

Slivisu User Manual

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Slivisu - A visual analytics tool to validate simulation models against collected data

To support the scientists in gaining insight into the data and the consistency between data and model, Slivisu was developed to fulfil the following tasks:

Making apparent

- the distribution of collected data over over space and time
- the various quality measures of the collected data
- the difference of calculated and modelled data in space and time

A combination of methods from analysis and visualization is applied in the concept to support the tasks:

- The Sea Level Indicator (SLI) data are clustered according to the collection process or data availability; the cluster is presented by an adaptive convex bounding box.
- All information about the SLIs in a cluster is summarized in a multivariate summation diagram which depicts the number of SLIs of a certain quality in various time intervals
- Information about single SLIs can be presented interactively on demand

Supported Data Format

Observation Data

- PostgreSQL DB
- Example:

```
Host: adsc.gfz-potsdam.de
Database: RSL2
Port: 5432
Scheme: rsl
Attribute Table: slivisu_attribs
```

with the respective username and password given.

For full functionality create a table *rsl.slivisu_attribs* which connects the native column names to those expected in slivisu. There, the information can be placed for different tables inside the database.

Attribute	Type	Description
relation	varchar(16)	Name of relation
rel_id	varchar(16)	Name of id
tab_name	varchar(16)	Name of region
curve	varchar(16)	Name of sea level curve
lat	varchar(16)	Latitude
long	varchar(16)	Longitude
rsl_min	varchar(16)	minimum of rsl
rsl_max	varchar(16)	maximum of rsl
cal_min	varchar(16)	Calibrated minimum age
cal_max	varchar(16)	Calibrated maximum age

Observation Data

The following attributes are optional. If the attribute does not exist, or the entry is empty, they are calculated from the respective equation below in the program.

cal_age	varchar(16)	Mean calibrated age, may differ from $(cal_min+cal_max)/2$
cal_std	varchar(16)	Standard error of age, may differ from $(cal_max-cal_min)/2$
rsl_mean	varchar(16)	Mean derived sea-level height, may differ from $(rsl_min + rsl_max)/2$
rsl_err	varchar(16)	Standard error of height determination, may differ from $(rsl_max-rsl_min)/2$
gid_gen	varchar(32)	contains format of global id for SLIs. E.g. gid = 'DYKE-%5.5i' rel_id

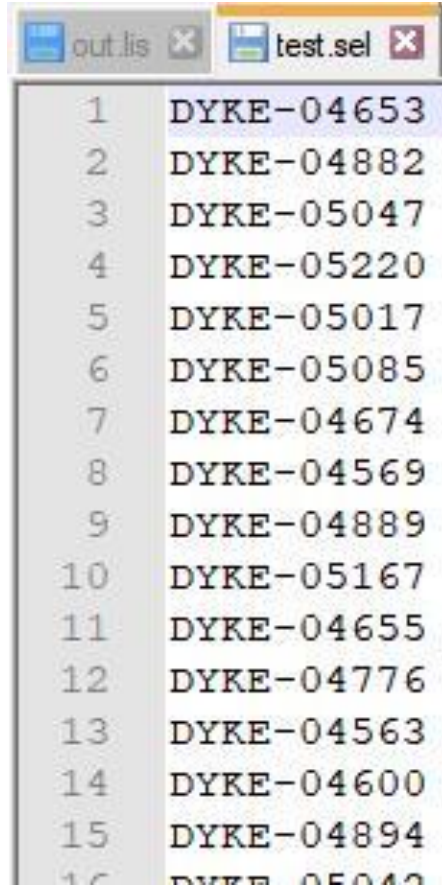
Model Data

- External data ahead of the database can be read in.
- SLIVISU/selection/blub.sel or SLIVISU/data/blub.lis
- Selection, .sel
 - Selections, that can be loaded or saved are newline separated lists of gid's in files ending with sel. These will be marked in the views, if the respective SLIs exist in the Listing. If not, the loaded selection is reduced to those gid's. But keep in mind, that with improper ending the file content is ignored.
- Parameter listing, .lis
 - A parameter listing is provided in .lis files, which contain for a set of models the parameter values and filenames where RSL predictions and calculated fits or deviations at the respective SLIs are given.

Model Data

.sel Files:

- newline separated lists of gid's in files ending with sel



```
out.lis x test.sel x
1 DYKE-04653
2 DYKE-04882
3 DYKE-05047
4 DYKE-05220
5 DYKE-05017
6 DYKE-05085
7 DYKE-04674
8 DYKE-04569
9 DYKE-04889
10 DYKE-05167
11 DYKE-04655
12 DYKE-04776
13 DYKE-04563
14 DYKE-04600
15 DYKE-04894
16 DYKE-05040
```


Model Data

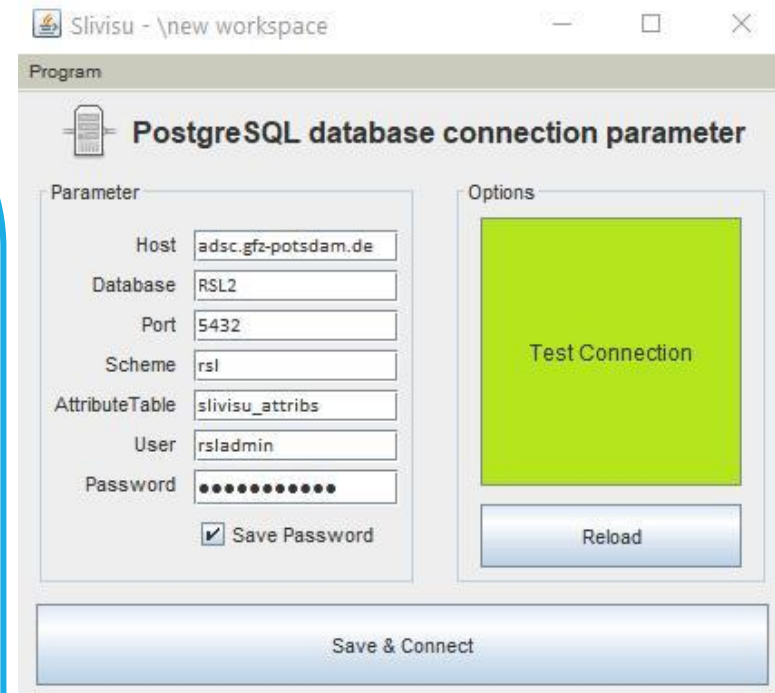
.lis Files:

- num is the number of parameters or dimension of the parameter space.
- name# gives the annotated name in the respective view,
- min# and range# gives the minimum value and range of the respective parameter for the representations in 'cube' and the other parameter charts and matrix.
- In the following data list, the first column gives the filename which is considered relative to the directory where the .lis is located and the following columns, 2, ..., num+1, give the considered par for each model.
- The parameter name and arrays are due to the name space used in this program, as the type definition follows after # at the beginning of each line. s is string, d and f is for double and single float.

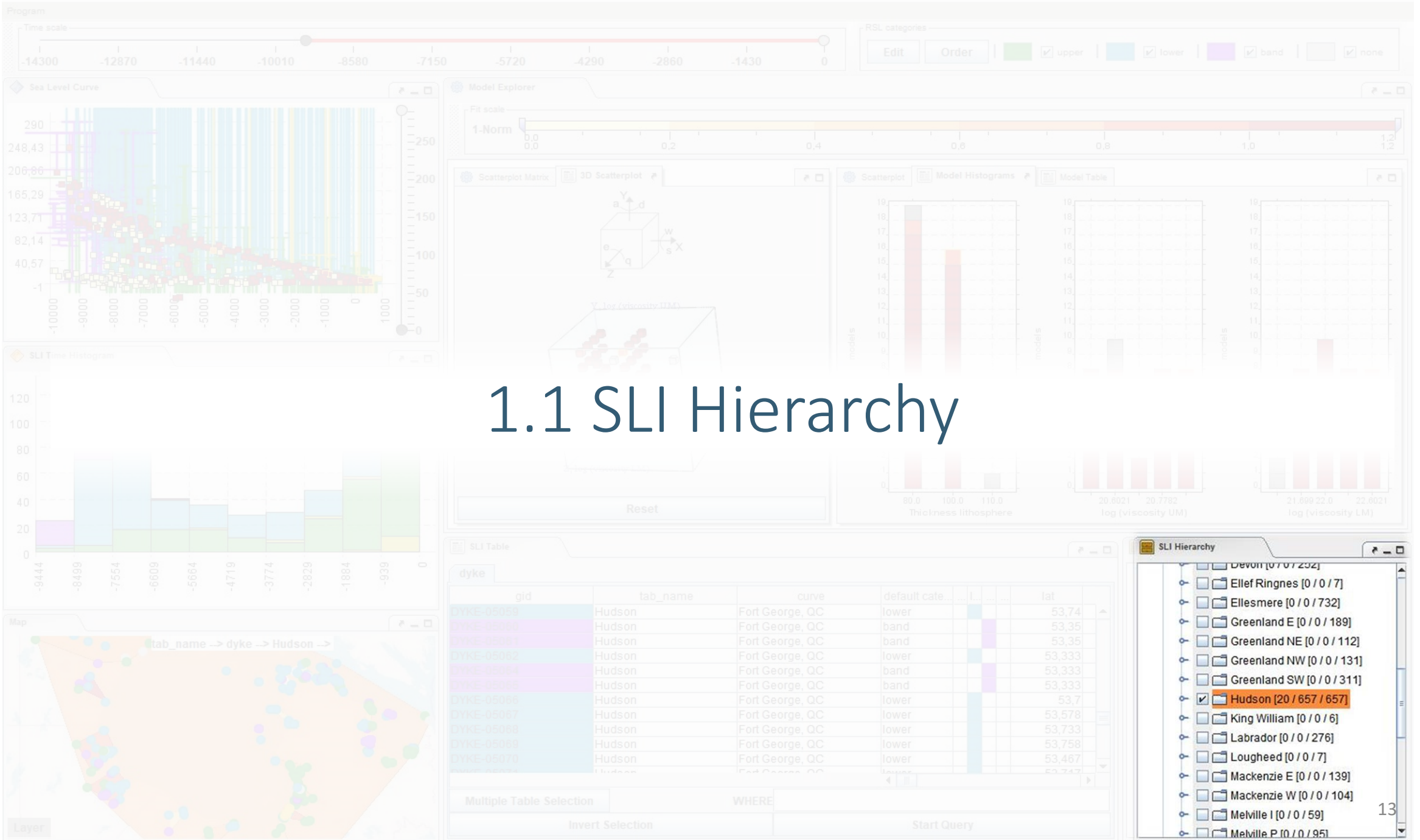
```
out.lis x
1 #s num = 3
2 #s name1 = Thickness lithosphere // name of parameter
3 #s name2 = log (viscosity UM) // name of parameter
4 #s name3 = log (viscosity LM) // name of parameter
5 #d min1 = 70 // minimum in scale
6 #d min2 = 20
7 #d min3 = 21
8 #d range1 = 60 // range in scale
9 #d range2 = 1
10 #d range3 = 2
11 #sfff [visc_list] dirname - par1 - par2 - par3 // name and parameters
12 L100_-vm2/SLI_data_f.out 110 20.6021 21.301
13 L100_1010/SLI_data_f.out 100 20.301 21.699
14 L100_1020/SLI_data_f.out 100 20.6021 21.699
15 L100_1030/SLI_data_f.out 100 20.7782 21.699
16 L100_1040/SLI_data_f.out 100 20.9031 21.699
17 L100_2010/SLI_data_f.out 100 20.301 22
18 L100_2020/SLI_data_f.out 100 20.6021 22
19 L100_2025/SLI_data_f.out 80 20.699 22
20 L100_2030/SLI_data_f.out 100 20.7782 22
21 L100_2040/SLI_data_f.out 100 20.9031 22
```

Connecting to Database

- Observation Data DB:
- Choose parameters on start
- When using a different database, the login of course has to be modified, but in the respective theme a table like `slivisu_attribs` has to exist, which relates the attribute names of the respective table containing the data to the column which is interpreted in SLIVISU.
- Click on *Test Connection*, green = connection established, yellow = connecting, red = connection failed
- *Save & Connect* to start



1. Exploration of Observation data

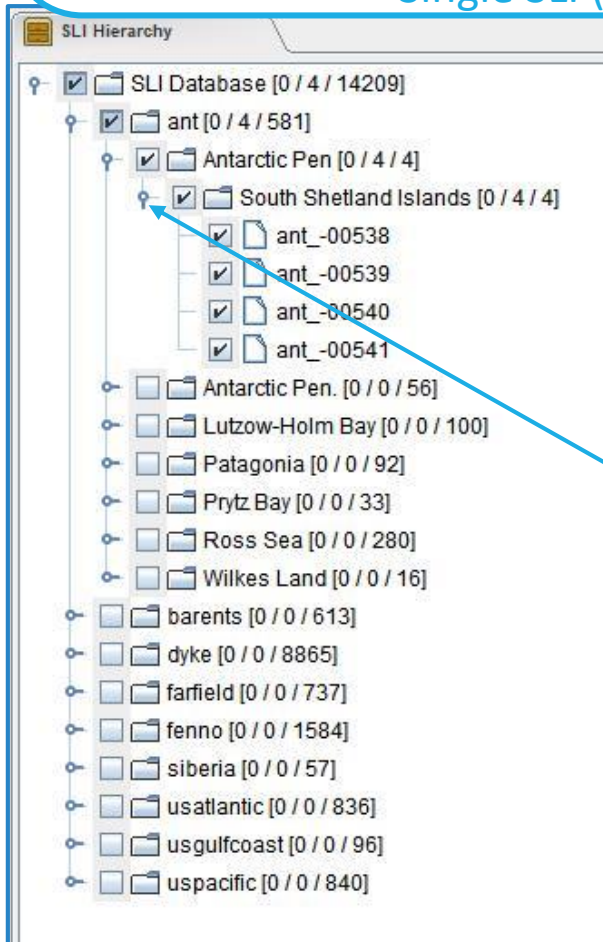


1.1 SLI Hierarchy

SLI Hierarchy:

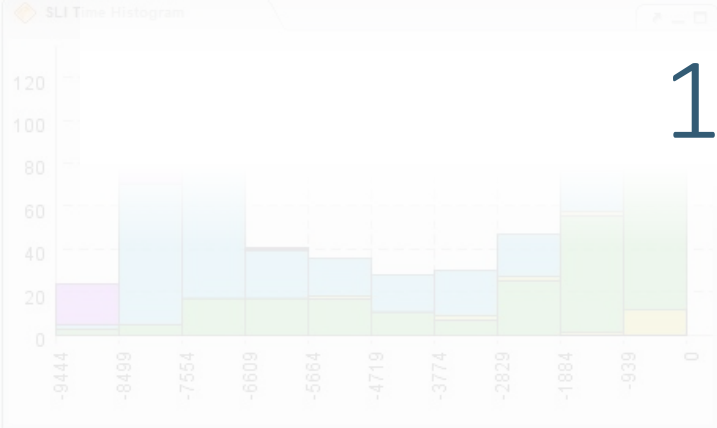
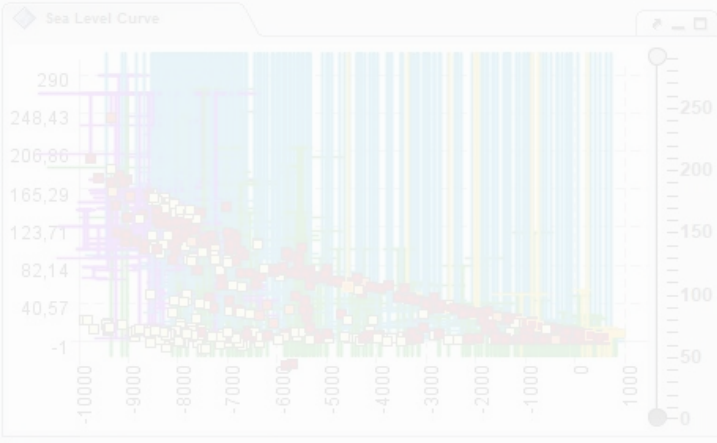
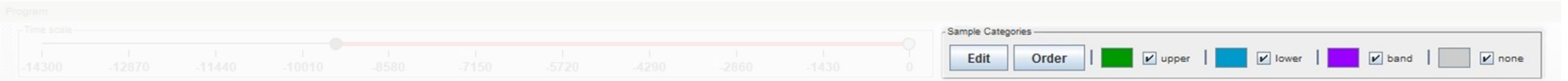
The hierarchy describes a regional definement inside a table

- Database (complete SLI Database)
- SQL-Table (in this case: ant)
 - Table (*tab_name*, in this case: Antarctic Pen)
 - Subregion (*curve*, in this case: South Shetland Islands)
 - Single SLI (ant_-00538)



[0/4/581] = 0 SLIs marked, 4 selected, 581 total

- Select a subset of SLIs by selecting hierarchy levels or single SLIs:
- Selecting a checkbox automatically selects every SLI on sublevels
- to unfold sublevels click on the circle next to the checkbox



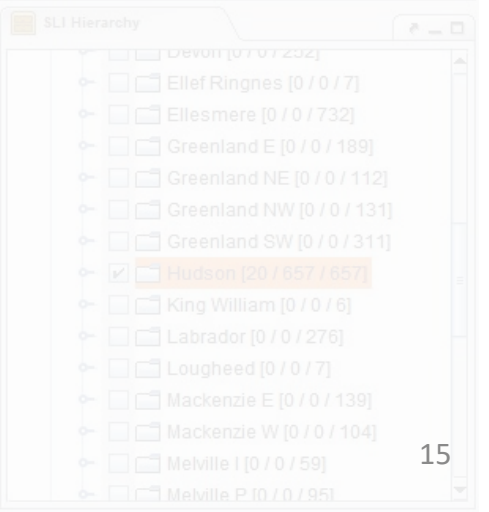
1.2 Sample Categories

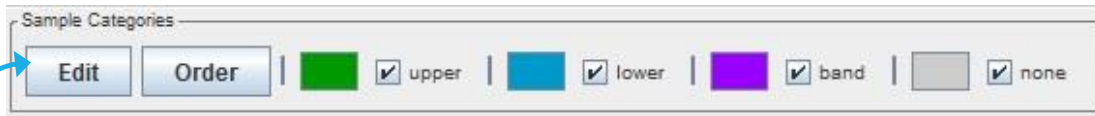


SLI Table

gid	tab_name	curve	default cate...	lat
DYKE-05059	Hudson	Fort George, QC	lower	53,74
DYKE-05060	Hudson	Fort George, QC	band	53,35
DYKE-05061	Hudson	Fort George, QC	band	53,35
DYKE-05062	Hudson	Fort George, QC	lower	53,333
DYKE-05064	Hudson	Fort George, QC	band	53,333
DYKE-05065	Hudson	Fort George, QC	band	53,333
DYKE-05066	Hudson	Fort George, QC	lower	53,7
DYKE-05067	Hudson	Fort George, QC	lower	53,578
DYKE-05068	Hudson	Fort George, QC	lower	53,733
DYKE-05069	Hudson	Fort George, QC	lower	53,758
DYKE-05070	Hudson	Fort George, QC	lower	53,467

Multiple Table Selection | WHERE | Invert Selection | Start Query









- The four default categories upper, lower, band and none are automatically selected on start
- upper: SLIs with given rsl_max and empty rsl_min
- lower: SLIs with empty rsl_max and given rsl_min
- band: SLIs with given rsl_max and given rsl_min
- none: SLIs with empty rsl_max and empty rsl_min
- to edit a category or define new categories click on *Edit*


Categories

Load Category File

▼ default.csv

<input checked="" type="checkbox"/> upper		img	Edit Query
<input checked="" type="checkbox"/> lower		img	Edit Query
<input checked="" type="checkbox"/> band		img	Edit Query
<input checked="" type="checkbox"/> none		img	Edit Query

new category

name:  img

myCat

Select From: ant

Where: h_max > 10

List of attributes

Save as... Cancel

SQL query

Category name

List of Attributes

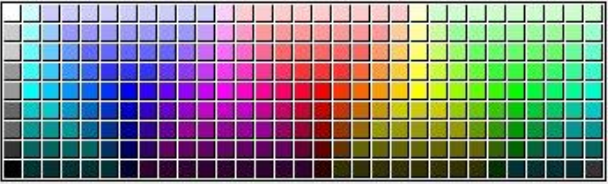
ant

loc	String
c14_basin	Integer
long_var	String
curve	String
cal_min	Integer
lab	String
cal_sig	Float
long	Float
h_rsl	Float
ref	String
c14_rep	Float
tab_name	String

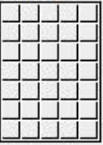
- Select category name, color and an SQL query to define SLIs for the category
- the List of attributes shows possible columns and their types
- Click *Save as...* when done

Choose Category Color


Swatches HSV HSL RGB CMYK



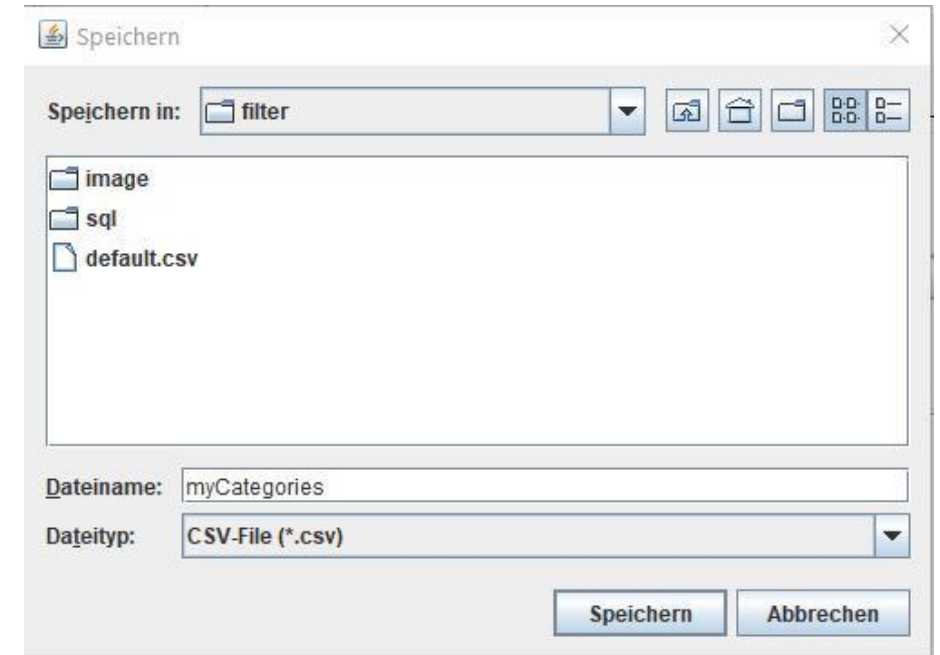
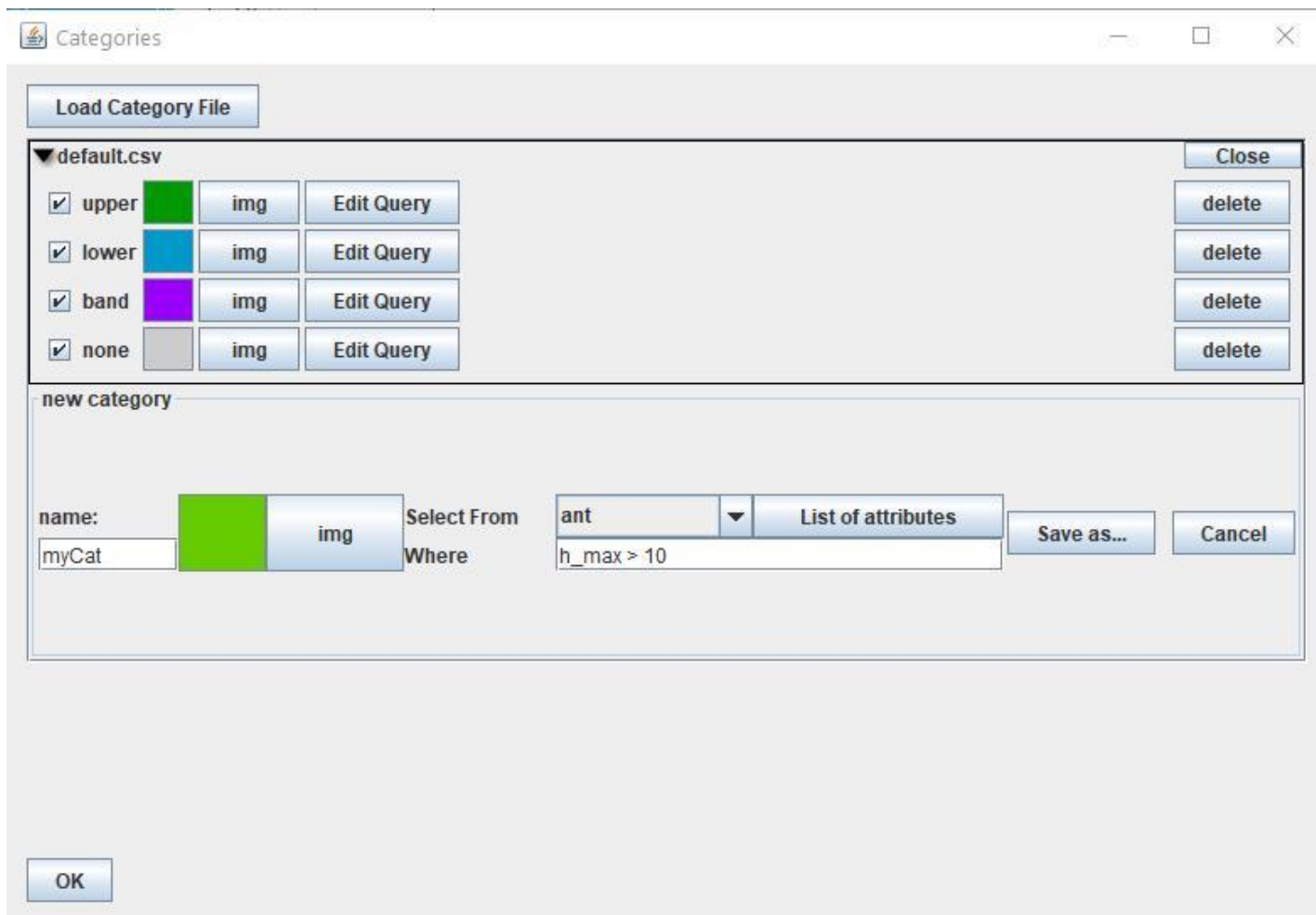
Aktuell:



