model has one boundary point with a Q-h relation. Make sure all parameters in the boundary point tab are defined as shown in the figure.

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Tutorial-Regional.Design1										
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Parameter	Туре	Description	Input	Value	Field	Allocator	Default	Dataset		
🥝 boundary_TY	Boundary p	boundary_TY	Constant	1		Constant	1	Design1		
🤡 boundary_FORM	Boundary p	boundary_FORM	Constant	4		Constant	4	Design1		
🤡 boundary_ID	Boundary p	boundary_ID	Vector map	bnd-points	ID_SOBEK	Sobado	0	Design1		
🤣 boundary_hqtat	Boundary p	boundary_hqtab	Table	Tutorial\$	h,Q	SobTab	0	Design1		

The lateral discharge points need three parameters in this Tutorial model. The discharge (time depended) is in an excel spreadsheet.

Tutorial-Regional.Design1											
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Parameter	Туре	Description	Input	Value	Field	Allocator	Default	Dataset			
🥝 lateralflbr_ID	Lateral disc	lateralflbr_ID	Vector map	laterals	ID_SOBEK	Sobado	0	Design1			
🥝 lateralflbr_DCLT	Lateral disc	lateralflbr_DCLT	Constant	1		Constant	1	Design1			
🤣 lateralflbr_table	Lateral disc	lateralflbr_tables	Table	Tutorial\$	D,T,Q	SobTab	0	Design1			

7.4.5 Overview of all parameters Tutorial model

All parameters of the Tutorial model have been defined. The list window (tab Parameters) should be look like the figure below. Check all settings of the parameters to make sure the design dataset is without errors.

Tutorial-Regional.Design1										
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Parameter	Туре	Description	Input	Value	Field	Allocator	Default	Dataset		
🤣 bedfriction_MF	River	bedfriction_MF	Constant	7		Constant	7	Design1		
Sedfriciton_MTCPVALUE	River	bedfriciton_MTC	Vector map	river	FRIC_BB	Sobado	0	Design1		
Sedfriciton_MRCPVALUE	River	bedfriciton_MRC	Vector map	river	FRIC_BB	Sobado	0	Design1		
🥝 initialbranch_TY	River	initialbranch_TY	Constant	0		Constant	0	Design1		
🮯 initialbranch_LVLLVALUE	River	initialbranch_LVL	Vector map	river	INI_WDEPTH	Sobado	0	Design1		
🤡 boundary_TY	Boundary point	boundary_TY	Constant	1		Constant	1	Design1		
🤡 boundary_FORM	Boundary point	boundary_FORM	Constant	4		Constant	4	Design1		
🤡 boundary_ID	Boundary point	boundary_ID	Vector map	bnd-points	ID_SOBEK	Sobado	0	Design1		
🥝 boundary_hqtables	Boundary point	boundary_hqtab	Table	Tutorial\$	h,Q	SobTab	0	Design1		
🤡 profile_TY	Profile	profile_TY	Constant	10		Constant	10	Design1		
🮯 profyz_NM	Profile	profyz_NM	Vector map	profile-points	ID_SOBEK	Sobado	0	Design1		
🥝 profyz_tables	Profile	profyz_tables	Table	Tutorial\$	Y,Z	SobTab	0	Design1		
🤡 weir_NM	Weir	weir_NM	Vector map	weir	ID_SOBEK	Sobado	0	Design1		
🤡 weir_CL	Weir	weir_CL	Vector map	weir	CRESTLEVEL	Sobado	0	Design1		
🥝 weir_CW	Weir	weir_CW	Vector map	weir	CRESTWIDTH	Sobado	0	Design1		
🮯 weir_RT	Weir	weir_RT	Constant	0		Constant	0	Design1		
🥝 lateralflbr_ID	Lateral discharge point	lateralflbr_ID	Vector map	laterals	ID_SOBEK	Sobado	0	Design1		
🥝 lateralflbr_DCLT	Lateral discharge point	lateralflbr_DCLT	Constant	1		Constant	1	Design1		
🤡 lateralfibr_tables	Lateral discharge point	lateralflbr_tables	Table	Tutorial\$	D,T,Q	SobTab	0	Design1		

7.5 Setting up a local model for the simulation

We have defined a regional discretisation set because database are often containing all information of a catchment area. However we do not want to model a large catchment but just a small piece of the upstream area. Therefore we have to define a second modelling level on which the local Tutorial model is based. First we add a new Surface water model to the Tutorial-SOBEKCF project which we call Tutorial-Local.