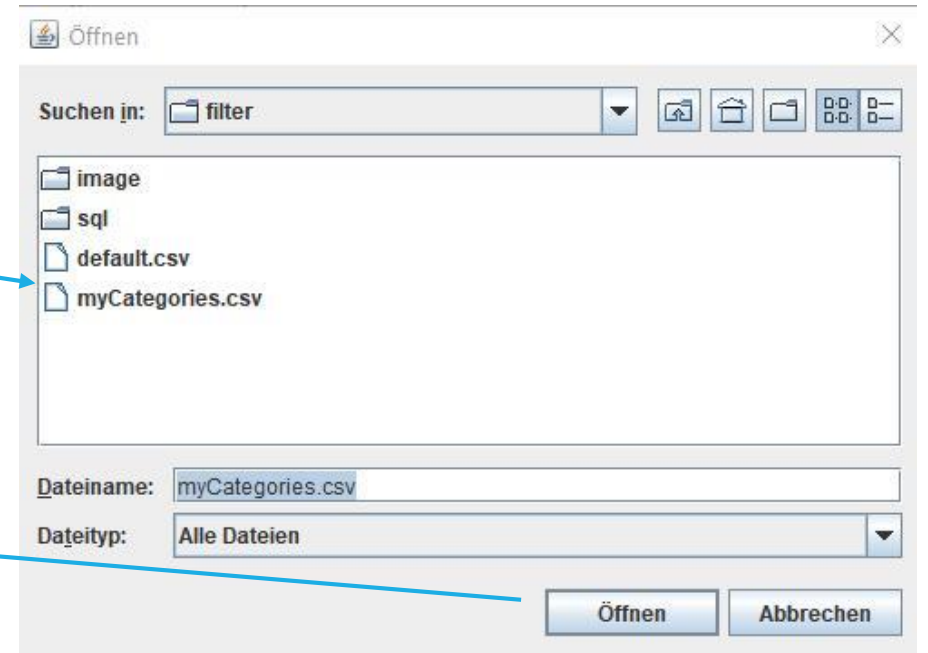
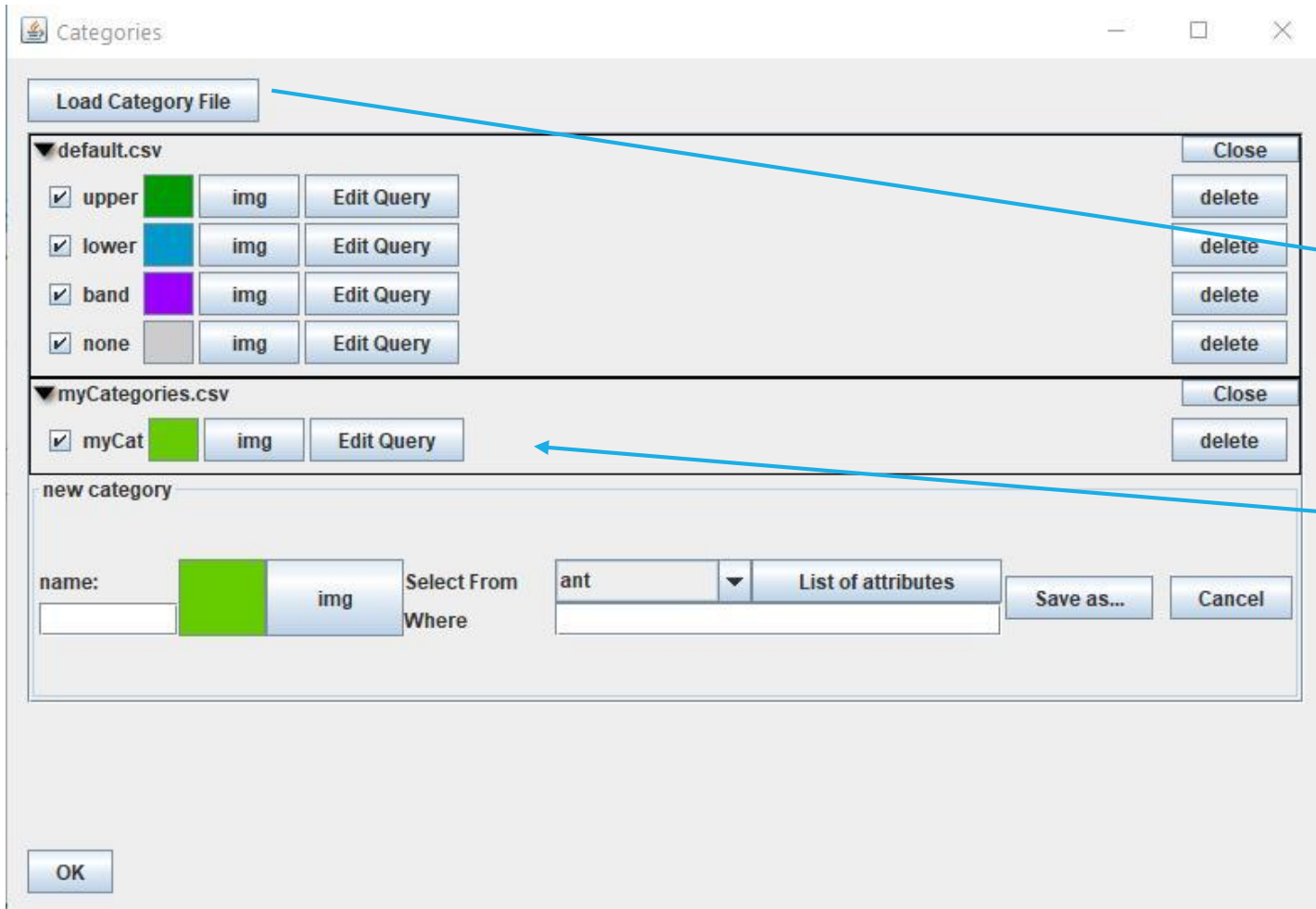
Vorschau



OK Abbrechen Zurücksetzen



Save your category file in SLIVISU/filter



Load your category file and select your category

CSV Files

- should be located in SLIVISU/filter/mycsv.csv
- the queries are stored separately in SLIVISU/filter/sql
- they can be edited in any text editor too
- Example default.csv:

```
myCat.sql  default.csv
1 upper;0,153,0,true;filter/image/null;filter/sql/upper.sql
2 lower;0,153,204,true;filter/image/null;filter/sql/lower.sql
3 band;153,0,255,true;filter/image/null;filter/sql/band.sql
4 none;204,204,204,true;filter/image/null;filter/sql/none.sql
5
```

Category Name

active y/n

Path to Query File

Category Color

Path to Image

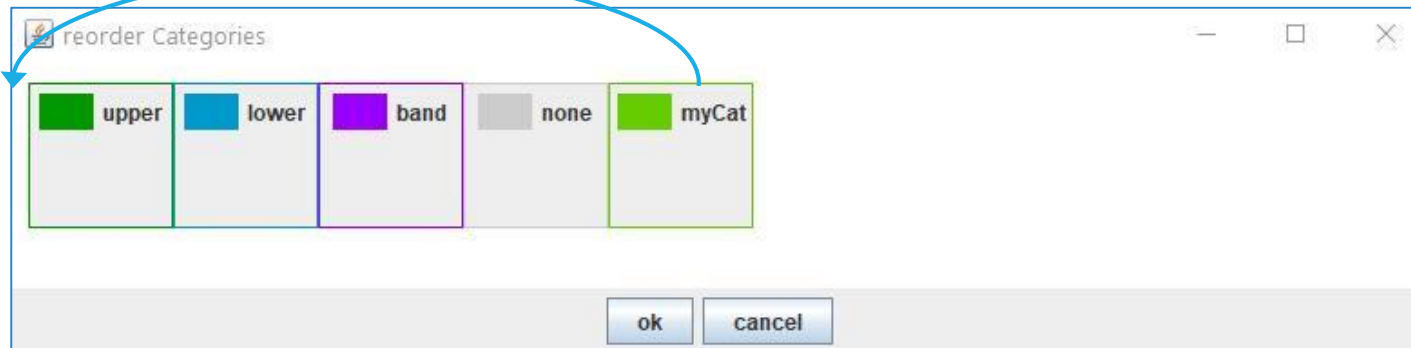
Query File

upper.sql	08.02.2018 12:06	SQL-Datei	1 KB
-----------	------------------	-----------	------

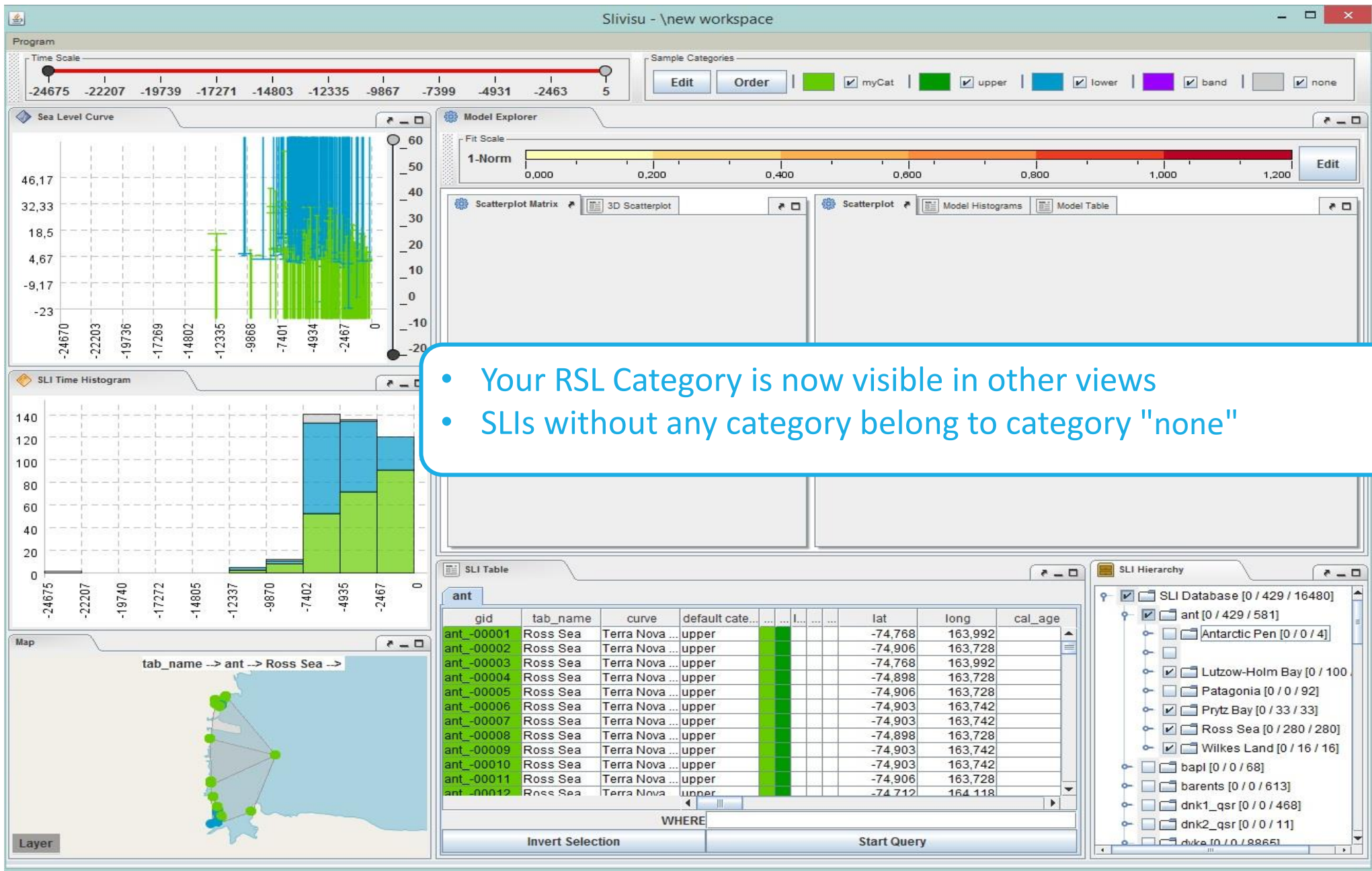
```
upper.sql - Editor
Datei Bearbeiten Format Ansicht ?
sli;cat = 'upper'
select from sli where cat = 'upper'
```

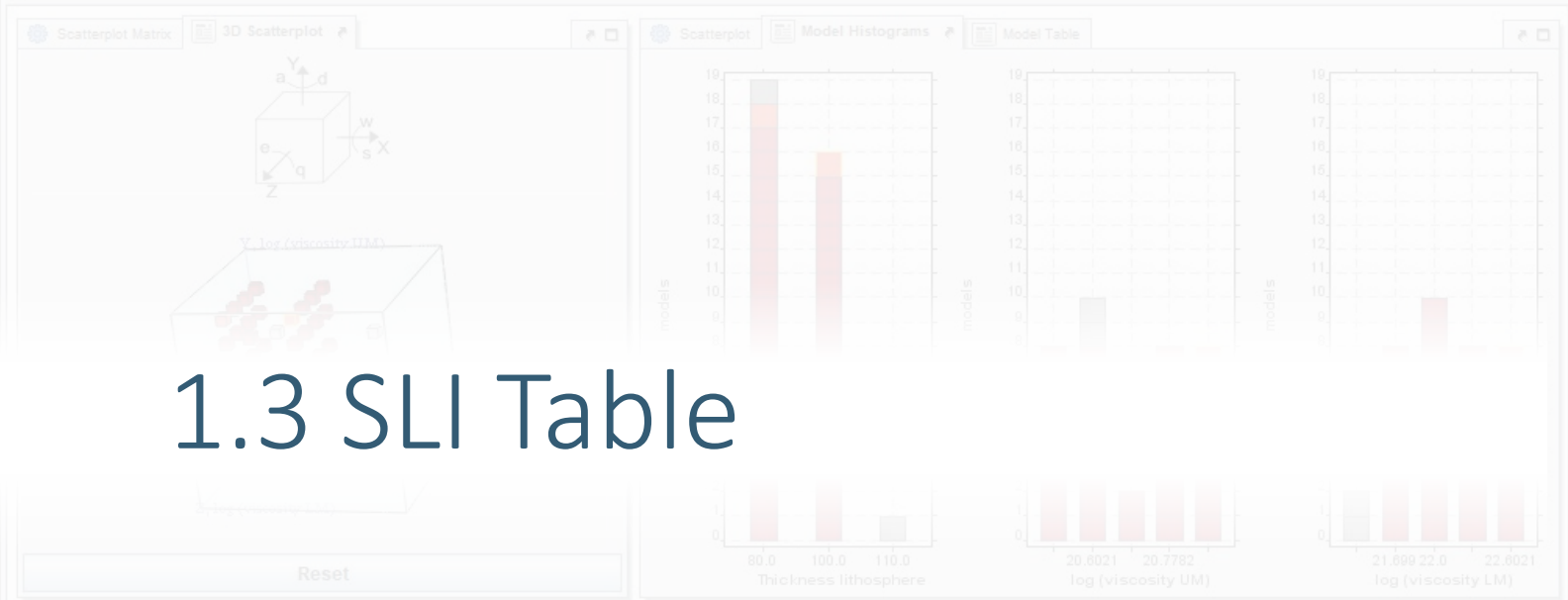
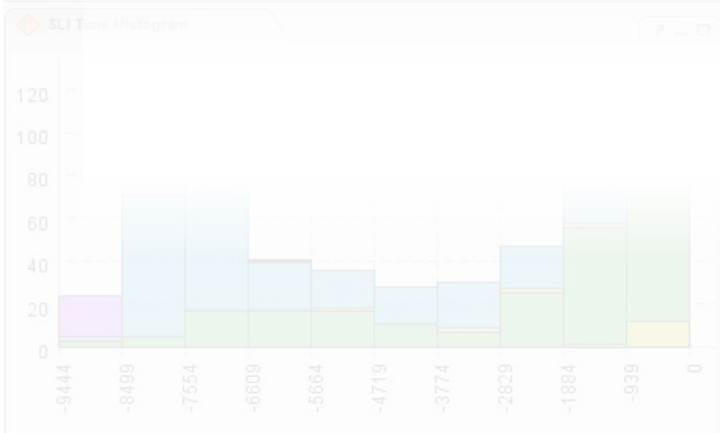
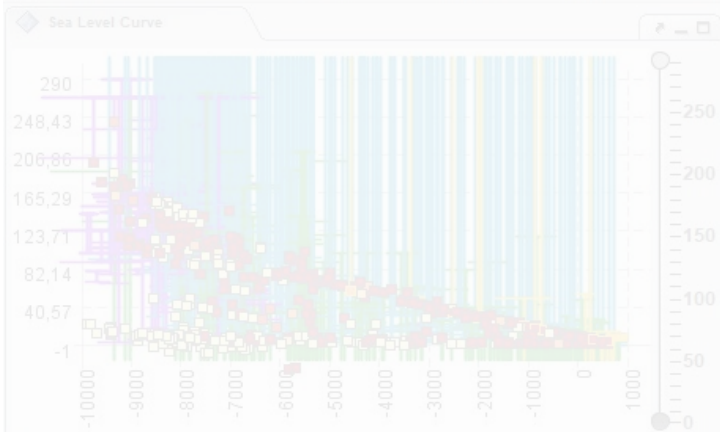


- SLI color depends on it's category. The priority is from left to right, you might need to deselect the default categories or reorder them to see your category in the other views
- To do so click on *Order*



- Click and hold a Category and move it to it's new place
- Click *ok* when done



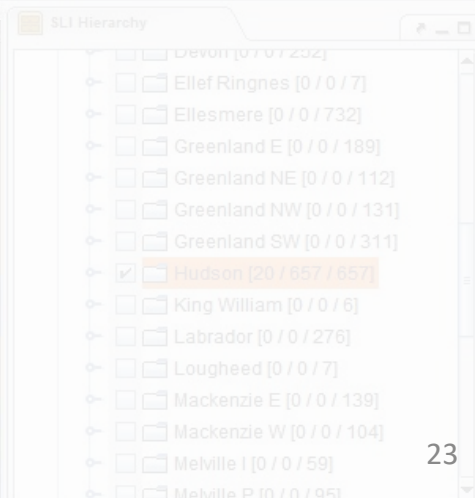


1.3 SLI Table

SLI Table

gid	tab_name	curve	default cate...	lat
DYKE-05059	Hudson	Fort George, QC	lower	53,74
DYKE-05060	Hudson	Fort George, QC	band	53,35
DYKE-05061	Hudson	Fort George, QC	band	53,35
DYKE-05062	Hudson	Fort George, QC	lower	53,333
DYKE-05064	Hudson	Fort George, QC	band	53,333
DYKE-05065	Hudson	Fort George, QC	band	53,333
DYKE-05066	Hudson	Fort George, QC	lower	53,7
DYKE-05067	Hudson	Fort George, QC	lower	53,578
DYKE-05068	Hudson	Fort George, QC	lower	53,733
DYKE-05069	Hudson	Fort George, QC	lower	53,758
DYKE-05070	Hudson	Fort George, QC	lower	53,467
DYKE-05071	Hudson	Fort George, QC	lower	53,747

Multiple Table Selection WHERE Invert Selection Start Query



SLI Table

dyke

gid	tab_name	curve	default cate...	l...	lat	long	cal_min	cal_max	cal_sig	min_rsl	max_rsl	dyke_id	loc
DYKE-04594	Hudson	Ungava Bay W, QC	lower		61,033	-69,925	7310	7695	1	66		4594	Koartac
DYKE-04595	Hudson	Ungava Bay W, QC	lower		60,083	-70,383	7260	7560	1	52		4595	Payne R
DYKE-04597	Hudson	Akpatok Island, NU	band		60,573	-68,168	8690	9190	1	76	100	4597	north coast
DYKE-04598	Hudson	Akpatok Island, NU	band		60,442	-68,317	6735	8650	1	82	91	4598	west coast
DYKE-04599	Hudson	Akpatok Island, NU	none		60,5	-67,85	13650	14300	1			4599	in till
DYKE-04600	Hudson	Akpatok Island, NU	band		60,5	-67,85	8975	9380	1	69	80	4600	NE
DYKE-04601	Hudson	Akpatok Island, NU	band		60,5	-67,85	8385	8570	1	76	81	4601	
DYKE-04602	Hudson	Akpatok Island, NU	none		60,583	-68,2	9450	9675	1	0	0	4602	NW
DYKE-04603	Hudson	Akpatok Island, NU	band		60,5	-67,85	7860	8240	1	76	90	4603	
DYKE-04604	Hudson	Akpatok Island, NU	lower		60,5	-67,85	7555	7855	1	42		4604	
DYKE-04605	Hudson	Akpatok Island, NU	lower		60,5	-67,85	7510	7765	1	13		4605	
DYKE-04606	Hudson	Akpatok Island, NU	lower		60,5	-67,85	7200	7565	1	58		4606	
DYKE-04607	Hudson	Akpatok Island, NU	lower		60,5	-67,85	6450	6870	1	33		4607	
DYKE-04608	Hudson	Akpatok Island, NU	lower		60,45	-68,317	810	1155	1	7		4608	
DYKE-04610	Hudson	Diana Island, QC/NU	upper		60,936	-69,976	1225	1510	1		8	4610	longhouse
DYKE-04611	Hudson	Diana Island, QC/NU	upper		60,709	-69,624	910	1210	1		8,4	4611	UNG.11-A

WHERE

Invert Selection Start Query

- **SLI Table** contains all the information from the database for the selected SLIs plus their categories
- yellow columns are marked SLIs

SLI Table

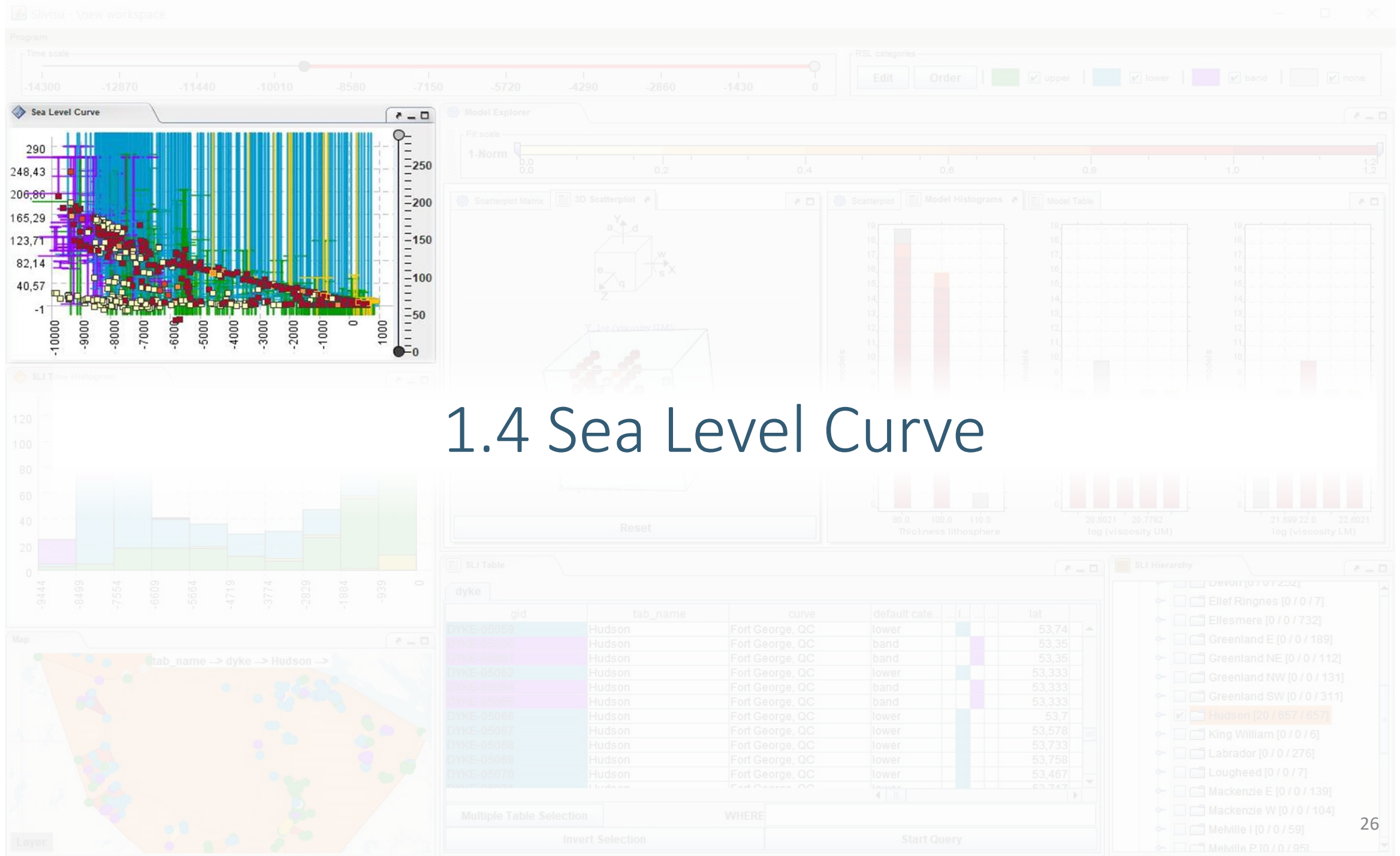
ant dyke

gid	tab_name	curve	default cate...	lat	long	cal_age	cal_min	cal_max	cal_error	h_rsl	h_min	h_max	h_error	ant_id	loc	c14_basin	long_var	lc
ant_00423	Antarctic Pen.	South Shetland Islands	upper	-62,583	-60,5		1945	2130		10,3		10,3		423	Byers Penn...	750	0° 30' 00.0"...	SRR-1
ant_00424	Antarctic Pen.	South Shetland Islands	upper	-62,583	-60,5		2335	2470		10,13		10,13		424	Byers Penn...	750	0° 30' 00.0"...	SRR-1
ant_00492	Antarctic Pen.	South Shetland Islands	upper	-62,583	-60,5		5	285		4,5		4,5		492	South Beac...		60° 30' 00....	I-7869
ant_00493	Antarctic Pen.	South Shetland Islands	upper				1315	1630		7,6		7,6		493	South Beac...		60° 30' 00....	I-7870
ant_00494	Antarctic Pen.	South Shetland Islands	upper				4145	4655		1,8		1,8		494	Start Point, ...		60° 30' 00....	I-7872
ant_00495	Antarctic Pen.	South Shetland Islands	upper				510	649		5,2		5,2		495	Barton Pen...		58° 45' 00....	MB-2.0
ant_00496	Antarctic Pen.	South Shetland Islands	upper				270	475		2		2		496	Barton Pen...		58° 45' 00....	MB-4.0
ant_00514	Antarctic Pen.	South Shetland Islands	upper				65	530		3		3		514	South Beac...	750	60° 30' 00....	Birm-5
ant_00515	Antarctic Pen.	South Shetland Islands	upper	-62,233	-58,75		430	800		7		7		515	Barton Pen...	750	58° 45' 00....	Birm-2
ant_00516	Antarctic Pen.	South Shetland Islands	upper	-62,083	-58,25		6490	6915		18		18		516	King Georg...	750	58° 15' 00....	
ant_00517	Antarctic Pen.	South Shetland Islands	lower	-62,193	-58,97		6640	7465		16	16			517	Kiteschsee...	750	58° 58' 10....	HD 11
ant_00518	Antarctic Pen.	South Georgia Is.	upper	-55	-35		2325	2490		8		8		518	Will Point, ...		0 40' 00' W	SRR-5
ant_00531	Antarctic Pen.	South Shetland Islands	upper	-62,215	-58,967		6405	6795		18		18		531	Wind Cree...	850		HD942

WHERE

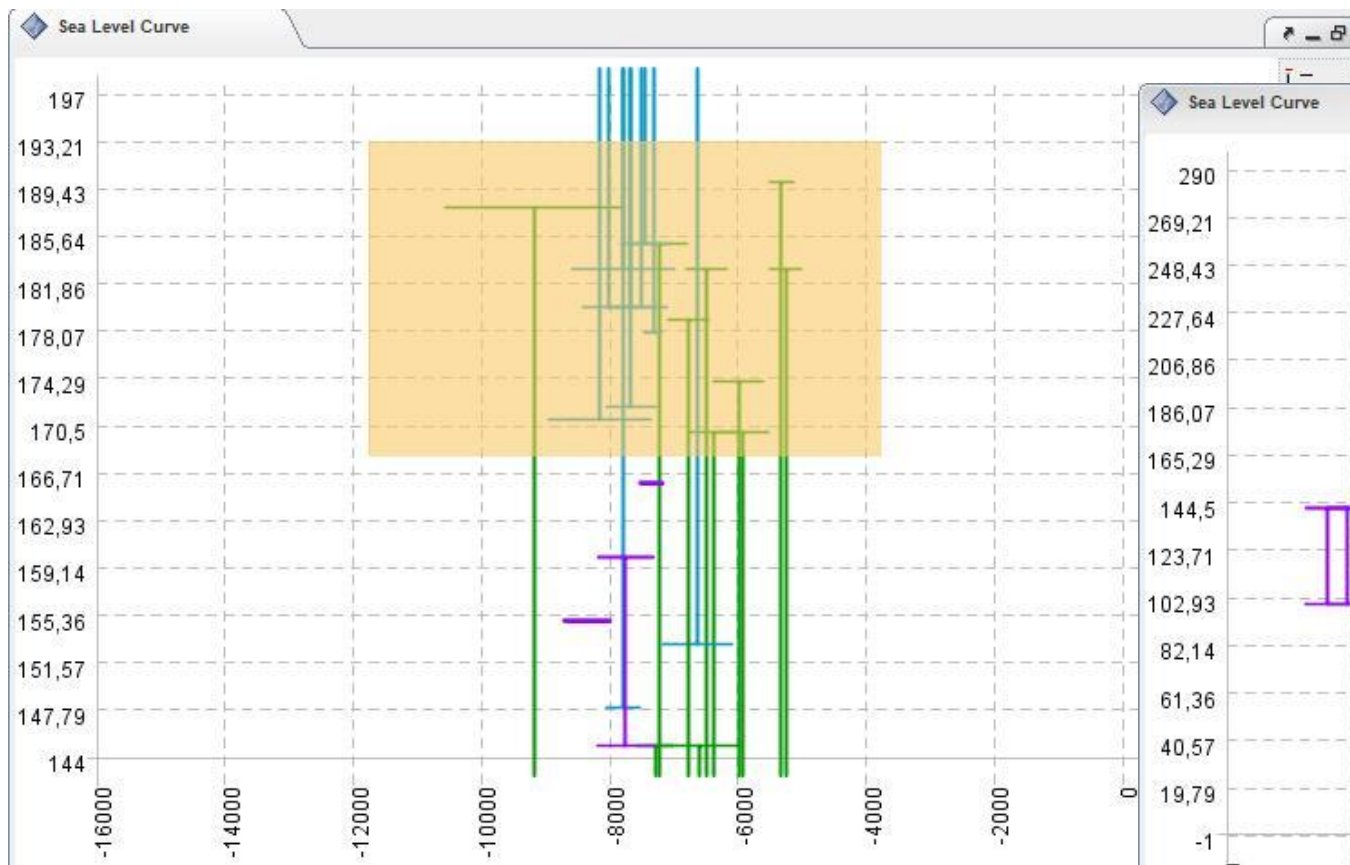
Invert Selection Start Query

- sort the table by clicking on a column header
- to select or deselect SLIs in the **SLI-Table** click on their row (ctrl + click for adding SLIs to the selection)
- or write a SQL-Query in the field and click on *Start Query*, this will automatically mark all fitting SLIs in the open table
- *Invert Selection* inverts the selection
- Right Click opens the pop-up menu:
 - *Show only Selected* hides non selected SLIs in the **SLI-Table**
 - *Invert Selection* inverts the selection
 - *Reduce to Selection* does not work on more than one table! Other tables will be closed.

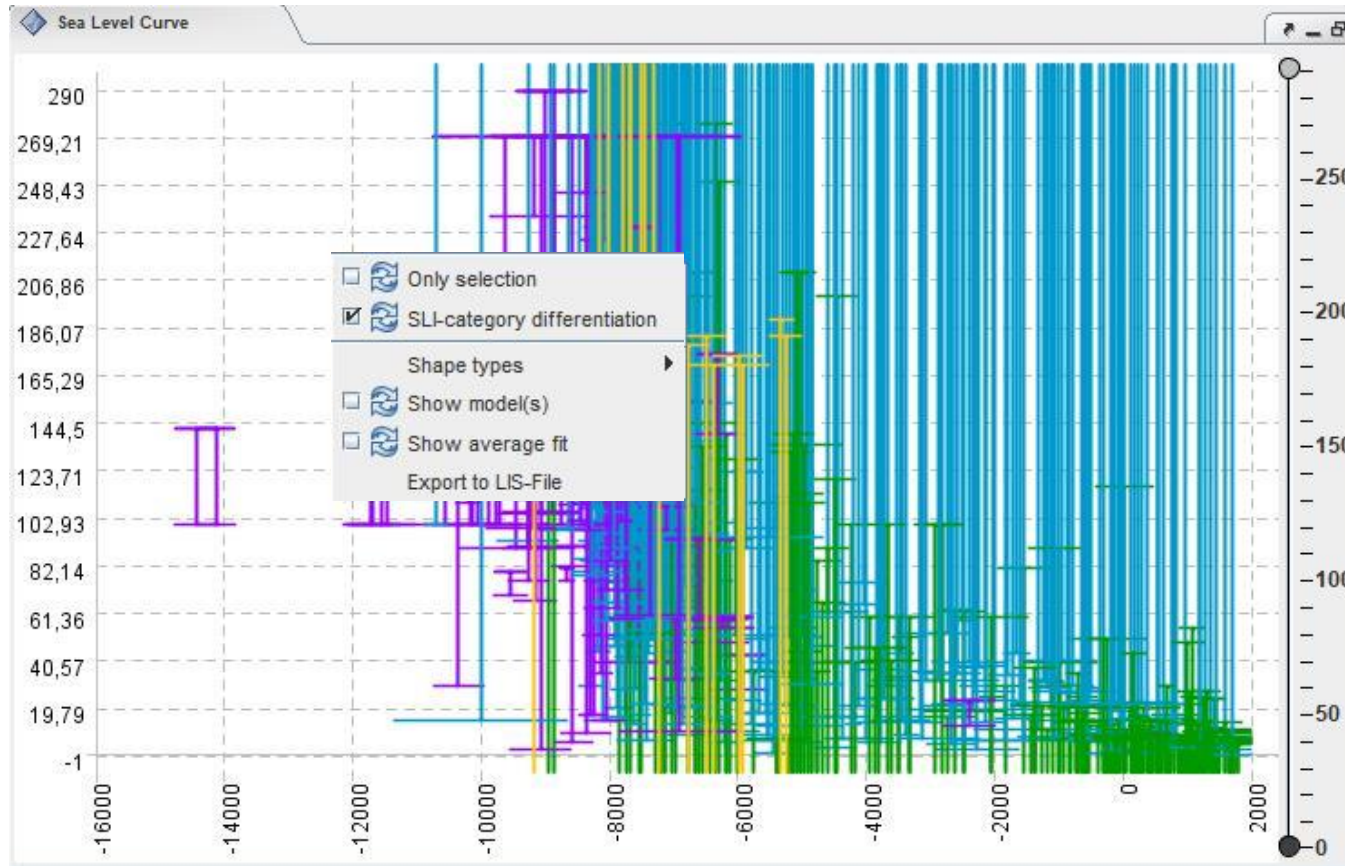




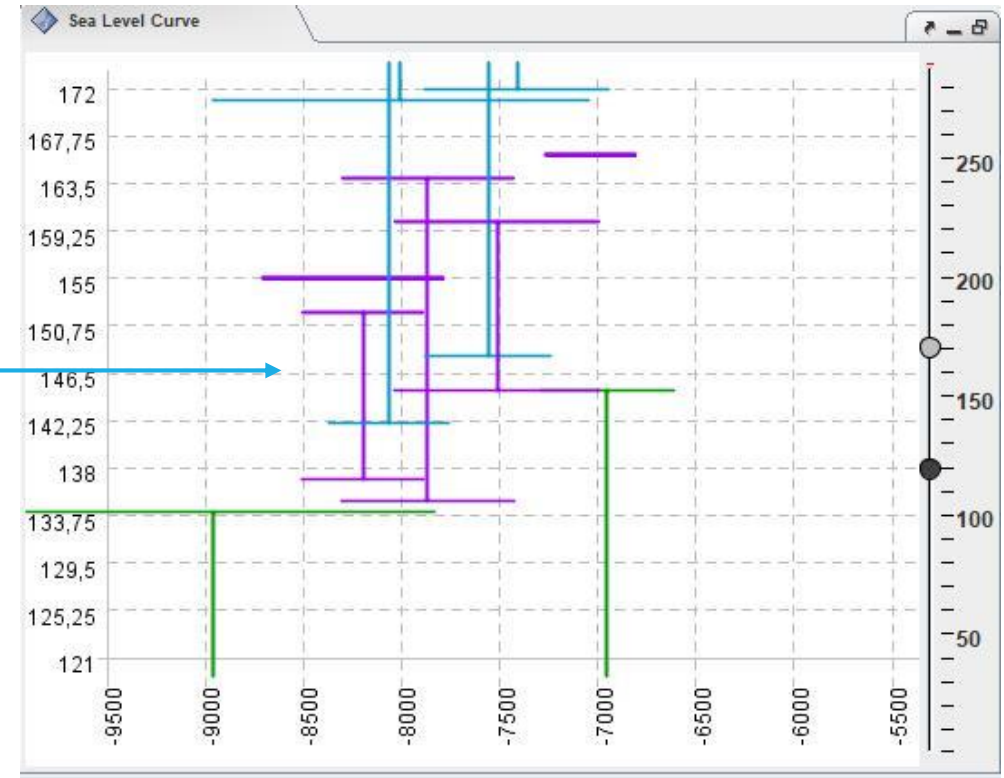
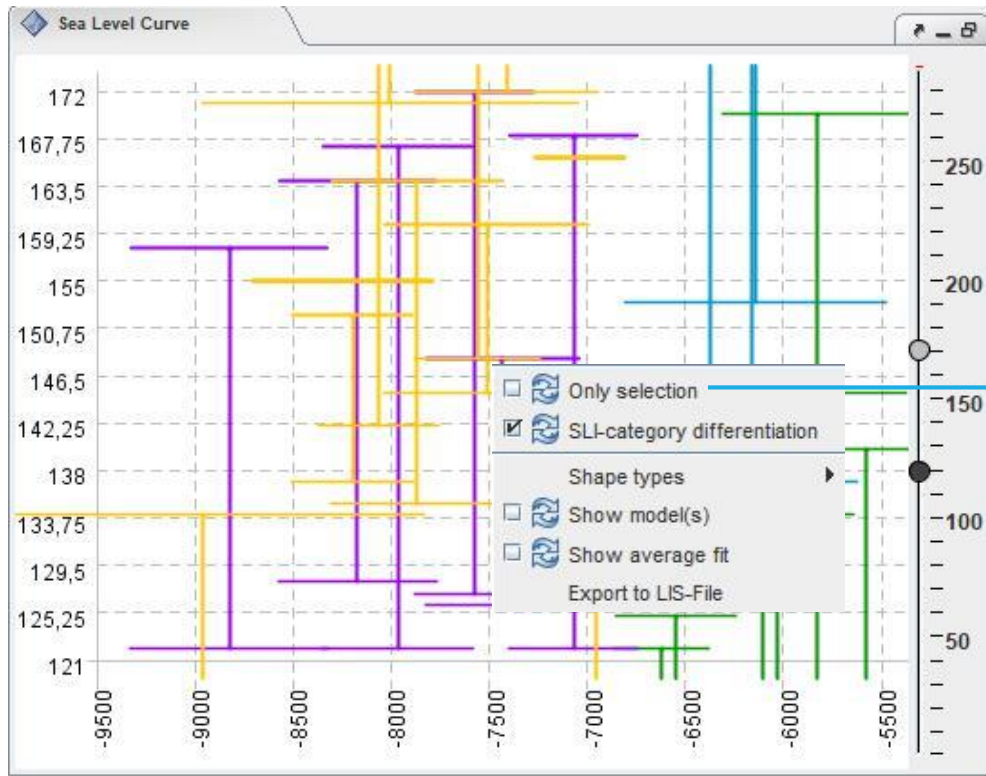
- **Sea Level Curve** for individual samples
- X: uncertainty interval of time point
- Y: uncertainty interval of value (height)
- Color: interval type / category



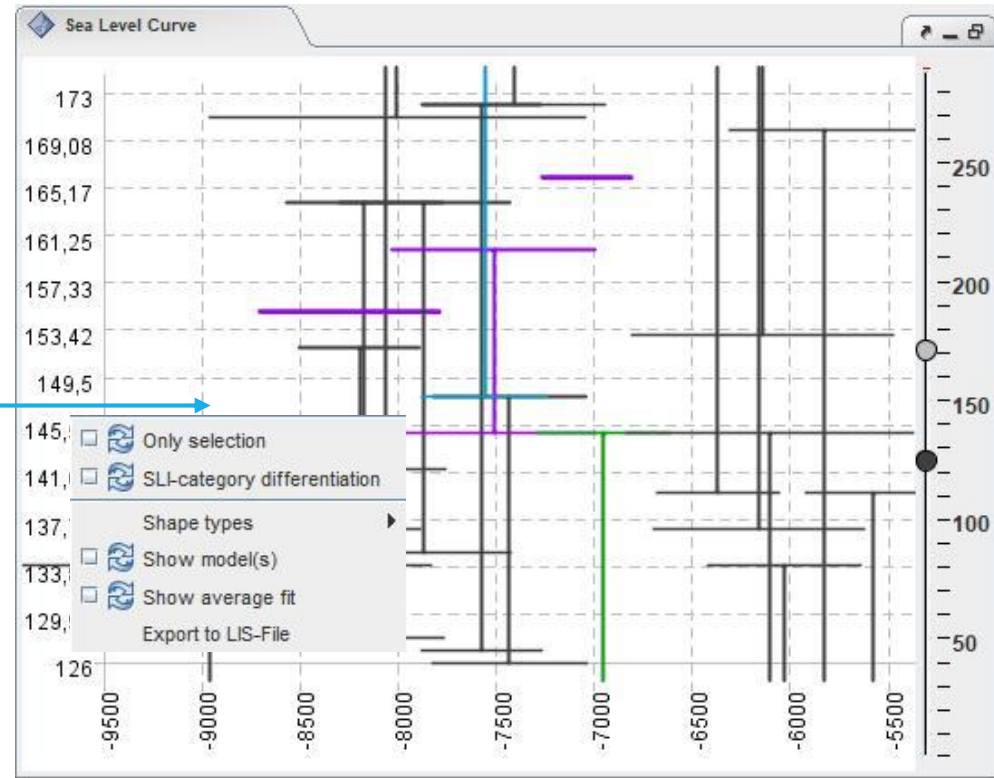
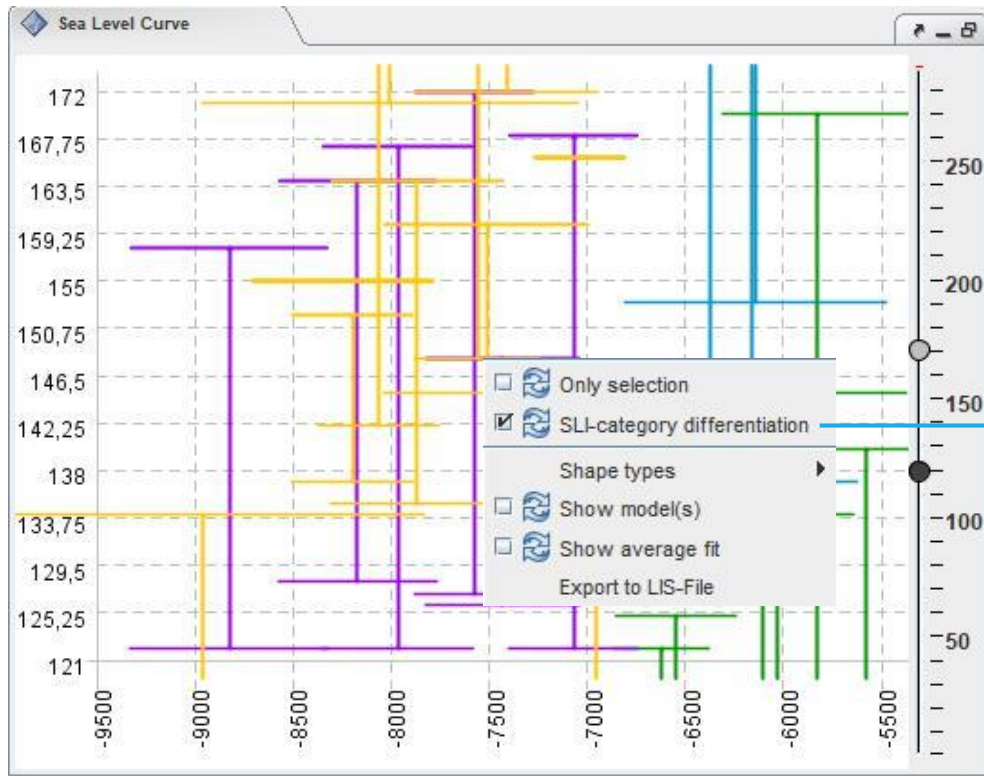
- Select by clicking and drawing a rectangle over the shapes
- Marked samples are yellow
- right click on the slider opens the edit menu where max height and min height can be adjusted
- adjust the scale on the right to view only SLIs within the selected height range by moving the sliders