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Proje	ct					4 × 1	Futori	ial-SC	BEK	CF		
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🔜 New Model												
General Infor Select the type	General Information Select the type of model to create and enter the name of the model											
Installed Mode	l Types											
Groundwater model	Surface water model	Unsaturated zone model	Linked model	Effect model	Rainfall-Ru model							
Model name Location	Tutorial-Local D:\Projecten\91	[1961_Triwaco2	2008\Tutorial\Tu	torial-SOBEKCF	\Tutorial-Local							
			< Back	Next >	Cancel							

In de model code window we now select a parent model, namely Tutorial-Regional. The local model will become a sub-model of the regional model.

🔜 New Model		
Model Code This page enables you to select the computer	code for your model	**
Installed Surface water model computer code	:5	
SobekCF		
Parent Model Tutorial-Regional Tutorial-Regional	Parent Model Code SobekCF	
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🔡 Triwaco Integrated Modelling Enviro	onment - [Project: Tutoria	al-SOBEKCF]					
🖳 File Edit View Project Mod	lel Tools Windows H	elp					
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Project 🛛 📮 🗙	Tutorial-SOB	KCF					
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E Tutorial-Regional	Model	Code	Gridder	Туре	Description	Parent	Modified
Discr-regional	🔄 Tutorial-Regional	SobekCF	SonetCF	Surface water model			08/12/2008 16:19
Design1	🔽 Tutorial-Local	SobekCF	SonetCF	Surface water model		Tutorial-Regional	08/12/2008 16:26

After adding the model Tutorial-Local to the project tree a new discretisation dataset should be added to the model (name it **Discr-reference**). Click 'Next' and in the Associated datasets window select 'Tutorial-Regional.Discr-Regional' as parent dataset. All parameters and its definitions will be inherited in the local discretisation. All other properties and settings remain the same as the default, so click 'Next' until the dataset is added to the model Tutorial-Local.

Now check the tabs 'Parameters' and 'Inherited' and one will notice that the inherited parameters are the same as defined in the Reigonal discretisation dataset. In the 'Parameter' tab some new parameters are listed but we do not need these, so remove them.

We want to make two changes in the local schematization in comparison to the Regional dataset, namely a different boundary and a difference in weir discretisation. Both these parameters are listed in the inherited tab so select them and open the context menu (right click). Select 'Modify' and check the parameter tab. These two parameters are now listed in the parameter tab and should be defined for the local discretisation.

🔜 Triwaco Integrated Modelling Environm	ent - [Model: Tutorial-	Łocal]			
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Tutorial-Regional	ataset	Type Description	Model		
Discr-regional					
Tutorial-Local					
Open					
Add Dataset	:				
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	New Dataset				*
	Select type or d	lacasec and enter a name			××.
	Installed Datas	et Types			
	Design	Discretisation	Simulation	Scenario	
	1				
	Dataset name	Discr-reference			
	Location	D:\Projecten\9T1961_Tri	iwaco2008\Tut	orial\Tutorial-SOBEK	CF\Tutorial-Local\Dis
		, , , , , , ,			
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🔡 New Dataset					
Associated Datasets				*	
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Demost Detroit					
Parent Dataset	rial-Regional.Disci	r-regional		<u> </u>	
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Tutorial-Regional	Parameter	Туре	Description	Input	Value	Field	Allocator	Default	Dataset
Discr-regional	📀 BND	Grid	boundary polyg	Vector map	bound_regional	1D	None	0	Discr-regio
- 😴 Design1 - 🐨 Tutorial-local - 🙀 Discr-reference	📀 REACH	Grid	CF reach	Vector map	river	ID_SOBEK	None	0	Discr-regio
	CALCPNTDENS	Grid	CF calculation p	None	None		None	0	Discr-regio
	S FIXEDCALCPNT	Grid	CF fixed calculat	Vector map	cal-points	ID_SOBEK	None	0	Discr-regio
	S LA TOISPNT	Grid	CF lateral discha	Vector map	laterals	ID_SOBEK	None	0	Discr-regio
	S MEASPNT	Grid	CF measuremen	None	None		None	0	Discr-regio
	📀 PROFPNT	Grid	CF profile point	Vector map	profile-points	ID_SOBEK	None	0	Discr-regio
	CFBRANCH	Grid	Nodes for conne	None	None		None	0	Discr-regio
		Grid	Nodes for conne	None	None		None	0	Discr-regio
	SOUNDARYPNT	Grid	CF Boundary Node	Vector map	bnd-points	ID_SOBEK	None	0	Discr-regio
	🤡 WEIR	Grid	CF weir	Vector map	weir	ID_SOBEK	None	0	Discr-regio
	📀 CULVERT	Grid	CF culvert	None	None		None	0	Discr-regio
	S PLIMP	Grid	CF pump	None	None		None	0	Discr-regio
	🕑 UNIVERSALWEI	Grid	CF Universal weir	None	None		None	0	Discr-regio
	🛛 🤡 BRIDGE	Grid	CF Bridge	None	None		None	0	Discr-regio
	ORIFICE	Grid	CF Orifice	None	None		None	0	Discr-regio

Inherited Parameters Grid

Inherited Parameters Grid

🔛 Triwaco Integrated Modelling Enviro	onment - [Dataset	:Tutorial-Loca	l.Discr-reference]						
🖳 File Edit View Dataset Par	rameter Tools \	Windows Help							
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🖃 🔛 Tutorial-SOBEKCF									
E Tutorial-Regional	Parameter	Type	Description	Input	Value	Field	Allocator	Default	Dataset
Discr-regional	📀 BND	Grid	boundary polyq	Vector map	bound_regional	ID.	None	0	Discr-regional
Design1	🐼 REACH	Edit		Vector map	river	ID_SOBEK	None	0	Discr-regional
E-Tutorial-Local	CALCPNTO G	Add Parame	ter Ins	None	None		None	0	Discr-regional
Discr-reference	S FIXEDCALC	View		Vector map	cal-points	ID_SOBEK	None	0	Discr-regional
	S LA TOISPNT	Explore Clean		. Vector map	laterals	ID_SOBEK	None	0	Discr-regional
	MEASPNT			None	None		None	0	Discr-regional
	📀 PROFPNT	Allocate		Vector map	profile-points	ID_SOBEK	None	0	Discr-regional
		Build		None	None		None	0	Discr-regional
		Modify		None	None		None	0	Discr-regional
	SOUNDAR)	Cut	Ctrl+X	Vector map	bnd-points	ID_SOBEK	None	0	Discr-regional
	🤡 WEIR	CODV	Ctrl+C	Vector map	weir	ID_SOBEK	None	0	Discr-regional
	CULVERT	Delete	Ctrl+Del	None	None		None	0	Discr-regional
	📀 PUMP	Paste	Ctrl+V	None	None		None	0	Discr-regional
	🕑 UNIVERSAL	Rename	F2	None	None		None	0	Discr-regional
	SRIDGE	Colorb All	Chillia I	None	None		None	0	Discr-regional
	ORIFICE	Defrect All	CON+A	None	None		None	0	Discr-regional
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🔡 Triwaco Integrated Modelling Enviro	onment - [Dataset:	Tutorial-Local.	Discr-reference]						
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Tutorial-Regional	Parameter	Туре	Description	Input	Value	Field	Allocator	Default	Dataset
Discr-regional	REACH	Grid	CFreach	Vector map	river	ID_SOBEK	None	0	Discr-regional
Design1	CALCPNITDENS	Grid	CF calculation p	None	None		None	0	Discr-regional
	FIXEDCALCPNT	Grid	CF fixed calculat	Vector map	cal-points	ID_SOBEK	None	0	Discr-regional
Disciplerence	S LA TDISPNT	Grid	CF lateral discha	Vector map	laterals	ID_50BEK	None	0	Discr-regional
	MEASPNT	Grid	CF measuremen	None	None		None	0	Discr-regional
	📀 PROFPNT	Grid	CF profile point	Vector map	profile-points	ID_SOBEK	None	0	Discr-regional
	RRCONNECTIO	Grid	Nodes for conne	None	None		None	0	Discr-regional
		Grid	Nodes for conne	None	None		None	0	Discr-regional
	SOUNDAR YPNT	Grid	CF Boundary Node	Vector map	bnd-points	ID_SOBEK	None	0	Discr-regional
	🤣 WEIR	Crid	CEmain	Vector map	weir	ID_SOBEK	None	0	Discr-regional
	CULVERT	Edit		None	None		None	0	Discr-regional
	📀 PUMP 🤎	Add Paramet	er Ins	None	None		None	0	Discr-regional
	📀 UNIVERSAL	VIEW	je.	None	None		None	0	Discr-regional
	SRIDGE	Explore		None	None		None	0	Discr-regional
	📀 ORIFICE	Clean		None	None		None	0	Discr-regional
		Allocate							
		Build							
		Modify							
	*	Cut	Ctrl+X						
		Сору	Ctrl+C						
	3	Delete	Ctrl+Del						
	2	Paste	Ctrl+V						
		Rename	F2						
		Select All	Ctrl+A						
	0	Refresh	FS						
		Properties	Alt+Enter						