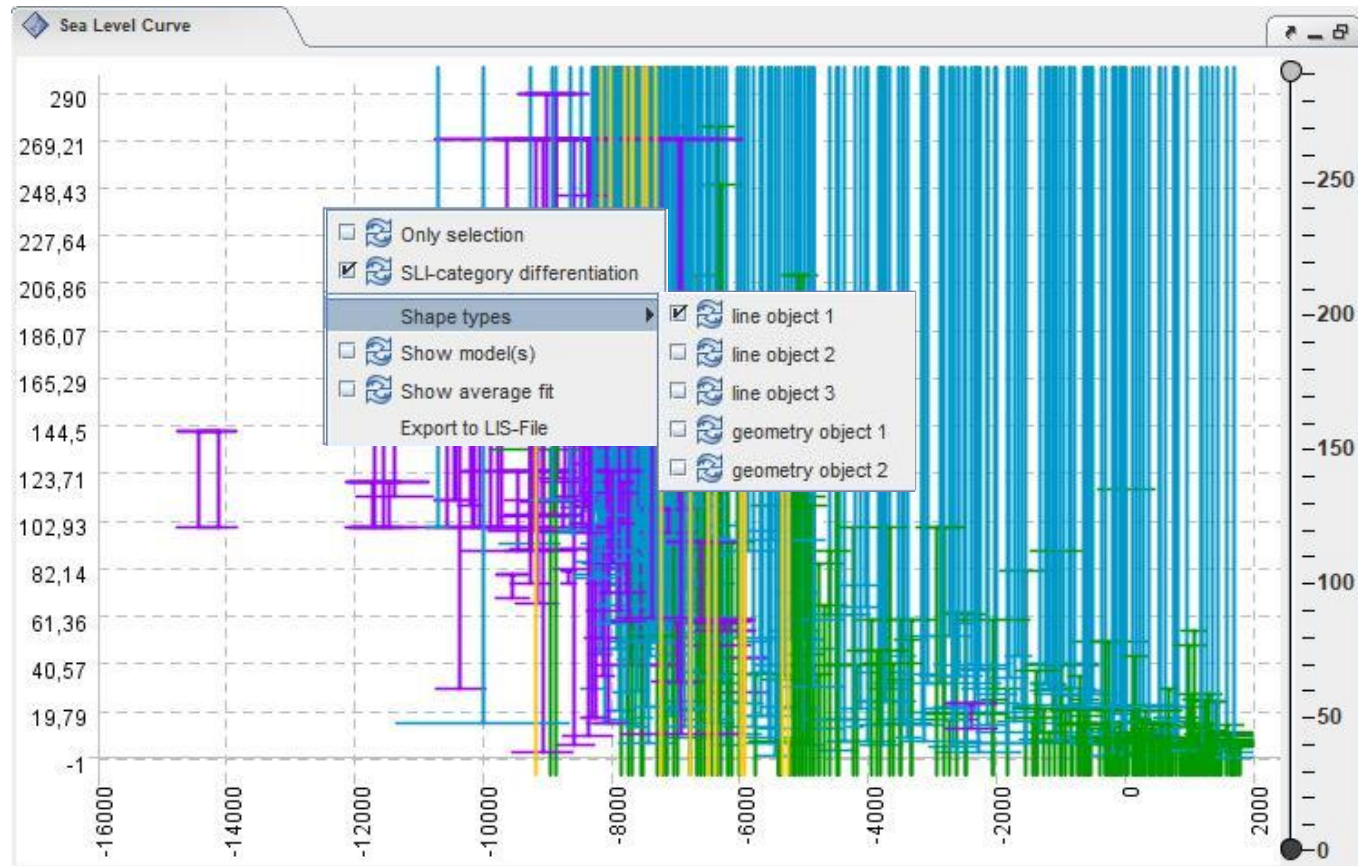
Right click opens the pop-up menu



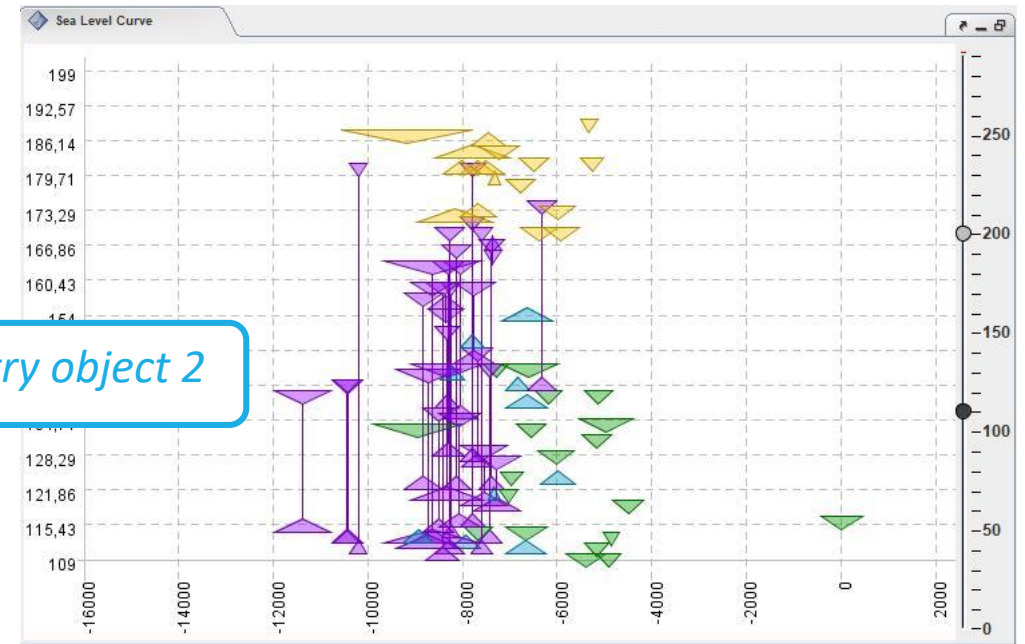
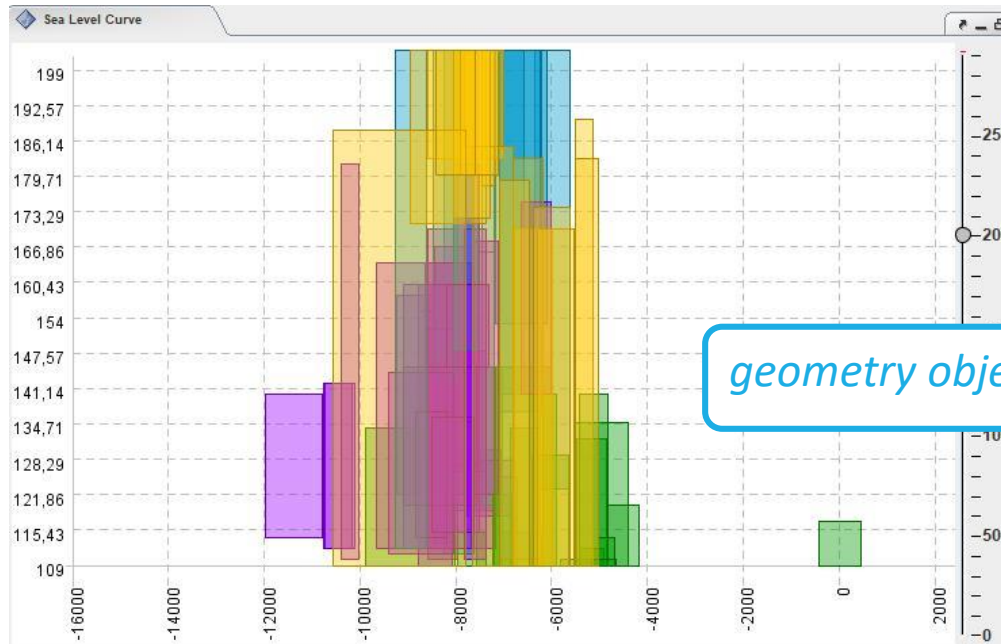
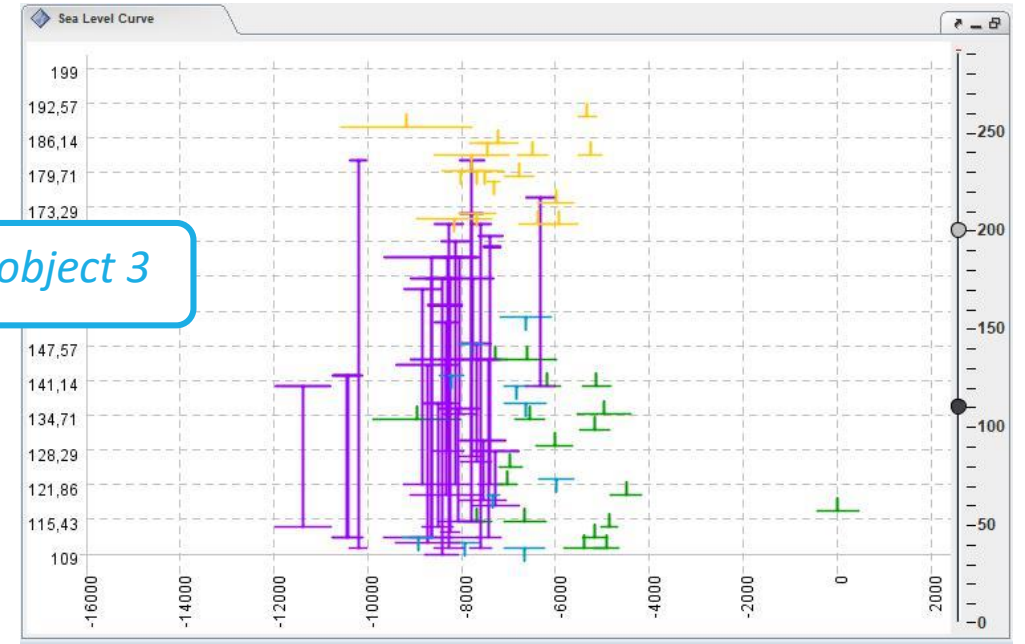
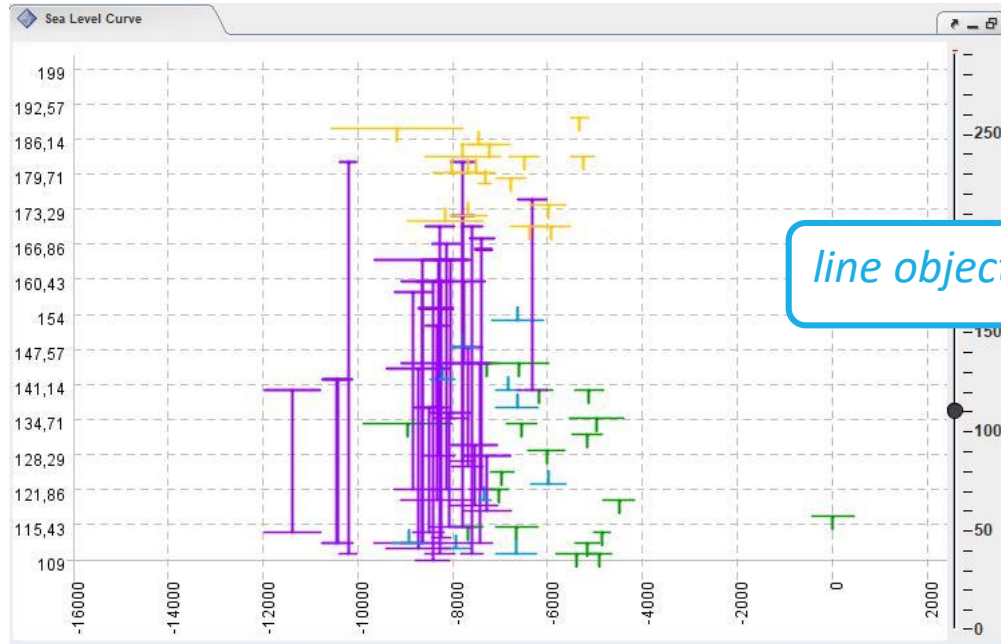
When *Only selection* is checked, only the marked SLIs are shown

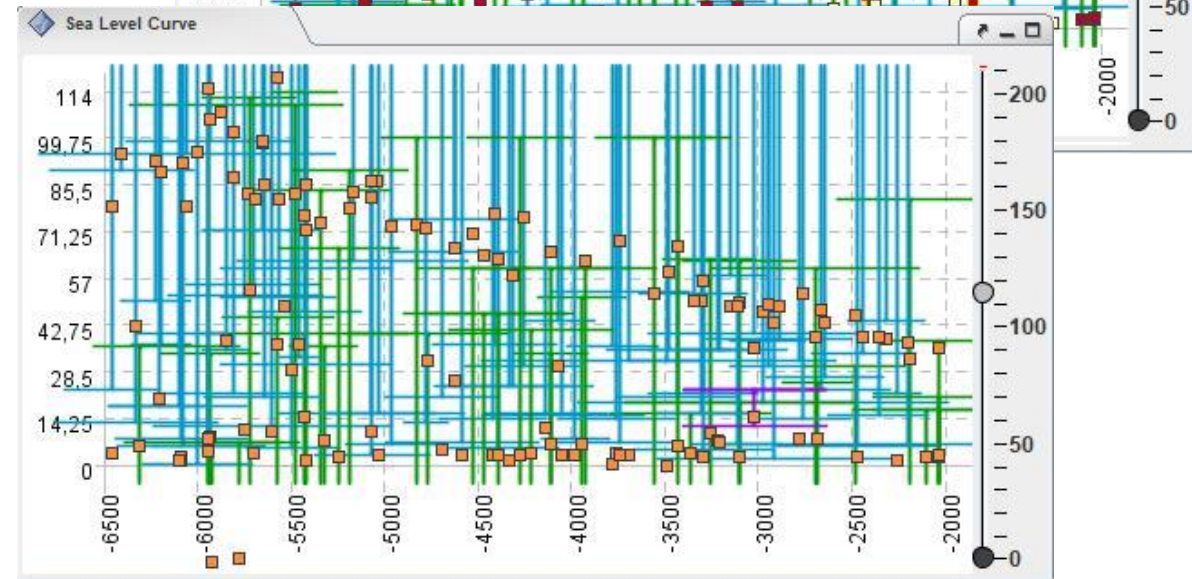
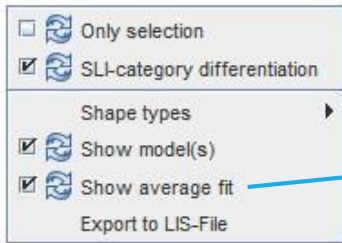
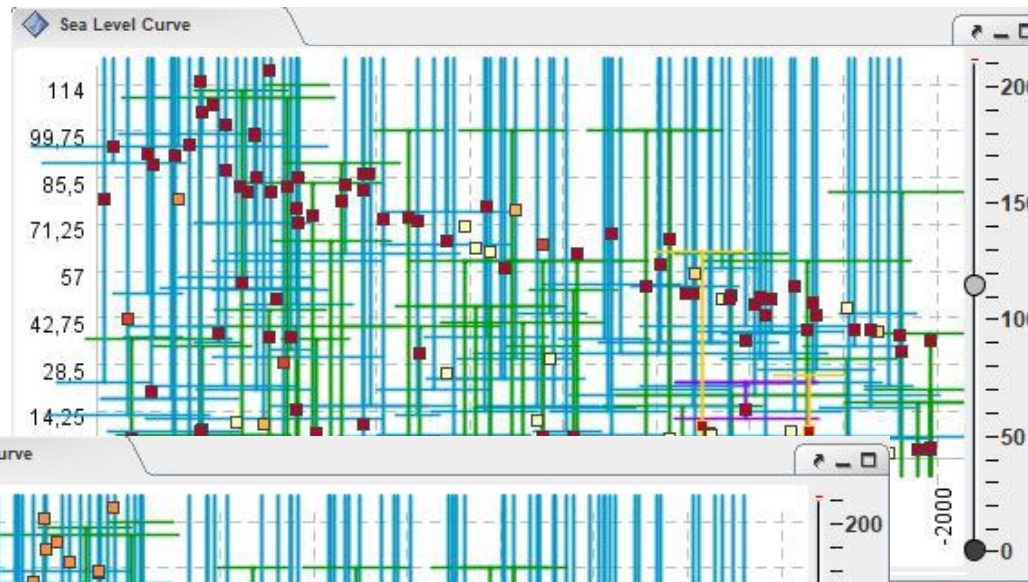
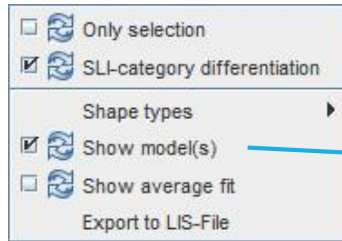


When *SLI-category differentiation* is unchecked, only the marked SLIs are shown in their category color, other SLIs appear dark grey.



Shape types changes the form of the SLIs, default is *line object 1*





- When *show model(s)* is checked, the model points are shown with their Goodness of Fit color
- *show average fit* shows them in the color of the average model fit
- *Export to LIS-File*: save the selected SLIs in lis-Format

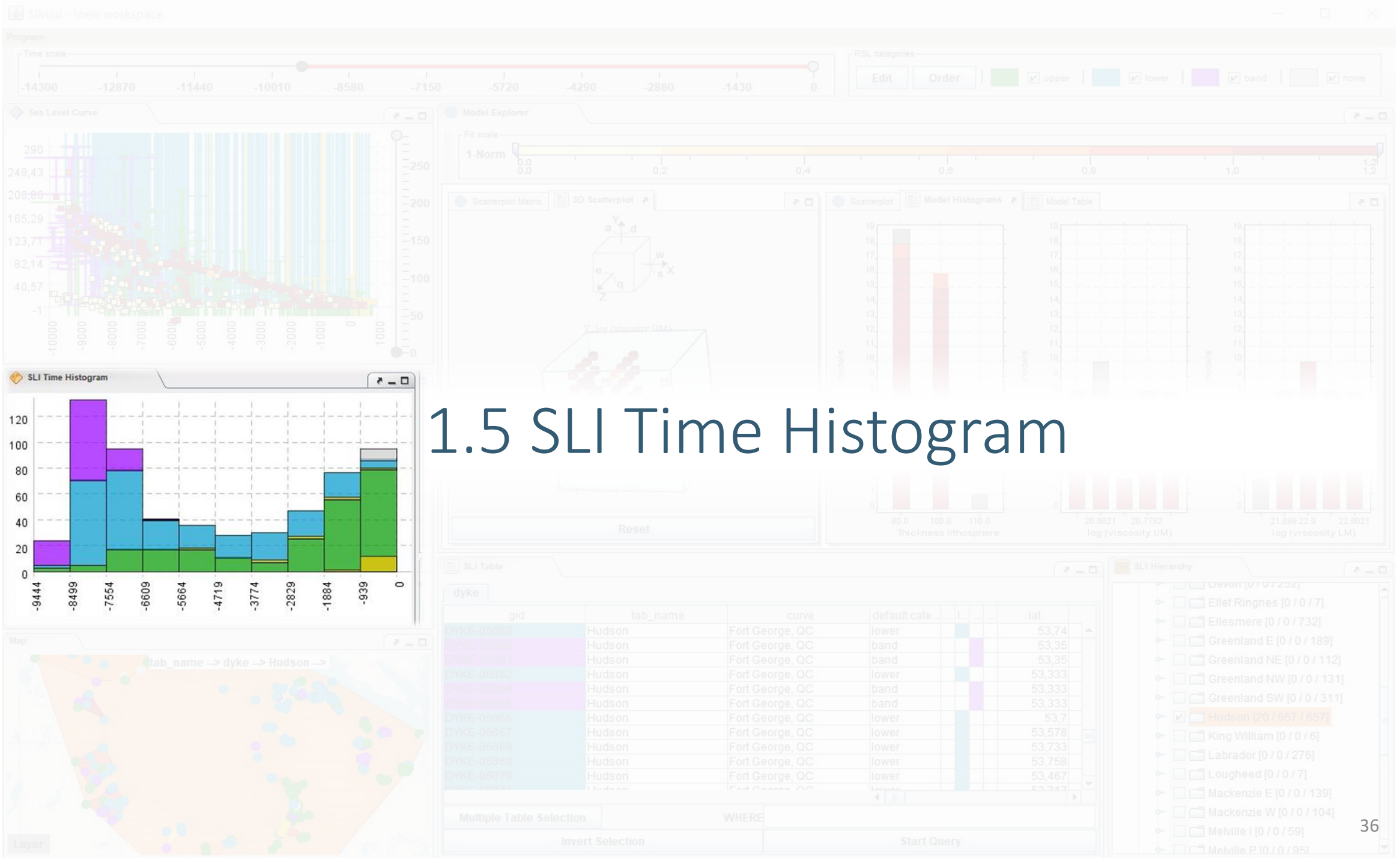
Lis Format for Sea Level Curve:

```

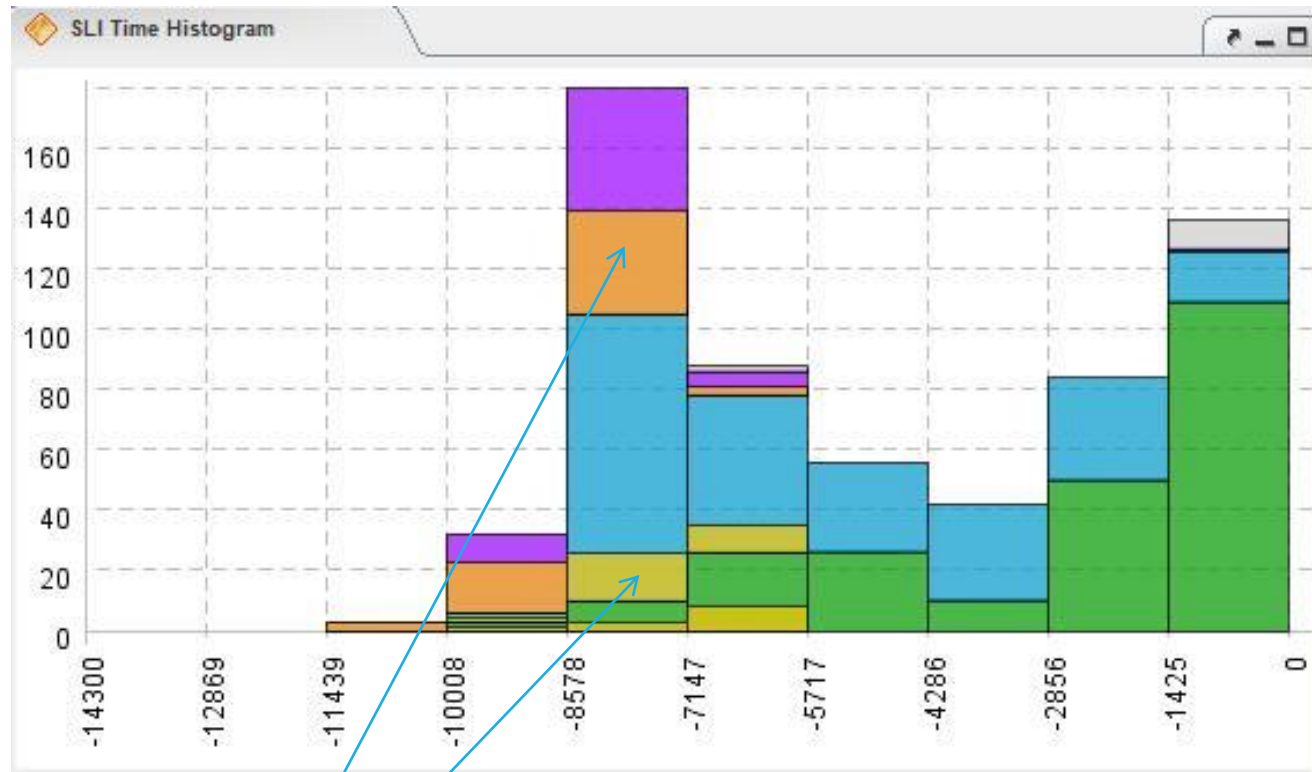
1 #s visual_query = SeaLevelCurve
2 #s [sli_tables] table
3 dyke
4 #sdddddd [slis from SLC] SLIcode - time_min - time_max - hsli_min - hsli_max - category - fit_L100_1010 - L100_1010_height - fit_L100_1030 - L100_1030_height
5 DYKE-00664 8380 9035 26.0 50.0 band 1.0 41.821 1.0 34.747
6 DYKE-00013 2850 3935 1.89999997615814 1.89999997615814 upper 1.0 -7.1531 1.0 -5.4194
7 DYKE-00018 785 1270 2.16000008583069 2.16000008583069 upper 1.0 -1.7385 1.0 -1.4669
8 DYKE-00109 915 1300 2.0 2.0 upper 1.0 -1.0546 1.0 -0.57788
9 DYKE-00032 3130 4620 3.90000009536743 3.90000009536743 upper 1.0 -8.355 1.0 -6.145
10 DYKE-00114 1305 1825 2.0 2.0 upper 1.0 -1.5755 1.0 -0.8791
11 DYKE-01546 6165 6660 64.0 83.0 band 1.0 64.793 1.0 71.268
12 DYKE-00737 7560 7865 20.0 25.0 band 1.0 25.877 0.0 12.809
13 DYKE-00094 645 800 4.0 4.0 upper 1.0 -0.62295 1.0 -0.34063
14 DYKE-00009 15405 18175 4.5 4.5 upper 1.0 -109.85 1.0 -89.548
15 DYKE-00061 11070 12965 -19.0 -19.0 upper 1.0 -52.404 1.0 -52.133
16 DYKE-00084 2360 2745 4.0 4.0 upper 1.0 -2.6626 1.0 -1.565

```

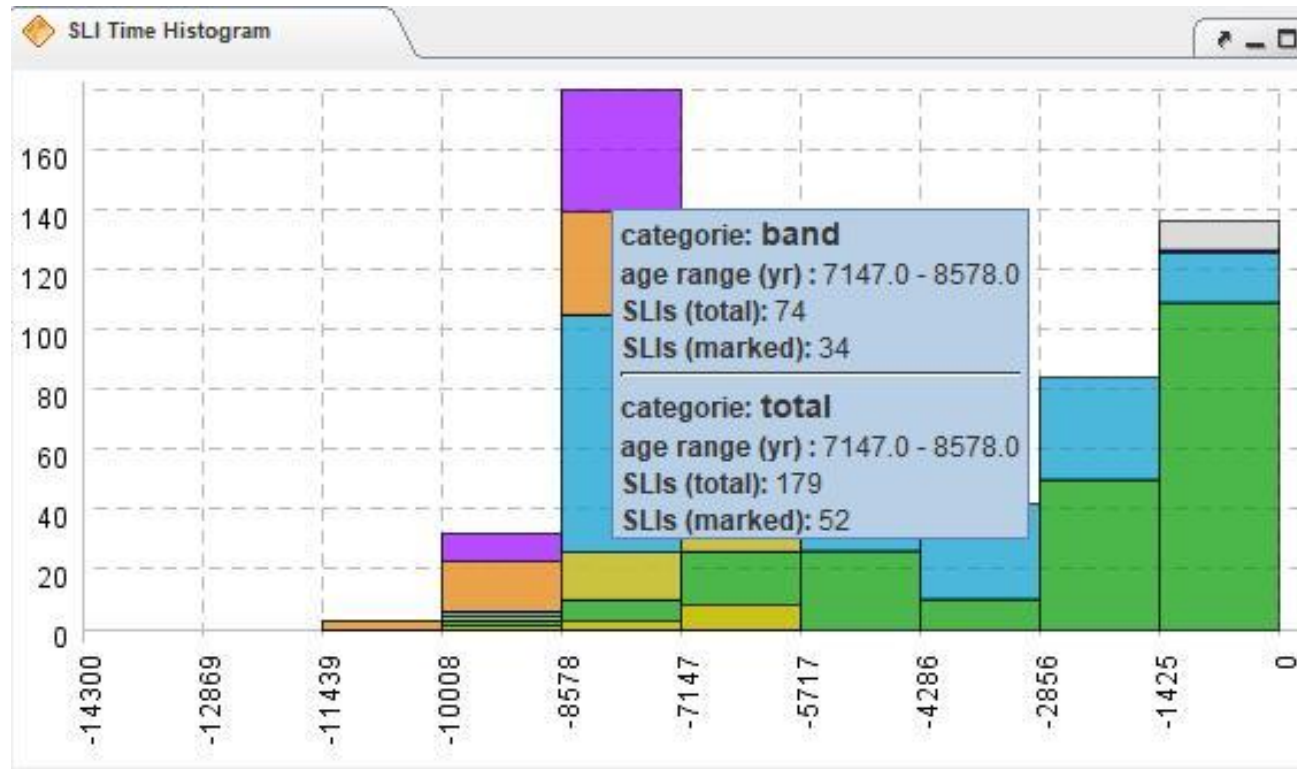
model fit and height
(only if at least one model is selected)