🔡 Triwaco Integrated Modelling Environment - [Dataset:Tutorial-Local.Discr-reference] 🖳 File Edit View Dataset Parameter Tools Windows Help 🗋 💕 🔒 Project * × Tutorial-Local.Discr-reference 🖃 🐏 Tutorial-SOBEKCF G 🎓 | X 🗈 🛍 | 🔇 🗄 🔽 Tutorial-Regional Parameter Field BND Type Description Input Value Allocator Default Dataset 🛛 🔯 Discr-regional BND Grid boundary polyg... Vector map None Discr-refere. - 👿 Design1 🔑 WEIR Grid CF weir Vector map WEIR WEIR None 0 Discr-refere... E Tutorial-Local

The boundary will be defined by a shape file bound_local.shp. This shape file is located in the directory XXX. Make sure the input screen is like the figure below.

🔜 Parameter Pro	perties		×
General Input			
Type of Input	Vector map		
Filename	D:\Projecten\9T1961_Triwaco2008\Tutorial\Modeldata\bound_loc	Browse	
Datasource	D:\Projecten\9T1961_Triwaco2008\Tutorial\Modeldata\bound_loc	Join	
Layer	bound_local	Refresh	
Ids		Show table	
Values	ID 💌		
Filter			
		Close	

For the weirs we use the same shape-file (weir.shp) but use a filter to select which weir is to be added in the discretisation and which not. The filter is defined by two attributes in the shapefile, mod_ref and mod_scen. The filter is binair, a zero (0) means not added to the discretisation and a one (1) means it should be added to the discretisation. The filter are being used in the input screen of the weir discretisation parameter (see figure). In the field filter one must fill in an logical expression like mod_ref=1 or mod_scen=1. It depends on the expression used which weir is added to the model. The shape of the Tutorial has already a filter to seperate the referenc3e fromn the scenario situation. Normally the user have to add filters to the shape files. In fact, modelling is done in a GIS environment and not in the SOBEK interface. See the figures below how the use the filter of the weir in the Tutorial model.



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🖻 🕎 Tutorial-Regional	Parameter	Type	Description	Toput	Value	Field	Allocator	Default	Dataset	-	_	_		
Discr-regional	S BND	Grid	boundary polyg	Vector map	bound local	ID	None	0	Discr-refere					
Design1	VEIR	Grid	CF weir	Vector map	weir	ID_SOBEK	None	0	Discr-refere					
Tutorial-Local	Par	rameter Prope	rties			×	1			-				
bia resorance							1							
	Liene	ral input					1							
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7.6 Setting up a simulation data set (reference situation)

Up to now the parameter values are stored independently of the calculation grid in tables and maps. The advantage is that the grid can be changed without a change of the original input. The original input is linked (allocated) to the grid in a separate data set, the simulation dataset. This is done only for the conceptual model (design dataset).

7.6.1 Creating a simulation data set for the reference situation

Open the context menu for the sub model Tutorial-Local by right clicking on it in the project-tree and select 'Add Dataset'.



A pop up window will appear the same as when we created the discretisation data set. Again in the first window select next to continue. In the second window one can choose the type of dataset. Select 'Simulation' and change the name to 'Sim-reference' and select 'Next'.

🔛 New Datase	et in the second se			
New Dataset Select type of c	lataset and enter a nam	e		**
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Dataset name	Sim-reference			
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The Simulation set combines the conceptual model (Design dataset) with a calculation grid of the local schematization (Discretisation Local dataset) to create a local model (Simulation Local dataset) to run with the specified model code. In the following window that appears the conceptual model (Design dataset) is selected as the Parent dataset as well as the calculation grid of the reference discretisation (Discr-reference dataset) as the Discretisation dataset. Note that this means you can easily create an alternative grid and create a new simulation dataset (thus a model) based upon the same conceptual model and visa versa.

• Note that the datasets are defined as [Model name].[Dataset name], so here for the Parent Dataset Tutorial-Regional.Design1.

Select next and find yourself in the same properties window when defining the design dataset. Leave everything as it is. All information was inherited from the Design dataset. Select the 'Next' button and 'Finish' the dataset wizard.