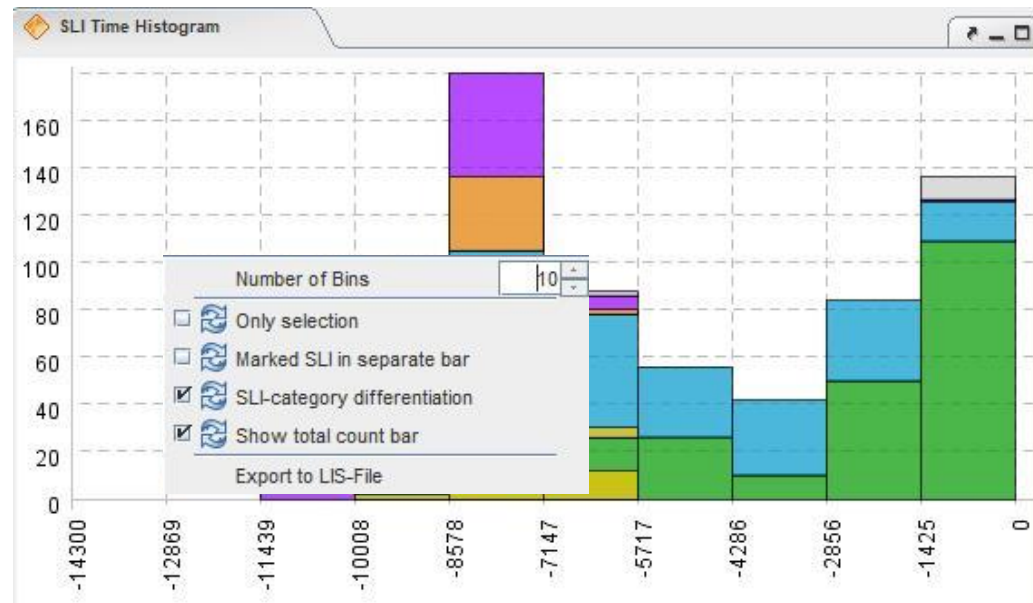
1.5 SLI Time Histogram



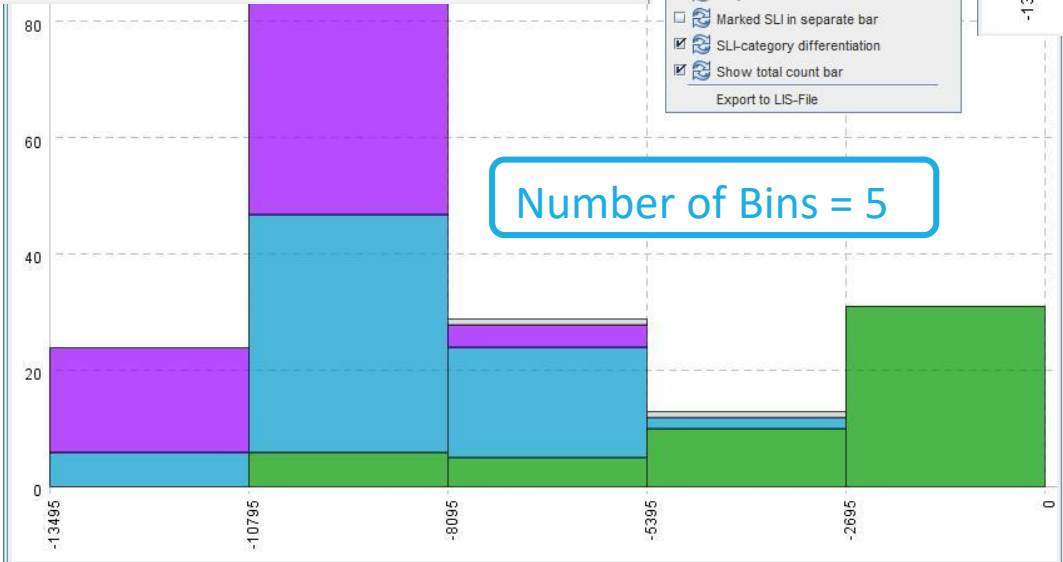
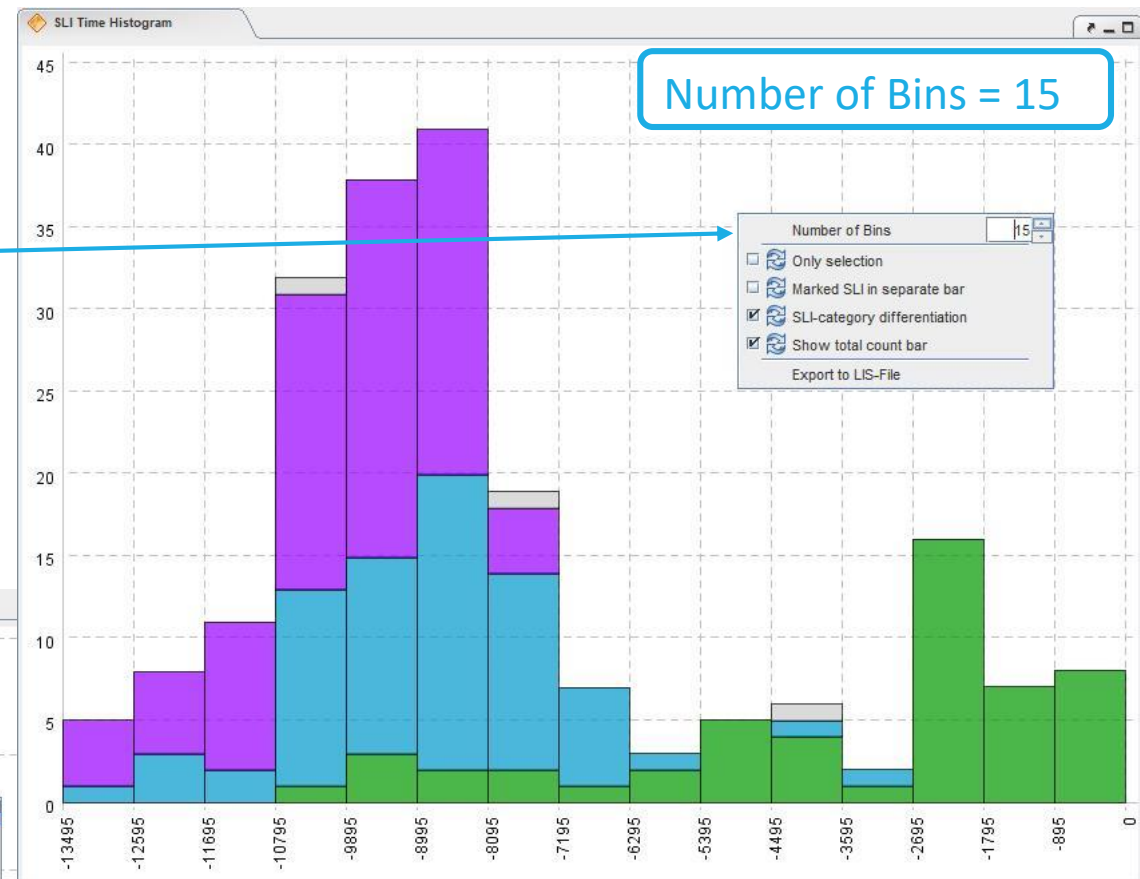
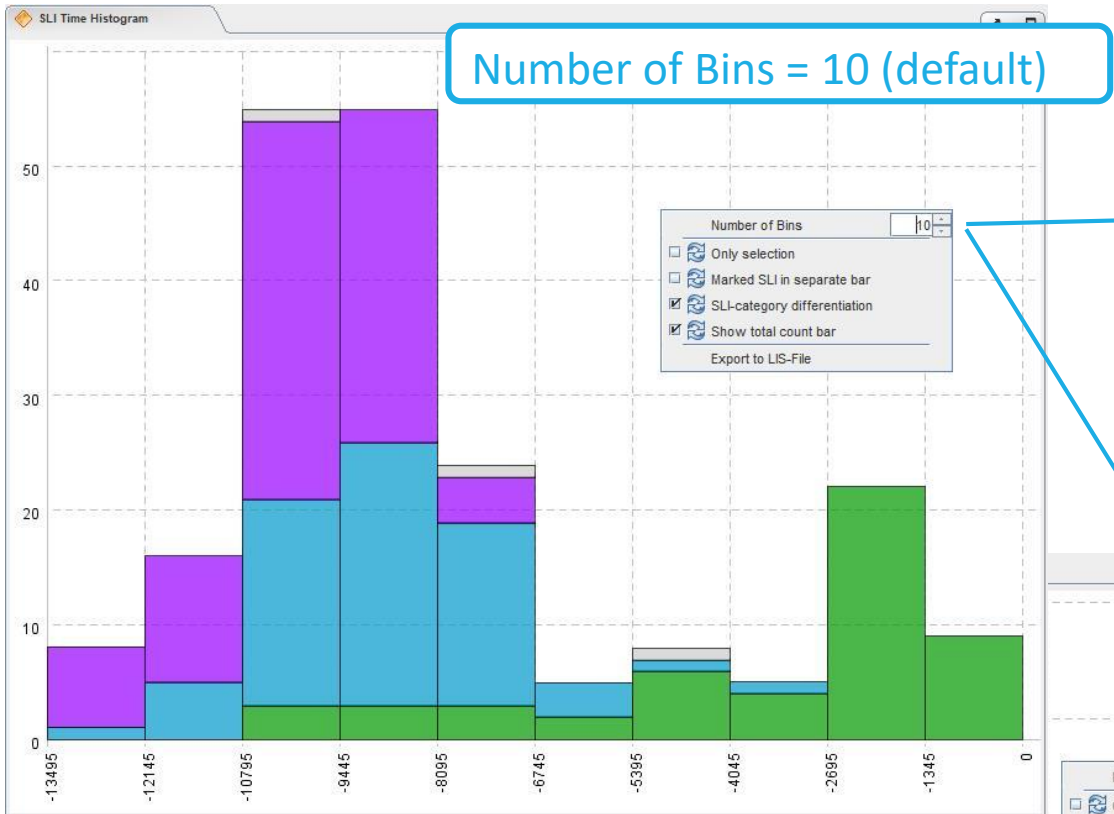
- Number of samples in a time interval grouped by type
- X: Time, Y: number
- yellow overlaid parts show the number of marked samples in the category/time interval



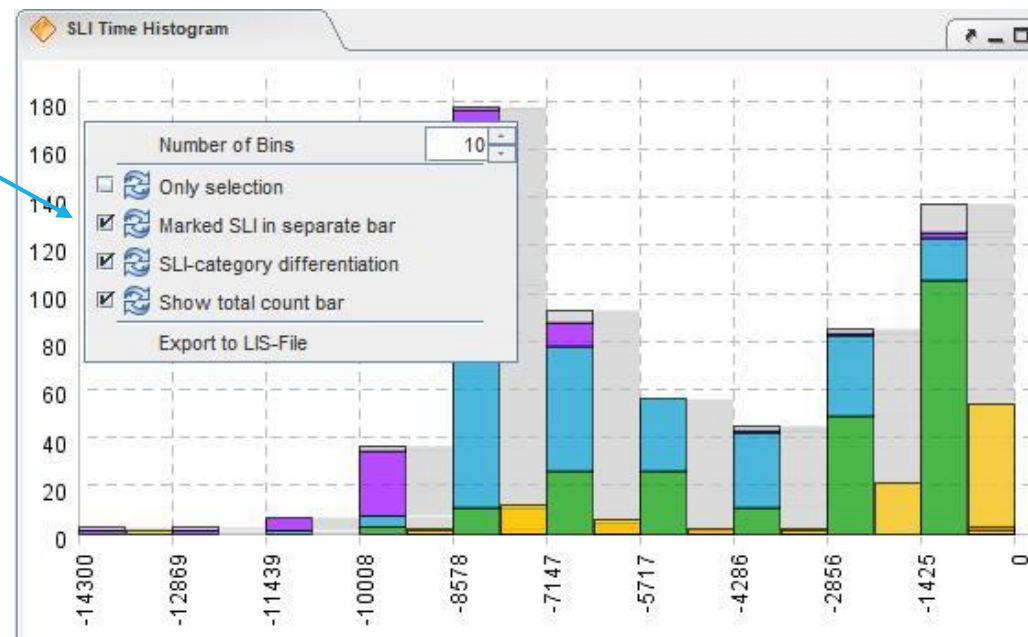
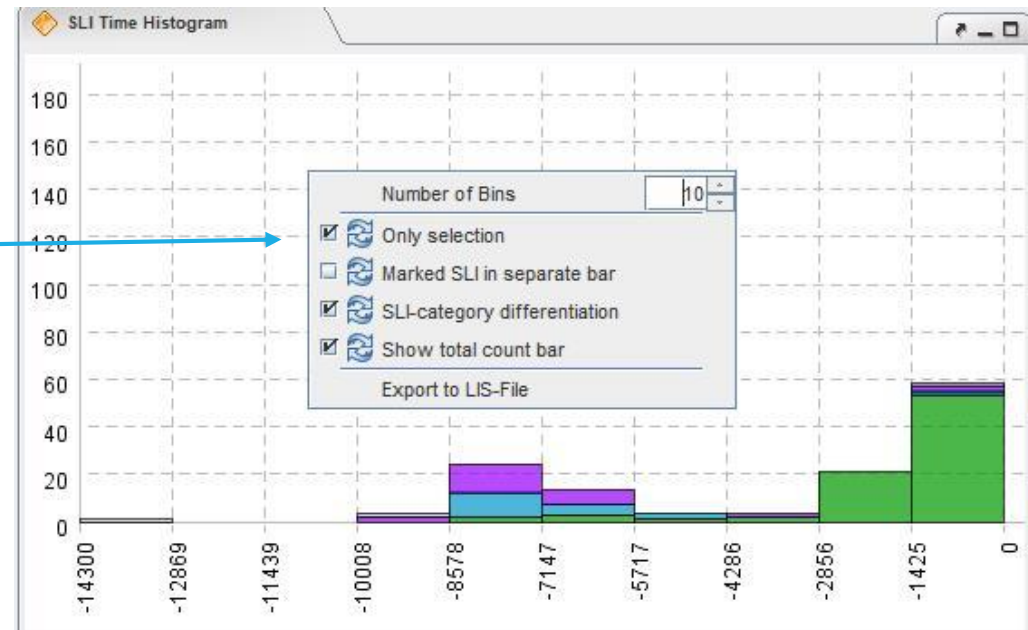
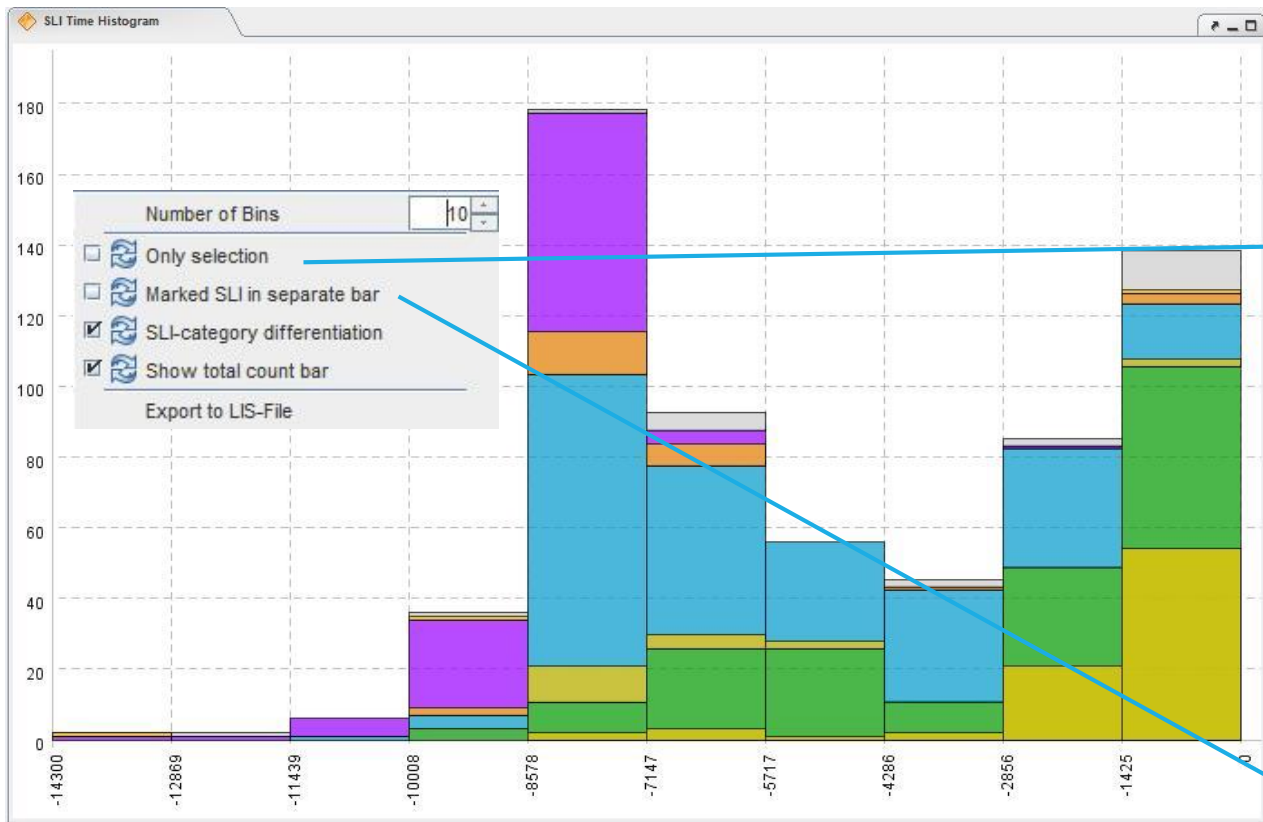
- A tooltip shows details about the category and the time interval by hovering the mouse over
- Selection of bins with click or ctrl + click



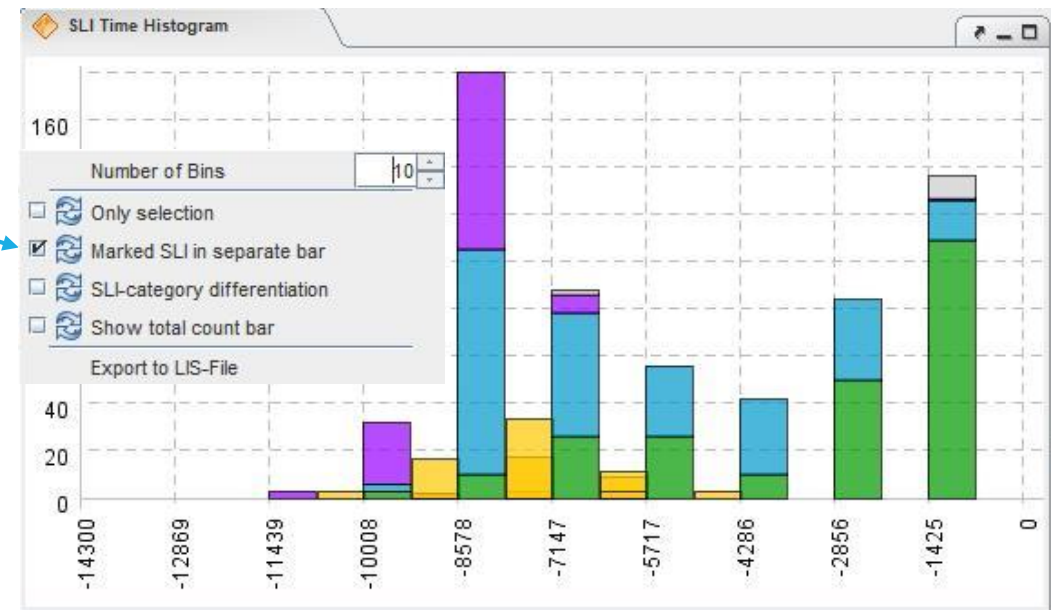
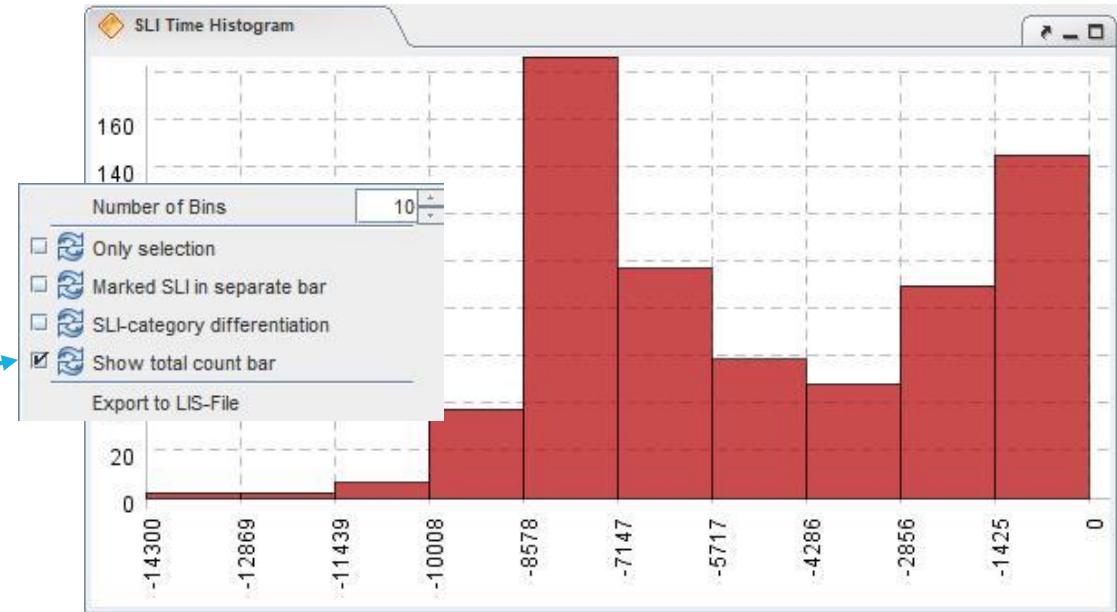
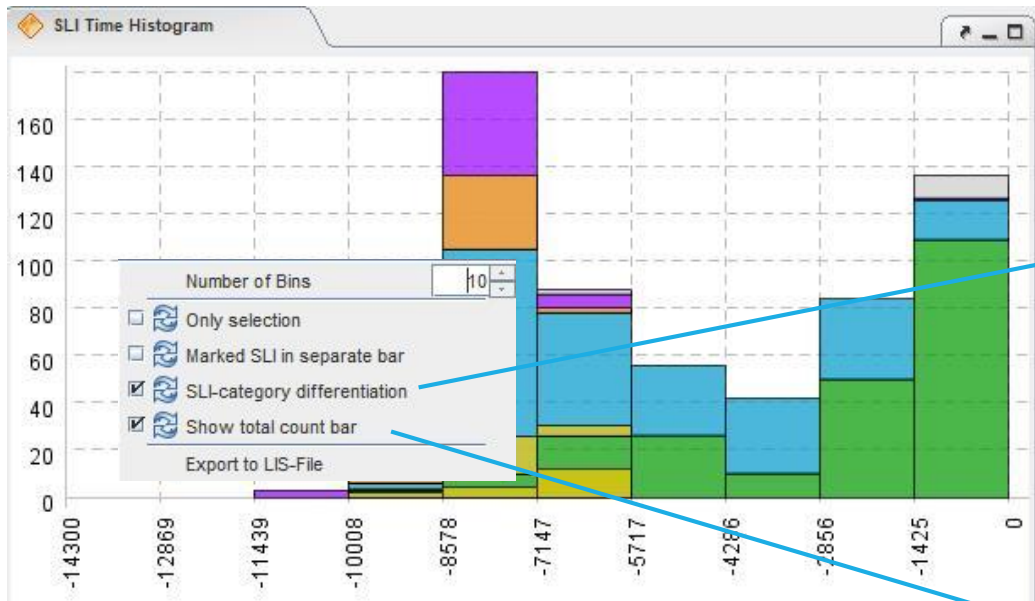
Right click opens the pop-up menu



The number of Bins can be adjusted from 1 to 30



- Check *Only selection* to see only marked SLIs in the histogram
- Check *Marked SLI in separate bar* to see the number of marked samples inside a time interval in a separate bar



- Unchecking *SLI-category differentiation* shows total count only
- Unchecking *Show total count bar* removes the grey separate bar (in combination with *marked SLI in separate bar*)
- *Export to LIS-File*: save the selected SLIs

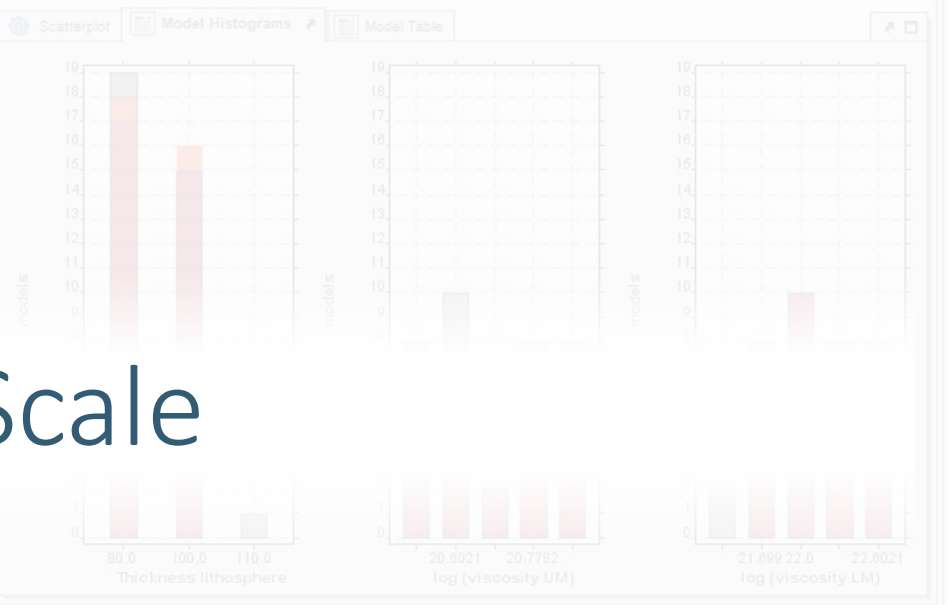
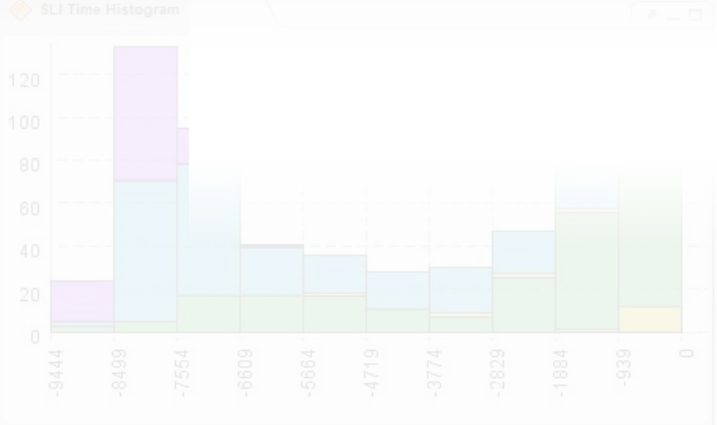
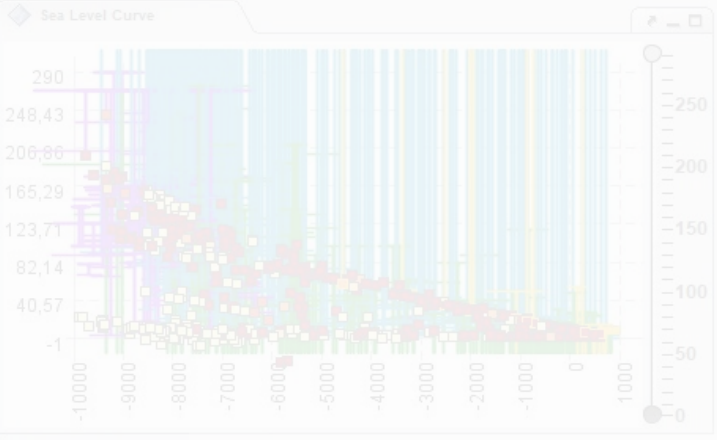
Lis Format for SLI Time Histogram:

```
Histo.lis x
1 #s visual_query = TimeHistogram
2 #s [sli_tables] table
3 dyke
4 #sdd [slis from histogram] SLIcode - bar_time_min - bar_time_max - category
5 DYKE-07363 -5.0 2371.0 upper
6 DYKE-05305 2371.0 4748.0 upper
7 DYKE-08990 4748.0 7124.0 lower
8 DYKE-08607 11877.0 14254.0 band
9 DYKE-06598 2371.0 4748.0 upper
10 DYKE-02665 9501.0 11877.0 band
11 DYKE-06028 2371.0 4748.0 upper
12 DYKE-08524 11877.0 14254.0 none
13 DYKE-03932 7124.0 9501.0 lower
14 DYKE-00433 9501.0 11877.0 upper
```



RSL categories: Edit Order

- upper
- lower
- band
- none



1.6 Time Scale

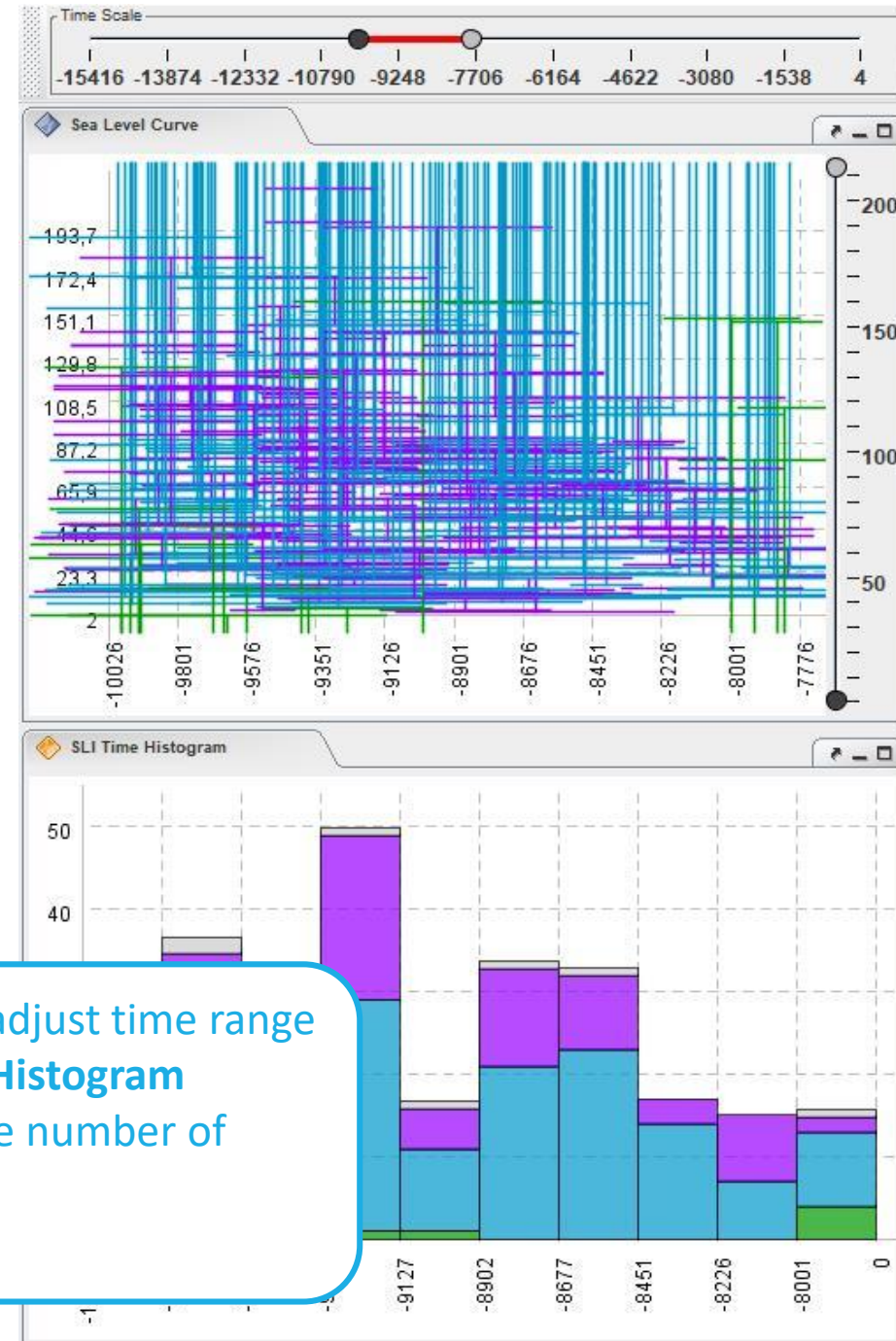
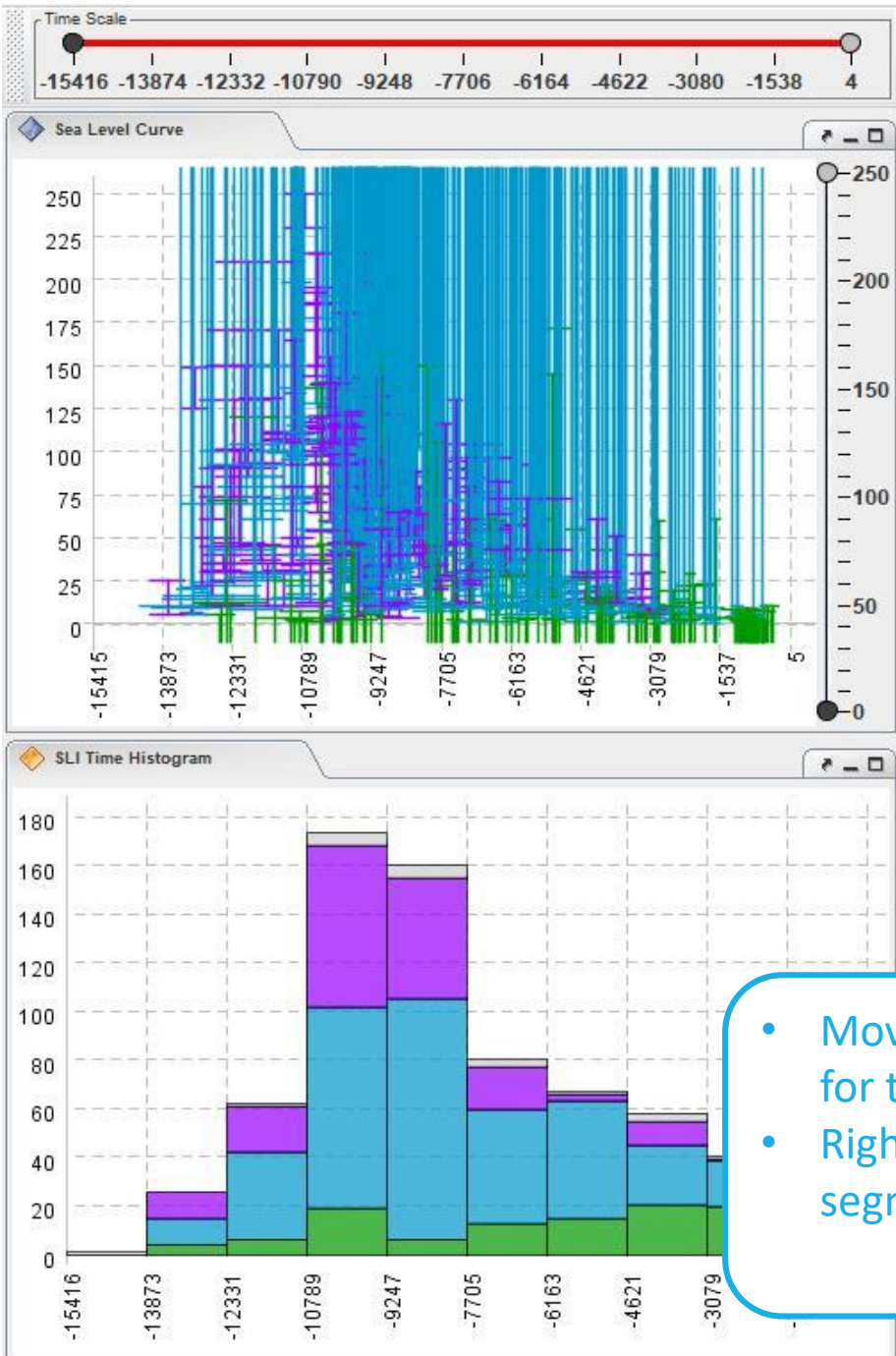


SLI Table

gid	tab_name	curve	default cate	lat
DYKE-05059	Hudson	Fort George, QC	lower	53,74
DYKE-05060	Hudson	Fort George, QC	band	53,35
DYKE-05061	Hudson	Fort George, QC	band	53,35
DYKE-05062	Hudson	Fort George, QC	lower	53,333
DYKE-05064	Hudson	Fort George, QC	band	53,333
DYKE-05065	Hudson	Fort George, QC	band	53,333
DYKE-05066	Hudson	Fort George, QC	lower	53,7
DYKE-05067	Hudson	Fort George, QC	lower	53,578
DYKE-05068	Hudson	Fort George, QC	lower	53,733
DYKE-05069	Hudson	Fort George, QC	lower	53,758
DYKE-05070	Hudson	Fort George, QC	lower	53,467
DYKE-05071	Hudson	Fort George, QC	lower	53,747

Multiple Table Selection WHERE Invert Selection Start Query

- SLI Hierarchy
- Devon [0 / 0 / 232]
 - Ellef Ringnes [0 / 0 / 7]
 - Ellesmere [0 / 0 / 732]
 - Greenland E [0 / 0 / 189]
 - Greenland NE [0 / 0 / 112]
 - Greenland NW [0 / 0 / 131]
 - Greenland SW [0 / 0 / 311]
 - Hudson [20 / 657 / 657]
 - King William [0 / 0 / 6]
 - Labrador [0 / 0 / 276]
 - Lougheed [0 / 0 / 7]
 - Mackenzie E [0 / 0 / 139]
 - Mackenzie W [0 / 0 / 104]
 - Melville I [0 / 0 / 59]
 - Melville P [0 / 0 / 95]



interval settings

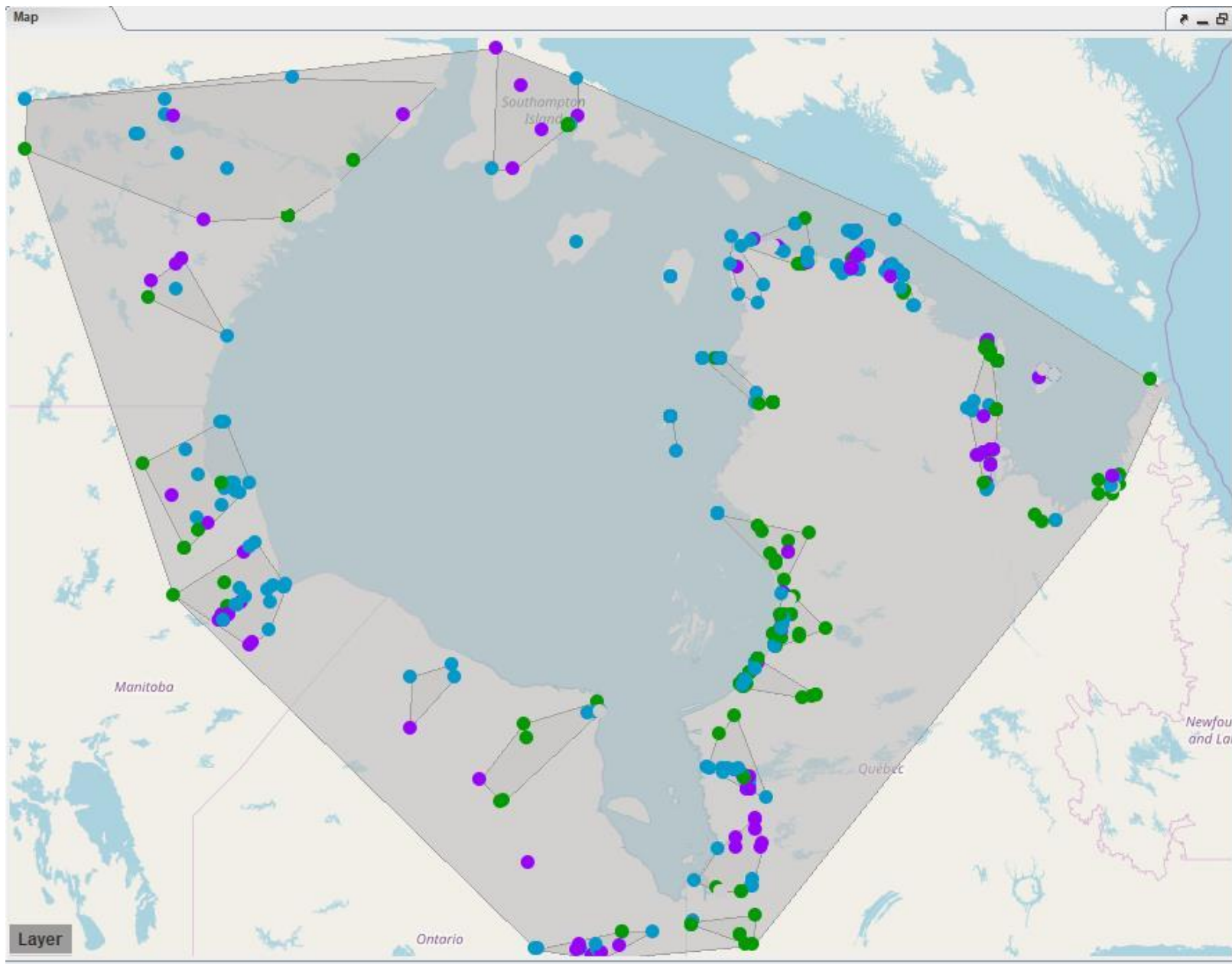
segments: 10

Close

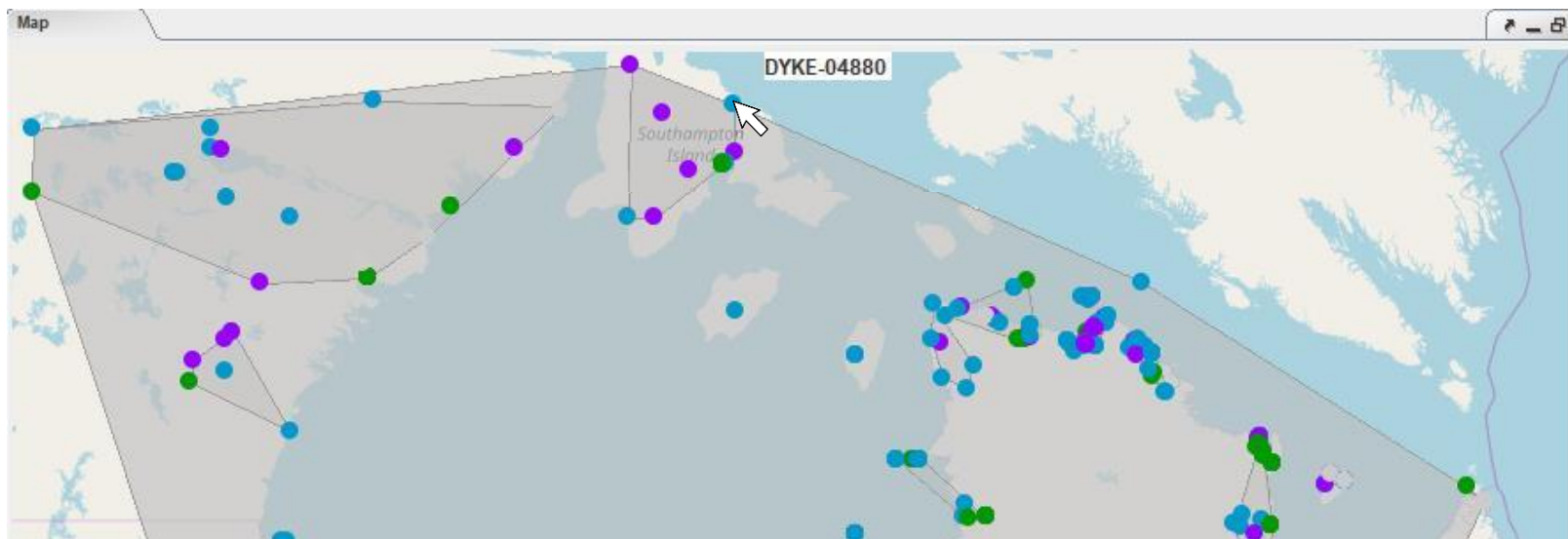
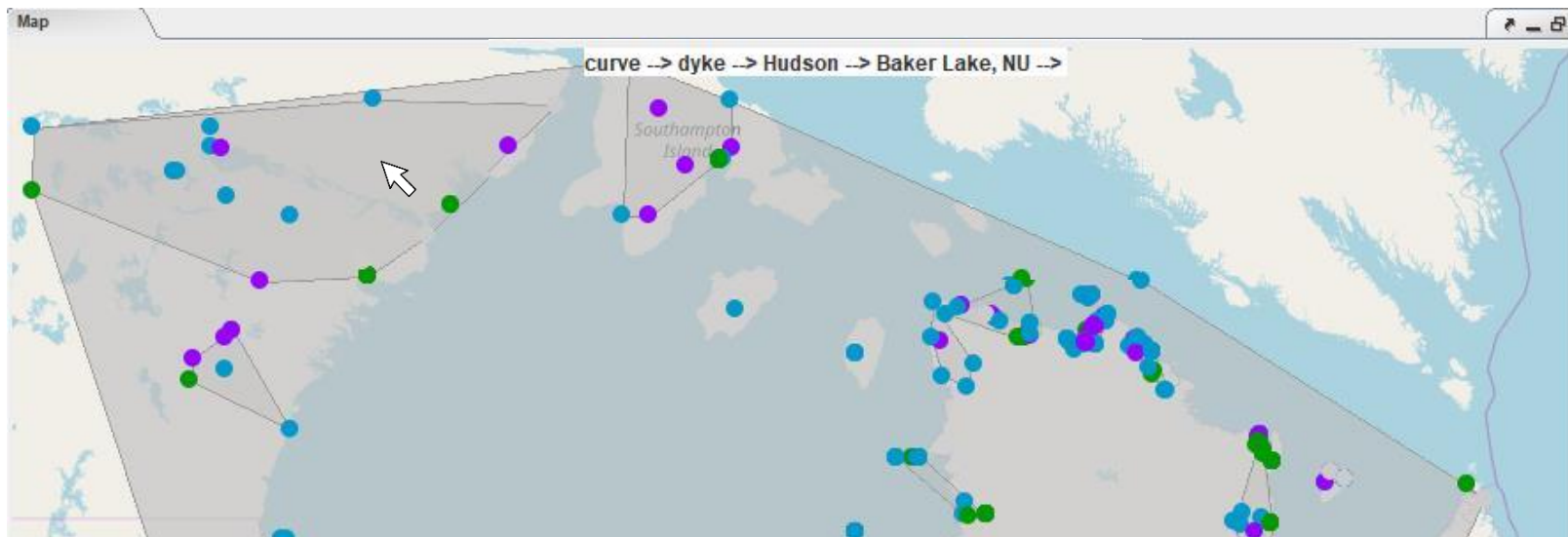
- Move the sliders in the **Time Scale** to adjust time range for the **Sea Level Curve** and the **Time Histogram**
- Right click opens a menu to change the number of segments



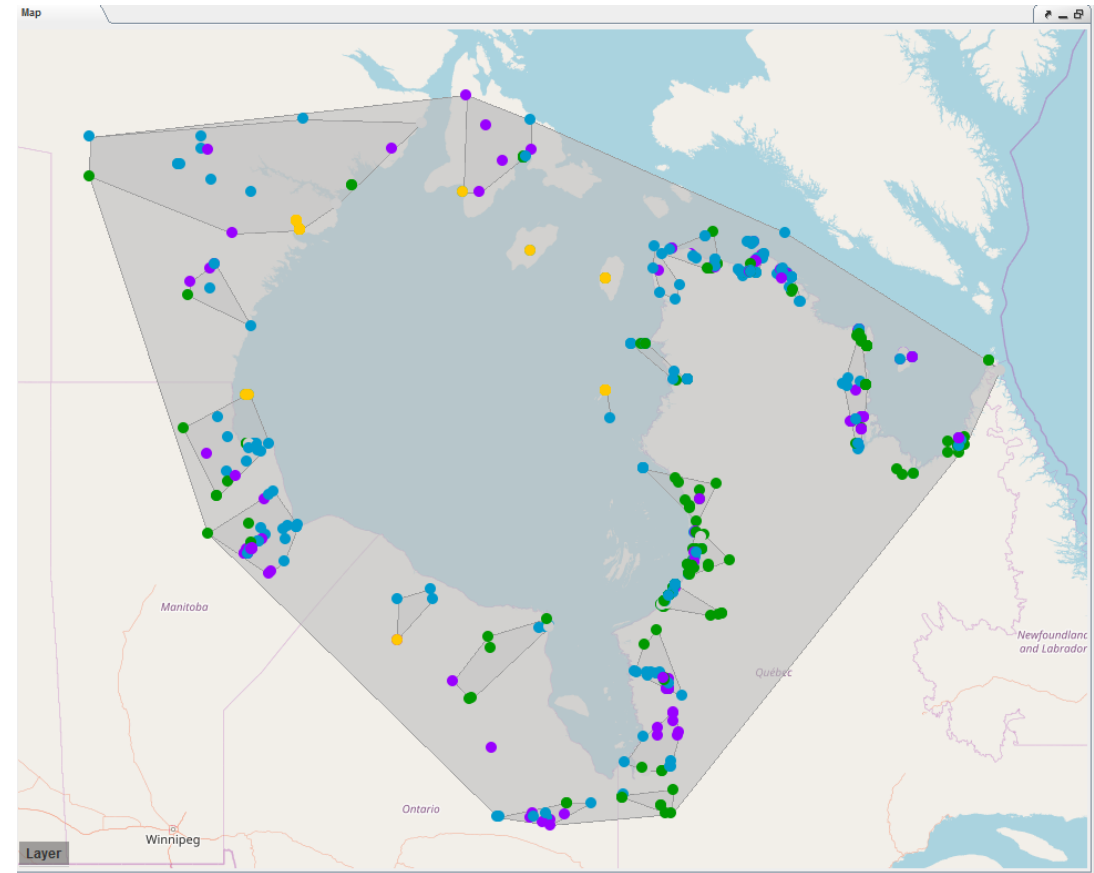
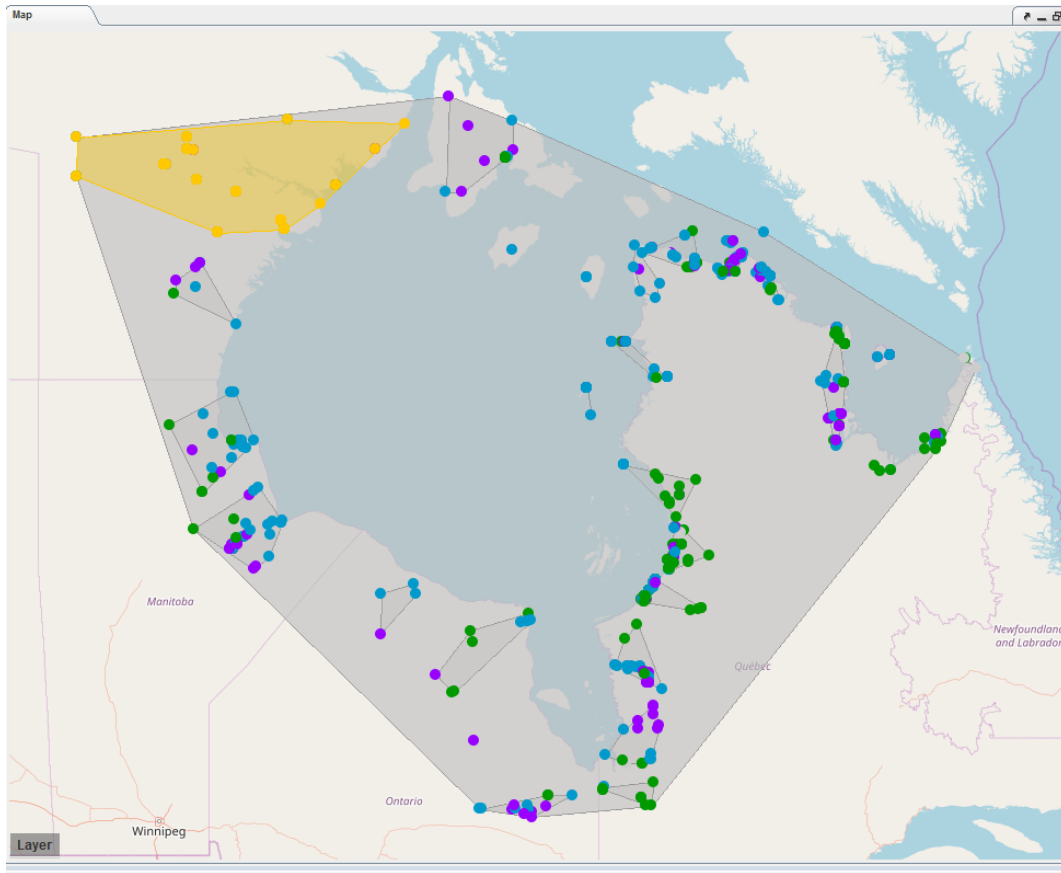
1.7 Map