🔜 New Dataset									
Associated Datasets The following dataset are	Associated Datasets The following dataset are related								
Parent Dataset	Tutorial-Regional.Design1	•							
Discretization Dataset Tutorial-Local.Discr-reference Tutorial-Regional.Discr-regional									
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Time discretisation i	s inherited from parent dataset								
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You are now back in the list of datasets in the model Tutorial-Local. Note that the dataset Simulation has a red status indicator. Open the dataset **Sim-reference**. You will automatically will be directed in the Inherited tab. Since the parameters are shown in a a different font (italic) than what you have seen before. The reason for this is that it is immediately clear that you are dealing with inherited parameters. Also notice that all status indicators are red which means they either need to be updated or allocation is not carried out yet.

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Triwaco Integrated Modelling Environment - [Dataset:Tutorial-Local.Sim-reference]											
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E Tutorial-Regional	Parameter	Туре	Description	Input	Value	Field	Allocator	Default	Dataset		
Discr-regional	🔑 bedfriction_MF	River	bedfriction_MF	Constant	7		Constant	7	Design1		
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Sim-reference	🕕 initialbranch_ T	River	initialbranch_TY	Constant	0		Constant	0	Design1		
	ALUE	River	initialbranch_LVL	Vector map	river	INI_WDEPTH	Sobado	0	Design1		
	🤑 boundary_TY	Boundary p	boundary_TY	Constant	1		Constant	1	Design1		
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	Inherited Paramet	ers River Bou	ndary point Profile	Weir Lateral di	scharge point						

In the parameter tab new parameters have been added to the dataset. For the Tutorial model we do not need these new parameters, so select all and 'Delete' them.

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	ALUE bedfriction SF	Allocate		Vector map	bedfriction SF	bedfriction SF	Sobado	3	Sim-reference
	bedfriction_ST	Build		Vector map	bedfriction STC	bedfriction STC	Sobado	50	Sim-reference
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7.6.2 Allocating the entire dataset and making all parameters up-to-date (Build)

Since modelling is a process of entering data, calibration adapting and changing maps and parameters keeping track of all changes made is difficult. Triwaco already provides a lot of useful information via the status indicator and dependencies. However with a lot of data you want as quickly as possible allocate all necessary parameters to do another simulation. For this there is the option 'Build'. This option checks the status of all parameters in the dataset and allocates them if necessary. It will also check the dependencies of parameters and will in order of dependencies allocate them. So with one push of the button the entire dataset is up to date.

You may test this option even though all parameters at the moment are up to date. From the pull down menu 'Dataset' select 'Build'. The building process starts. In the Jobs pane you will see the progress. In the Output pane information is provided for each parameter. If one of the parameters fails the reason for this is given, so the appropriate action can be taken.

There is always a change of error in the model input files (.ado) even though the status indicator may be green. It is therefore recommended to check all the allocated data (adore files) before running a simulation. One can easily check the outcome of the allocation by looking at the summary of the parameter in Triwaco. Select the parameter and open the 'Properties Window'. You will now see that next to General and Input tab an additional tab is present, Output. Go to this tab to look at the allocated data.

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Additionally it is important to check the model within the SOBEK interface with the tools 'Validate network' and 'Check Flow model'. This is possible when the SOBEK-files have been copied in the designated case (after executed 'Run'; see paragraph XXX).

7.6.3 Generating the SOBEK-CF model-files (Generate)

When all parameters are allocated to the calculation grid and checked, the model is ready for the first simulation run. The first thing that has to be done is to convert all parameters now in the standard Triwaco file format into modelinput files for the model code as well as creating other input files to run the simulation with the specified modelcode, in this case SOBEK-CF.

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Discr-region	View	•	River	bedfriction_MF
	Properties	Alt+Enter	River	bedfriciton_MTC
	rence	ALUE	River	bedfriciton_MRC
Sim-refere	ence) initialbranch_TY	River	initialbranch_TY
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In the Simulation dataset select 'Dataset - Generate', which creates the input files for the SOBEK-CF model code, based on the parameters defined in the dataset.

7.6.4 Copy SOBEK-files for simulation (Run)

To start the simulation first the created SOBEK-files must be copied to the designated SOBEK project and case. This is done by selecting 'Dataset - Run'.



A pop up window is opened where one can choose the right SOBEK-project and SOBEK-case. Select the SOBEK-project TUTORIAL.lit and case Tutorial – reference. Notice that this SOBEK project should exist (as dummy-project, with dummy cases) on the <u>C:\SOBEK</u> directory. For this tutorial the SOBEK-project and cases have already been made, so you only have to copy it to the right SOBEK directory.