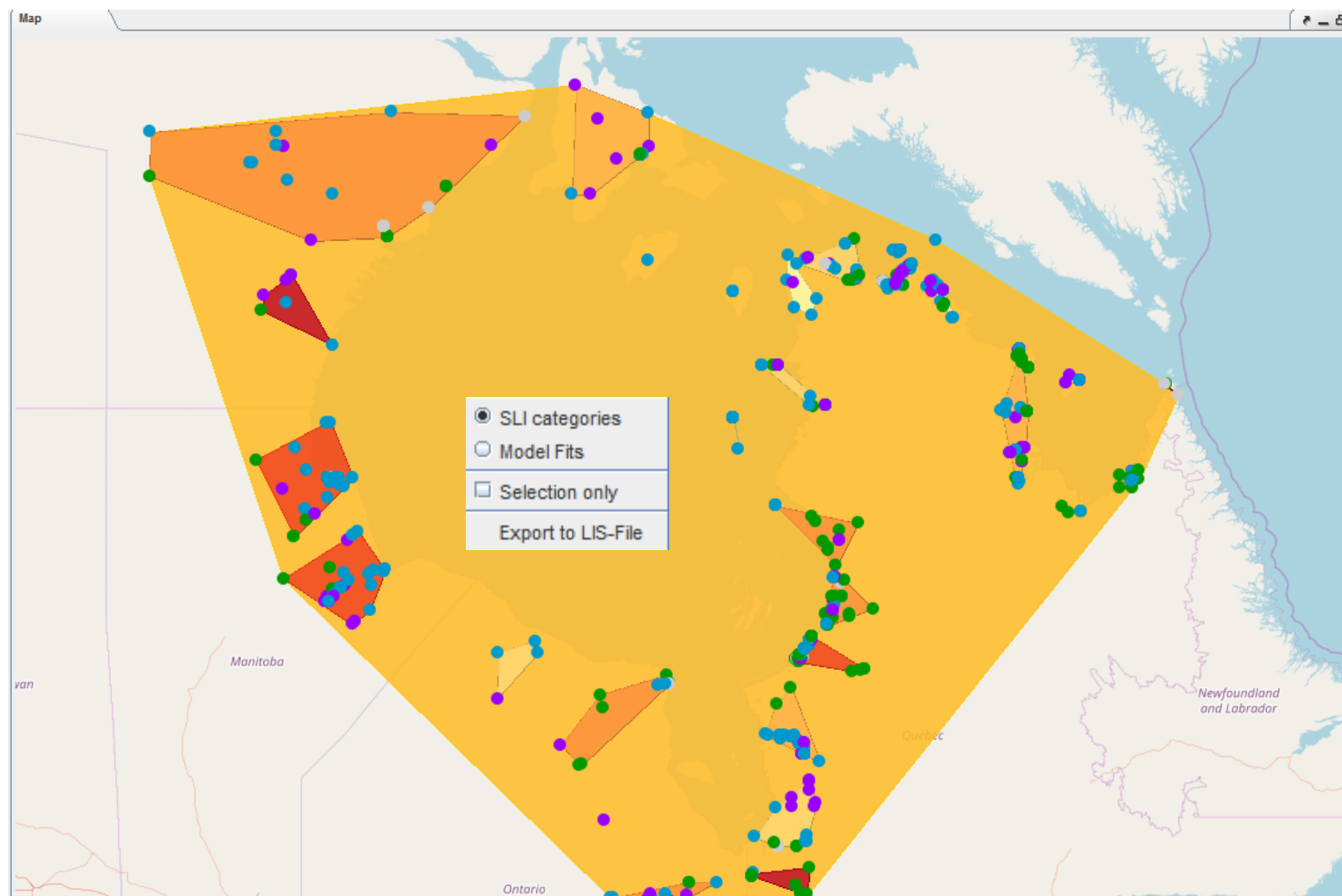
Spatial distribution of samples and sample groups



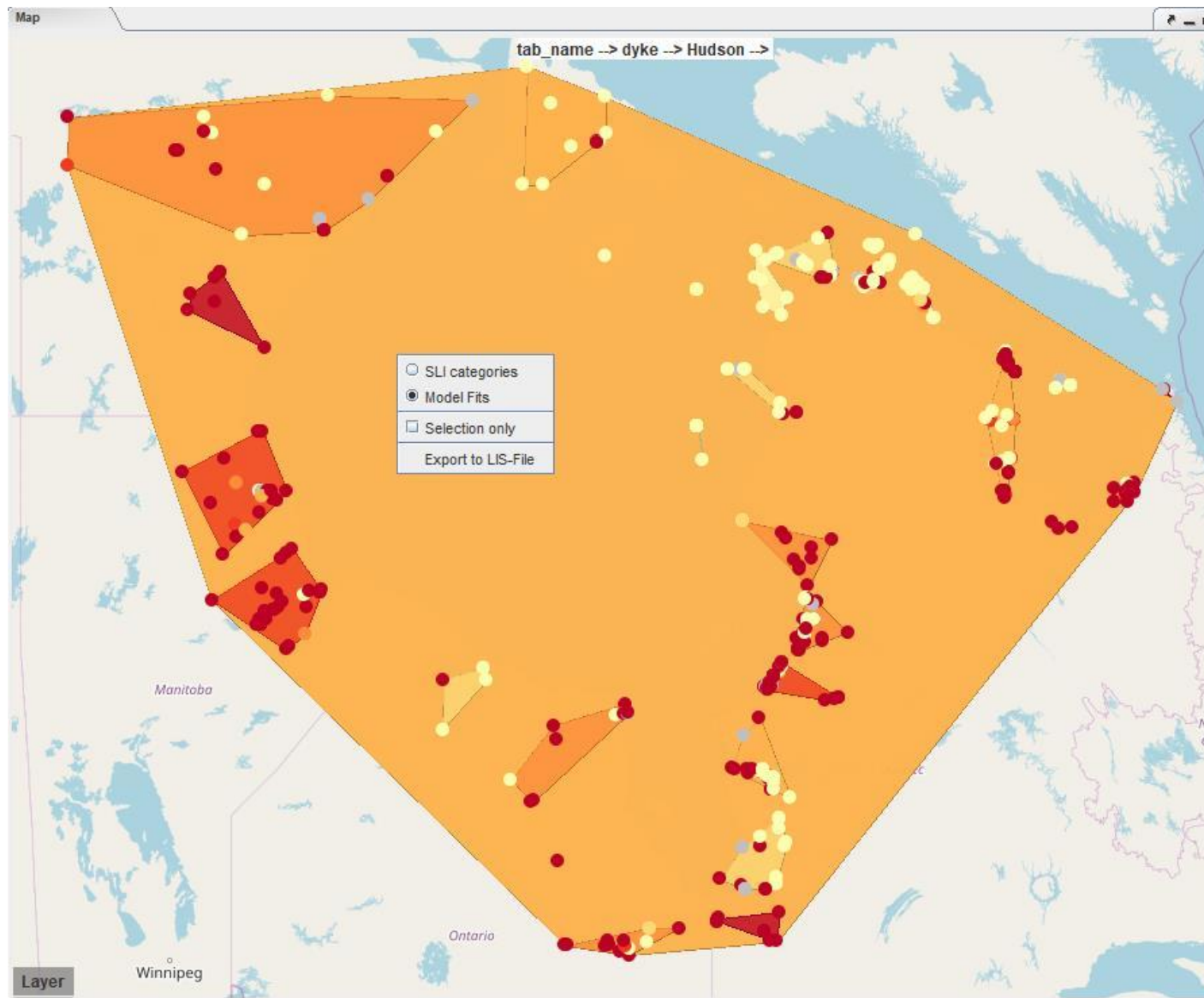
- The name of a SLI or curve is shown at the top by hovering over it with the mouse
- "Grab" the map with the left mouse button to pan it
- Zooming is possible with the mouse wheel



- select a (sub)region by clicking in the polygon
- or select single SLIs by clicking (ctrl + click adds SLI to selection)



- After reading in model data, the layers for regions will have the average fit color ([see Fitscale](#))
- SLI points keep their category color
- to see their goodness of fit color select *Model Fits* from the pop-up menu (right click)
- on selection of indicators in **SLI Table**, the fit is not adjusted here, but depends on the SLIs existing in the table



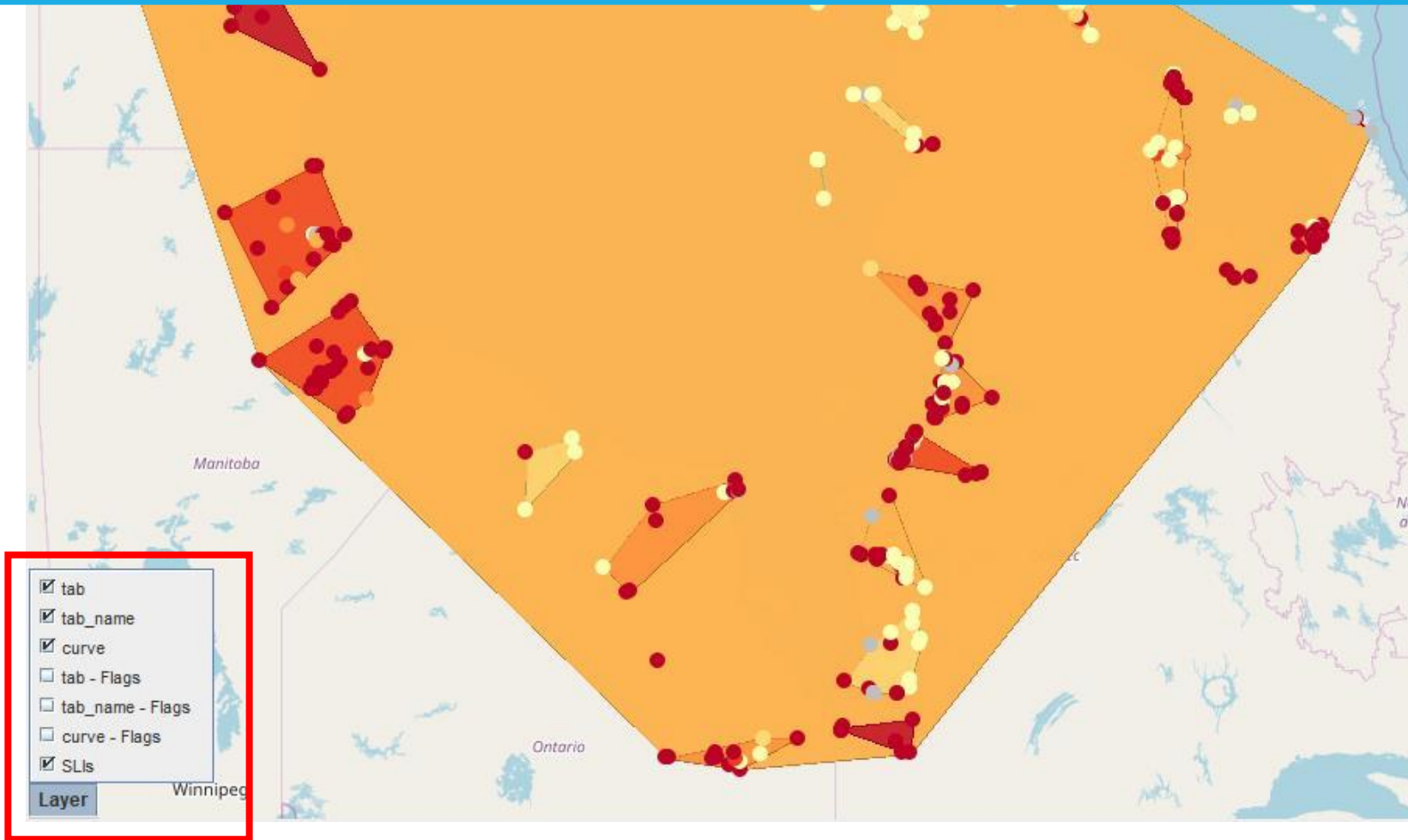
- Check *Selection only* to see only marked SLIs
- Chose *Export to LIS-File* to save the selected SLIs

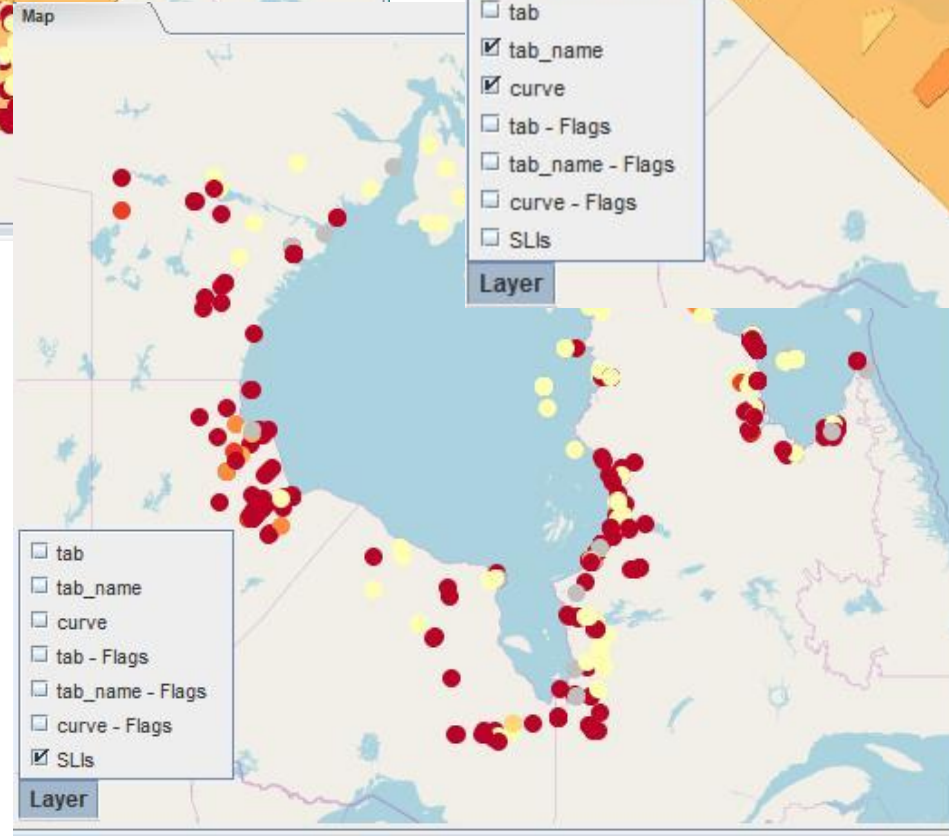
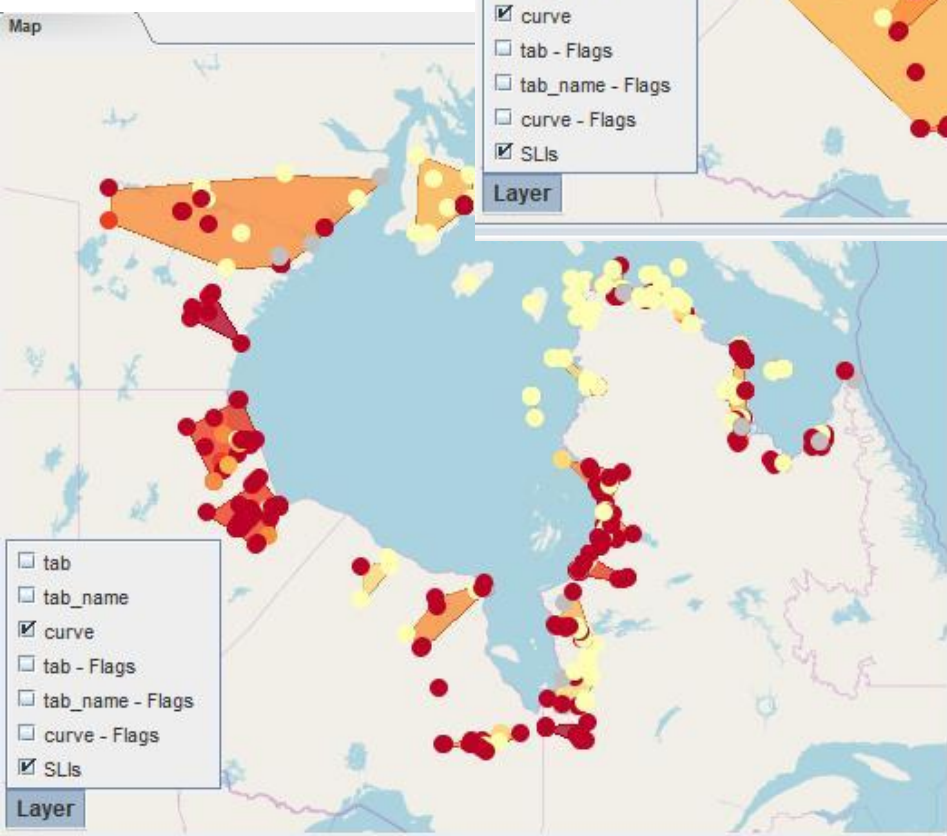
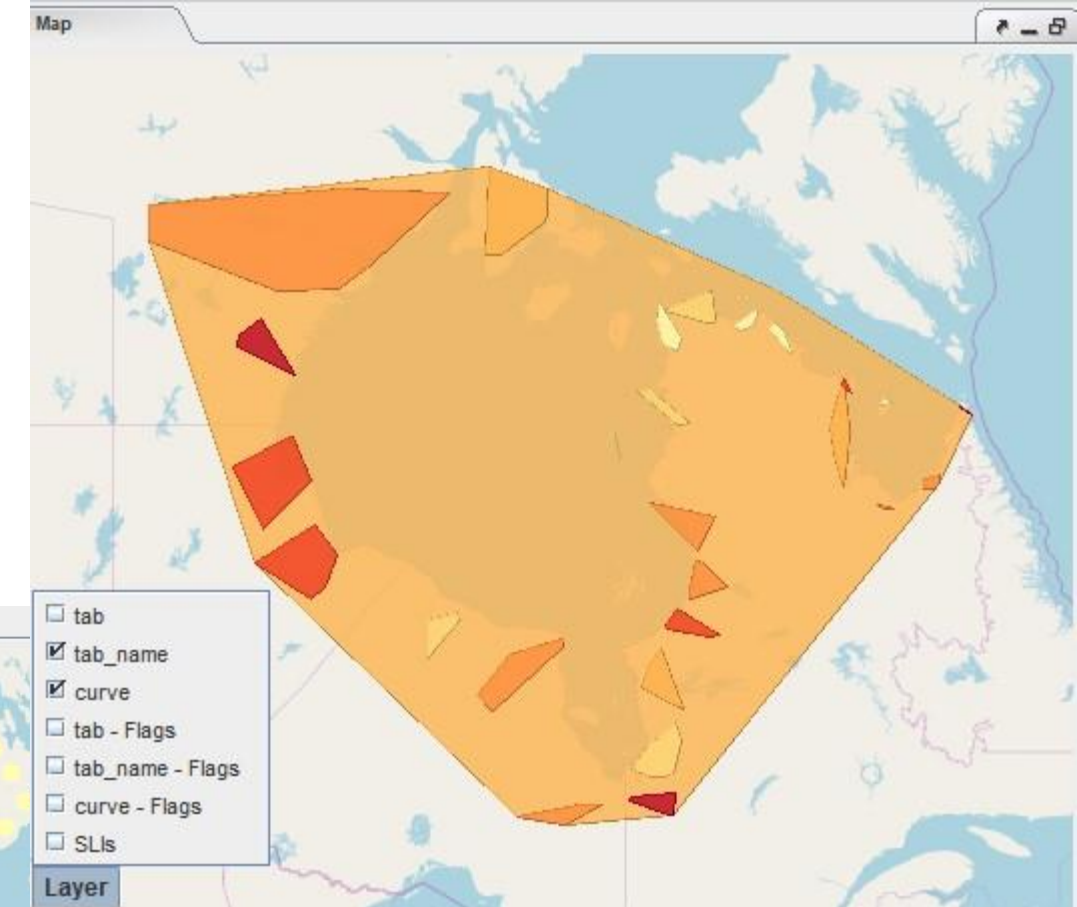
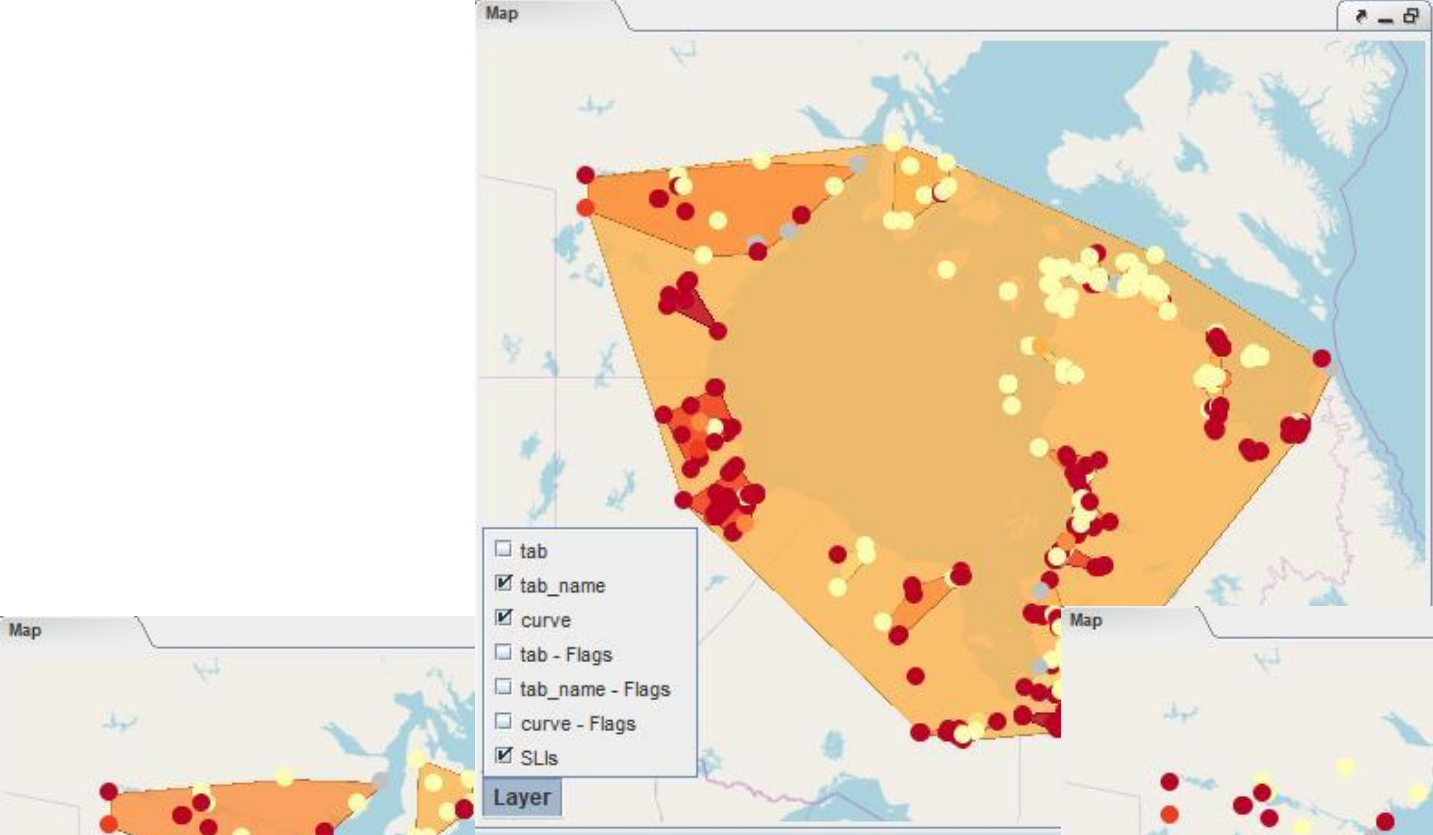
Lis Format for Map:

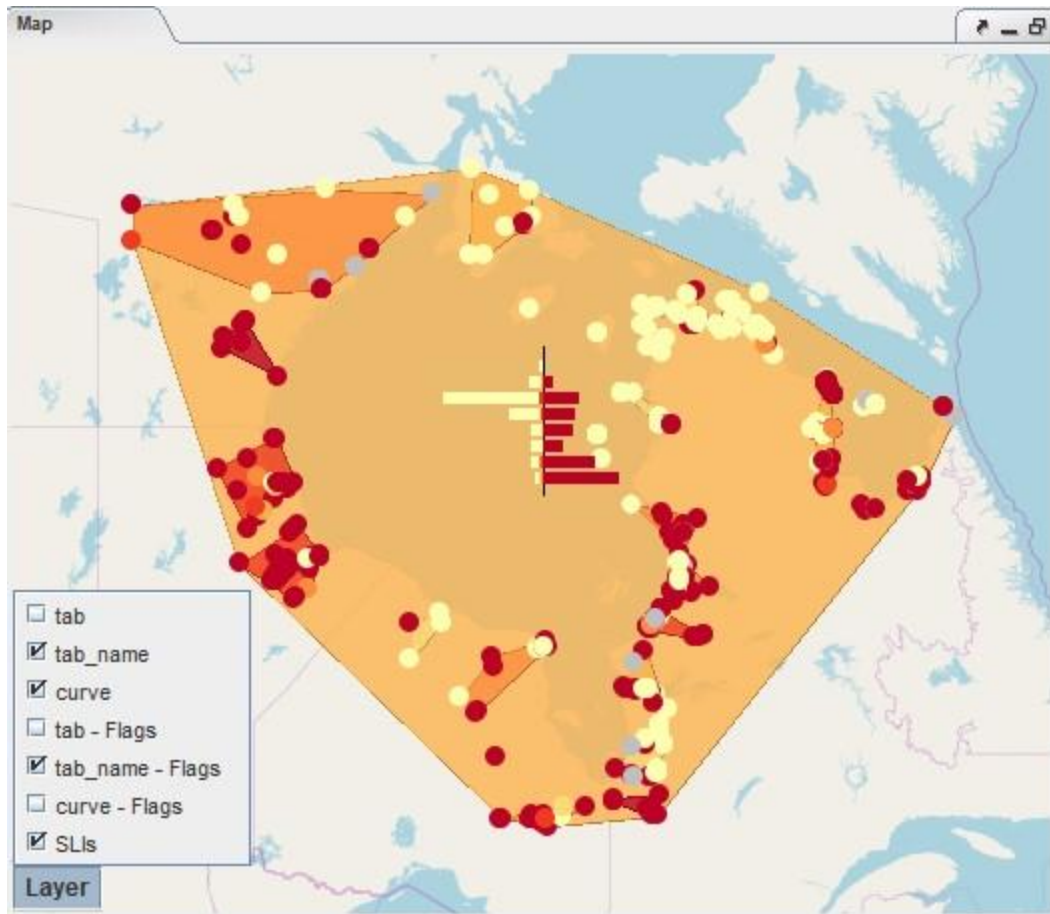
```
Map.lis x
1 #s visual_query = Map
2 #s [sli_tables] table
3 dyke
4 #sdddd [slis for map] SLIcode - lat - lon - tab name:curve - fit L100 1010 - fit L100 1030
5 DYKE-00664 66.1417007446289 -65.7249984741211 Baffin E:Pangnirtung F, Baffin I, NU 1.0 1.0
6 DYKE-00013 71.3167037963867 -156.567001342773 Alaska N:Pt Barrow, AK 1.0 1.0
7 DYKE-00018 71.38330078125 -156.483001708984 Alaska N:Pt Barrow, AK 1.0 1.0
8 DYKE-00109 67.1667022705078 -163.5 Alaska N:Kotzebue Sound, AK 1.0 1.0
9 DYKE-00032 71.25 -156.75 Alaska N:Pt Barrow, AK 1.0 1.0
10 DYKE-00114 67.1667022705078 -163.5 Alaska N:Kotzebue Sound, AK 1.0 1.0
```

model fit
(only if at least one model is selected)