7.7 Setting up a Scenario (scenario situation)

In most cases a surface water model or any other model is used to predict consequences of changes made to the water system. These changes usually concern only a few model parameters. Scenario's in surface water model result often in a change in network and therefore a new discretisation must be set up. Consequently, when a new discretisation is set up, a new simulation dataset has to be defined. In TRIWACO it is not possible to define a scenario dataset without defining a simulation dataset first. Therefore in surface water modellering we choose to use a new discretisation dataset combined with a simulation dataset to define a scenario model. In this paragraph we show how to add a new weir to the schematisation.

7.7.1 Creating a scenario dataset

Go back a higher level to the level of the model Tutorial-Local. This can be achieved by double clicking on it in the project tree or by opening the context menu of the model Tutorial-Local and selecting 'Open'.

🔜 New Datase	et 👘			
New Dataset Select type of d	lataset and enter a name			**
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Design	Discretisation	Simulation	Scenario	
Dataset name	Discr-scenario			
Location	D:\Projecten\9T1961_Tri	iwaco2008\Tutorial	\Tutorial-SOBEKCF\Tut	orial-Local\Dis
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The new discretisation data set is created by: 'Dataset','Add Dataset'. A pop up window will appear the same as when we created the other datasets. Again in the first window select next to continue. In the second window one can choose the type of dataset. Select Discretisation and name it 'Discr-scenario' and select 'Next'.

In the following window that appears select Tutorial-Regional.Discr-regional as the Parent dataset.

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🛃 New Dataset		<u>_ 🗆 ×</u>
Associated Datasets The following dataset are	related	*
Parent Dataset	Tutorial-Regional.Discr-regional	•
Discretization Dataset	<none> Tutorial-Regional.Discr-regional Tutorial-Regional.Design1 Tutorial-Local.Discr-reference</none>	
🗖 Dataset is time depe	endent	
Time discretisation i	s inherited from parent dataset	
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Select next and find yourself in the same properties window when defining the other discretisation datasets. Leave everything as it is. All information was inherited from the Simulation dataset. Select next and finish.

🔡 Triwaco Integrated Modelling Enviro	onment - [Dataset	Tutorial-Local	.Discr-scenario]						
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	🔑 WEIR	Grid	CF weir	Vector map	WEIR	WEIR	None	0	Discr-scenario
Sim-reference									
Discr-scenario									

Two parameters in the discretisation dataset have to be modified. The boundary has to be defined on a local scale and the weirs need to be filtered for the scenario discretisation as we have seen in chapter XXX.

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7.7.2 The discretisation of the scenario model

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Build' and 'Generate' the network and look at the the result ('Dataset' – View-output). Notice that a new weir has been added to the network. Now we will create a new simulation dataset. It is not neccessary to create a design dataset, because we can inherit all parameter definitions from the Regional design dataset. So, add a new dataset to the project-tree. Choose a simulation dataset and name it 'Sim-scenario'.

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🔜 New Datase	et 👘			<u> </u>
New Dataset Select type of d	ataset and enter a name			**
Installed Datas	et Types			
Design	Discretisation	Simulation	Scenario	
Dataset name	Sim-scenario			
Location	D:\Projecten\9T1961_Tri	waco2008\Tut	orial\Tutorial-SOBEKCE\Tu Name of the model to ci	utorial-Local\Sir reate
		< Ba	ck Next >	Cancel

Select the 'Tutorial-Regional.Design1' as the Parent dataset and the 'Tutoral-Local.Discr-scenario' for the desired scenario network. Select 'Next' a couple of times and the scenario simulation dataset will be added to the project-tree. Open the parameter window by double clicking it in the project tree. The necessary parameters have been inherited from the design dataset (tab inherited) and again a large number of additional parameters have been added to the dataset (tab parameter). These additional parameters should be deleted.

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🔜 New Dataset			
Associated Datasets The following dataset are	related		**
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All parameters are ready because they have already been defined in the design dataset. Build and generate the simulation dataset and the model is ready to run. To run the simulation choose 'Dataset','Run'. A simulation window is opened showing the link to the SOBEK-model. Make sure that the SOBEK-model is already on your hard disk. The SOBEK-model need to be ready up until 'schematisaion' (its colour should be yellow). Select the right case 'Tutorial – scenario' and choose 'Run'. All files are being copied to the SOBEK case and now you can open the model with the SOBEK interface and run the simulation.

🐙 Transfer Sobek network/data-files		<u> </u>
	TUTORIAL.lit	Project
Tutorial - scenario	-	Case
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