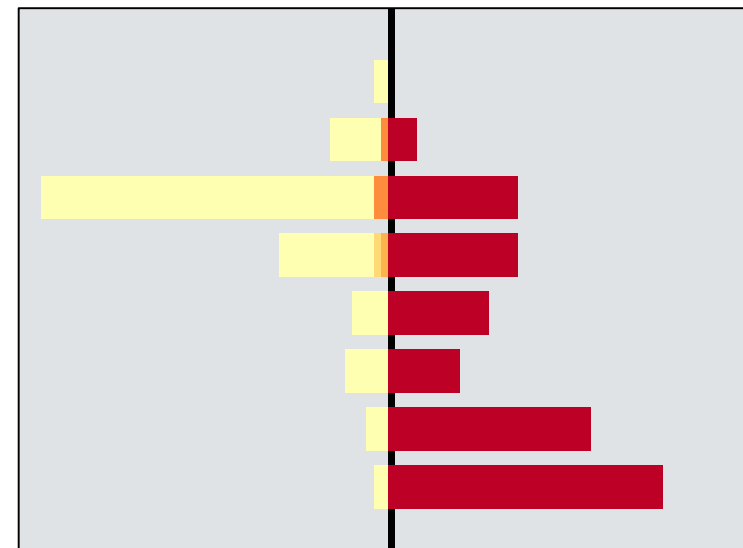
- Click on Layer in the lower left corner to open the layers menu
- *tab*: Polygons for the tables (SQL-Table)
- *tab_name*: Polygons for the regions (*tab_name*)
- *curve*: Polygons for the subregions (*curve*)
- *flags*: show goodness of fit histogram
- SLIs: SLI points







Time from past to present



- color = goodness of fit
- length = number of SLIs in time interval

2. Exploration of Model Data

Slivisu - \new workspace

Program

Workspace

- Save Selection...
- SLI attributes
- Import Model Data
- Database Connection
- Exit

Sample Categories

Edit Order

upper lower band none

Model Explorer

Fit Scale

1-Norm

0,000 0,200 0,400 0,600 0,800 1,000 1,200

Edit

Scatterplot Matrix 3D Scatterplot Scatterplot Model Histograms Model Table

Load LIS-File

Suchen in: fuzzy - duplicated parameters

0_2025 L80_3040 L100_1010 L100_2025 L100_3040 out.lis

0_2030 L80_4010 L100_1020 L100_2030 L100_4010

0_2040 L80_4020 L100_1030 L100_2040 L100_4020

0_3010 L80_4030 L100_1040 L100_3010 L100_4030

0_3020 L80_4040 L100_2010 L100_3020 L100_4040

0_3030 L80_-vm2 L100_2020 L100_3030 L100_-vm2

Dateiname: out.lis

Dateityp: LIS-File

Load LIS-File Abbrechen

SLI Time Histogram

SLI Hierarchy

dyke [0 / 299 / 8865]

Alaska N [0 / 0 / 129]

Amund Ringnes [0 / 0 / 12]

Axel Heiberg [0 / 0 / 67]

Baffin E [0 / 0 / 117]

Baffin NE [0 / 0 / 79]

Baffin NW [0 / 0 / 465]

Baffin S [0 / 0 / 208]

Baffin W [0 / 0 / 16]

Banks [0 / 0 / 30]

Bathurst I [0 / 0 / 56]

Boothia [0 / 0 / 30]

British Columbia [0 / 0 / 942]

Map

Layer

Import models into database - processed model: L100_1040

WHERE

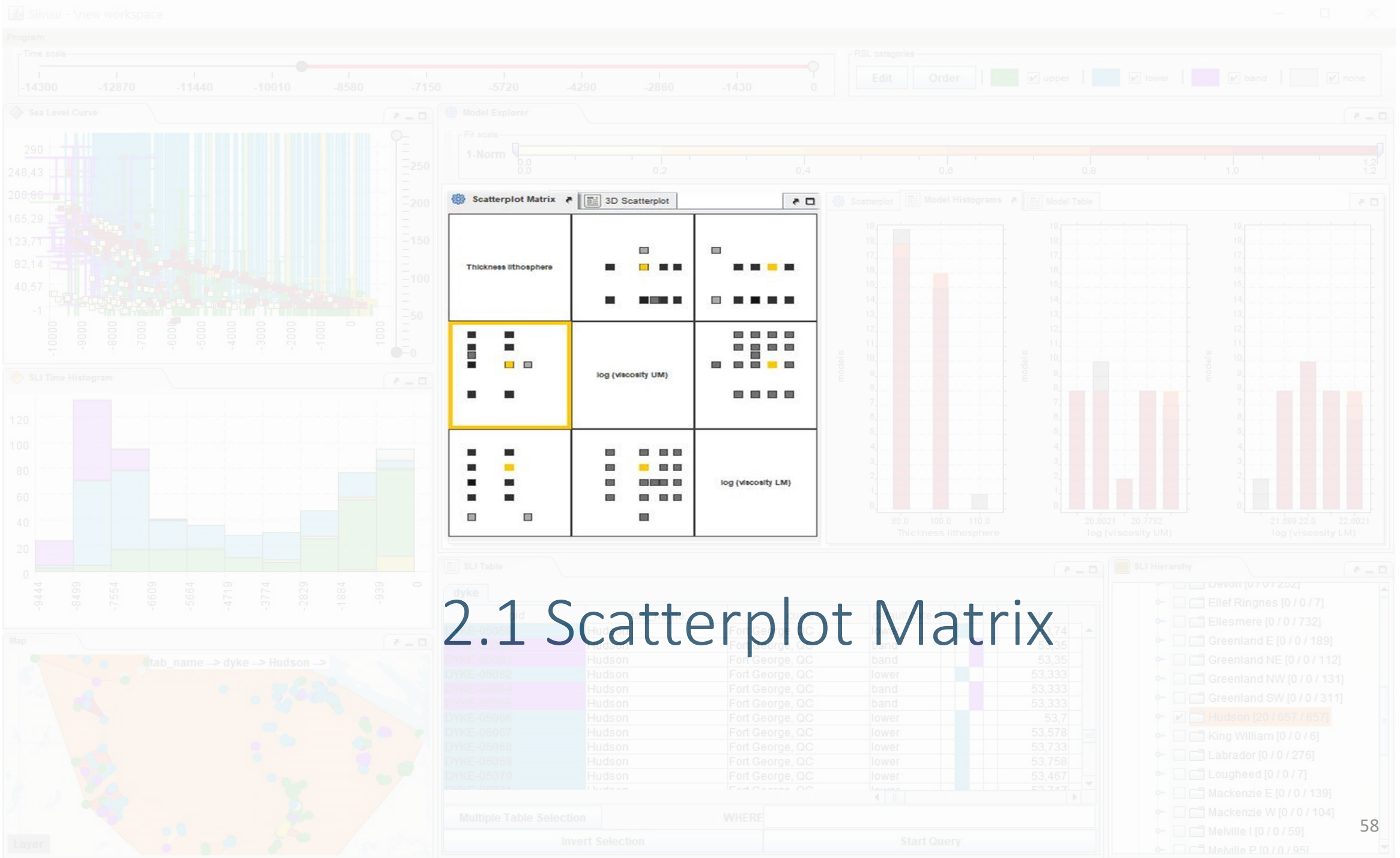
Invert Selection Start Query

Table:

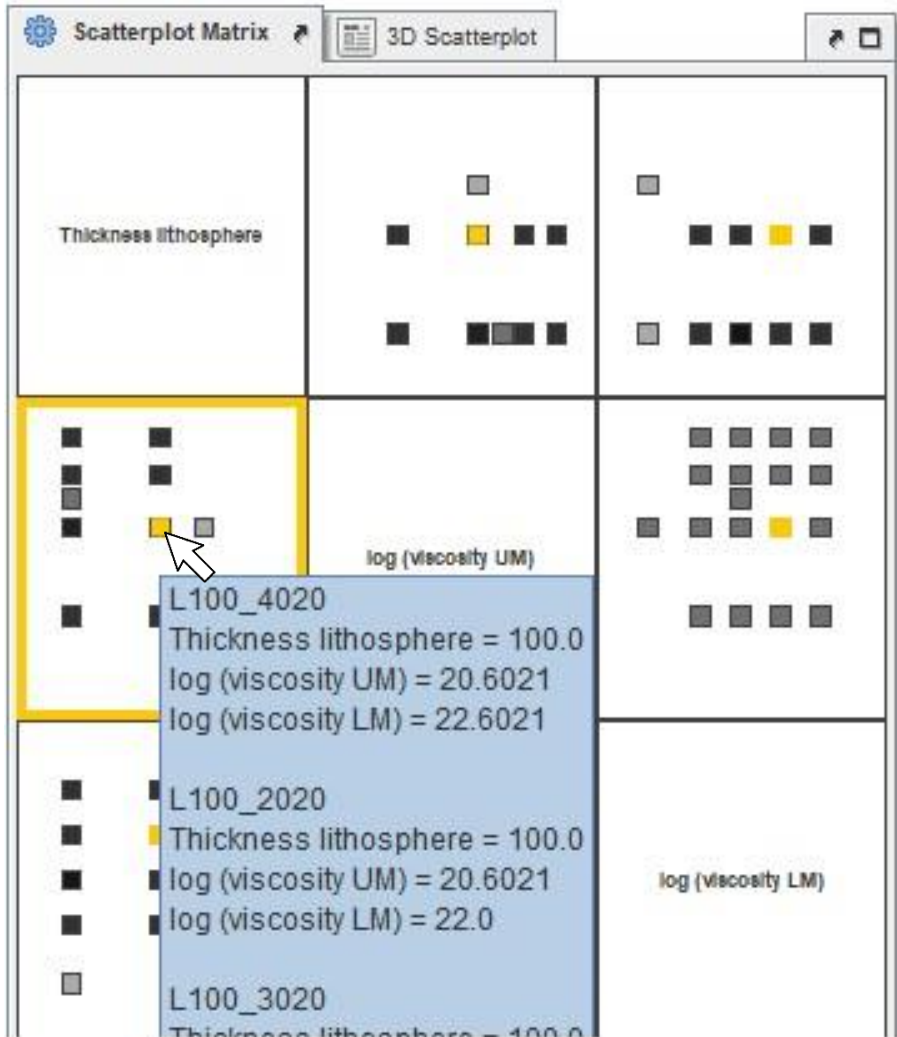
ID	Region	Category	Value
DYKE-00136	Alaska SW	Sitkinak I, Aleutians, AK	lower
DYKE-00138	Alaska SW	Anangula I, Aleutians, AK	upper
DYKE-00139	Alaska SW	Anangula I, Aleutians, AK	upper
DYKE-00140	Alaska SW	Anangula I, Aleutians, AK	upper
DYKE-00141	Alaska SW	Anangula I, Aleutians, AK	upper
DYKE-00142	Alaska SW	Anangula I, Aleutians, AK	upper
DYKE-00143	Alaska SW	Anangula I, Aleutians, AK	upper
DYKE-00144	Alaska SW	Anangula I, Aleutians, AK	upper
DYKE-00145	Alaska SW	Anangula I, Aleutians, AK	upper
DYKE-00146	Alaska SW	Anangula I, Aleutians, AK	upper
DYKE-00147	Alaska SW	Anangula I, Aleutians, AK	upper
DYKE-00148	Alaska SW	Anangula I, Aleutians, AK	upper

To load a model data file

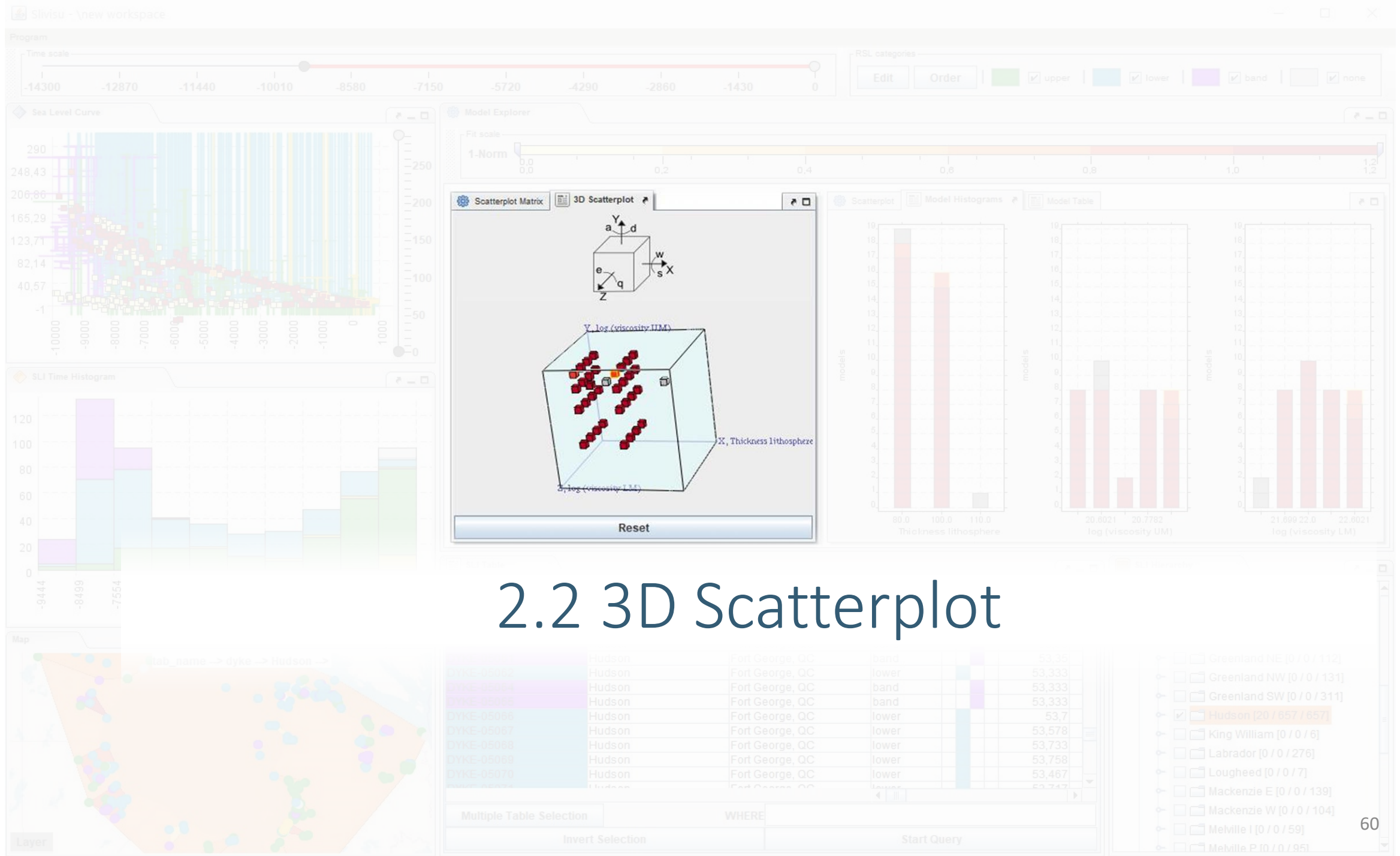
- click on *Program* → *Import Model Data*
- (s. Model Data)
- select the file from the menu
- click on *Load LIS-File*
- while the file is loading the status is shown in the status bar below



2.1 Scatterplot Matrix



- A Scatterplot Matrix for the model parameters
- Moving the mouse over an instance shows details as tool tip



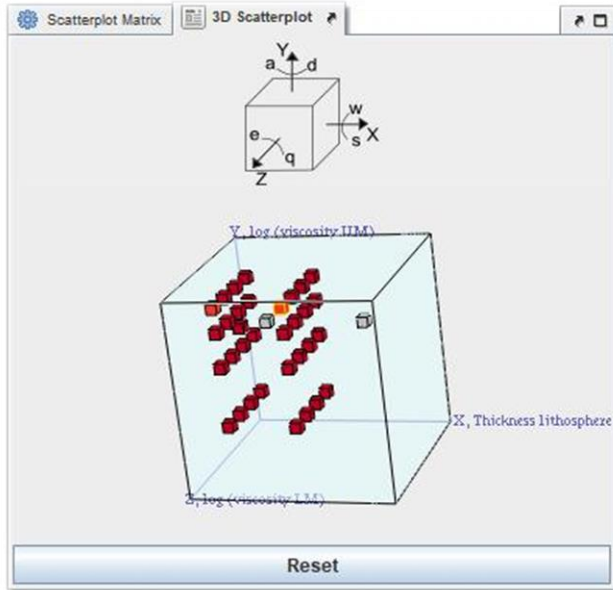
2.2 3D Scatterplot

DYKE-05061	Hudson	Fort George, QC	band	53,335
DYKE-05062	Hudson	Fort George, QC	lower	53,333
DYKE-05064	Hudson	Fort George, QC	band	53,333
DYKE-05065	Hudson	Fort George, QC	band	53,333
DYKE-05066	Hudson	Fort George, QC	lower	53,7
DYKE-05067	Hudson	Fort George, QC	lower	53,578
DYKE-05068	Hudson	Fort George, QC	lower	53,733
DYKE-05069	Hudson	Fort George, QC	lower	53,758
DYKE-05070	Hudson	Fort George, QC	lower	53,467
DYKE-05071	Hudson	Fort George, QC	lower	53,747

Multiple Table Selection WHERE

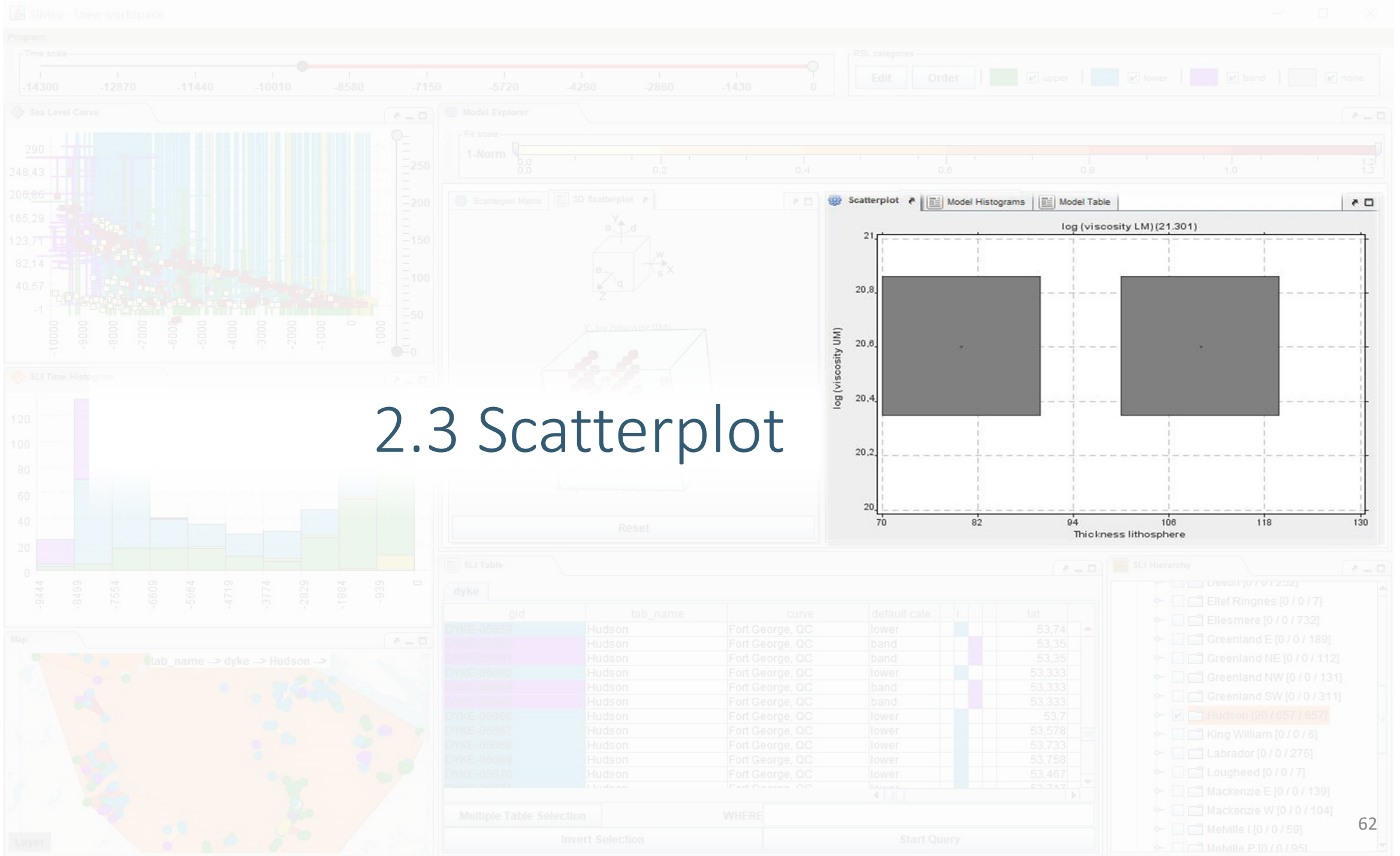
Invert Selection Start Query

- Greenland NE [0 / 0 / 112]
- Greenland NW [0 / 0 / 131]
- Greenland SW [0 / 0 / 311]
- Hudson [20 / 657 / 657]
- King William [0 / 0 / 6]
- Labrador [0 / 0 / 276]
- Loughheed [0 / 0 / 7]
- Mackenzie E [0 / 0 / 139]
- Mackenzie W [0 / 0 / 104]
- Melville I [0 / 0 / 59]
- Melville P [0 / 0 / 95]

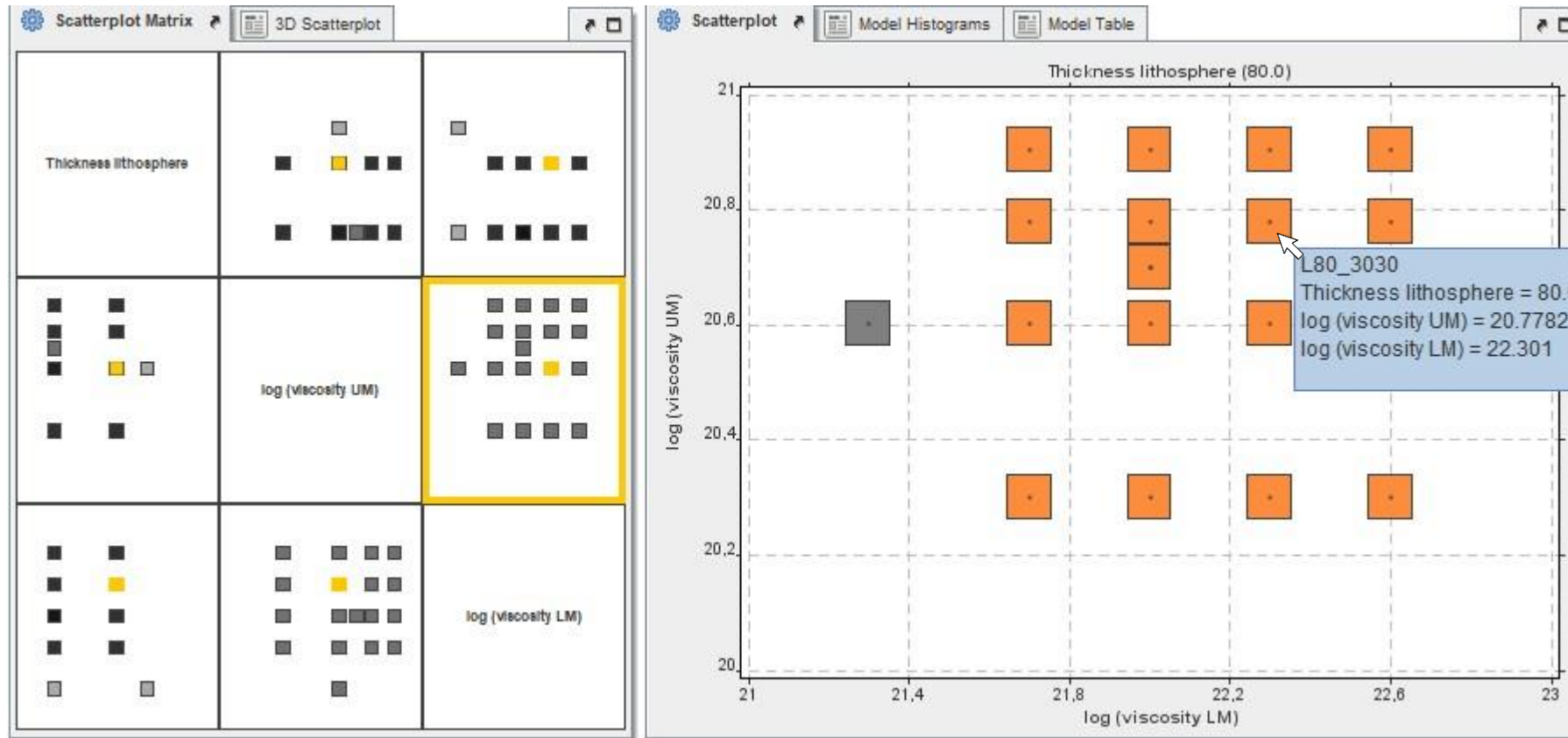


3D Scatterplot

- Axes: model parameters
- Cubes: model instances
- Cube color: aggregated goodness of fit
- Turn the cube with the keyboard as shown in the graphic above (or with the mouse, X-Axis only)
- *Reset* brings the cube back in the default position

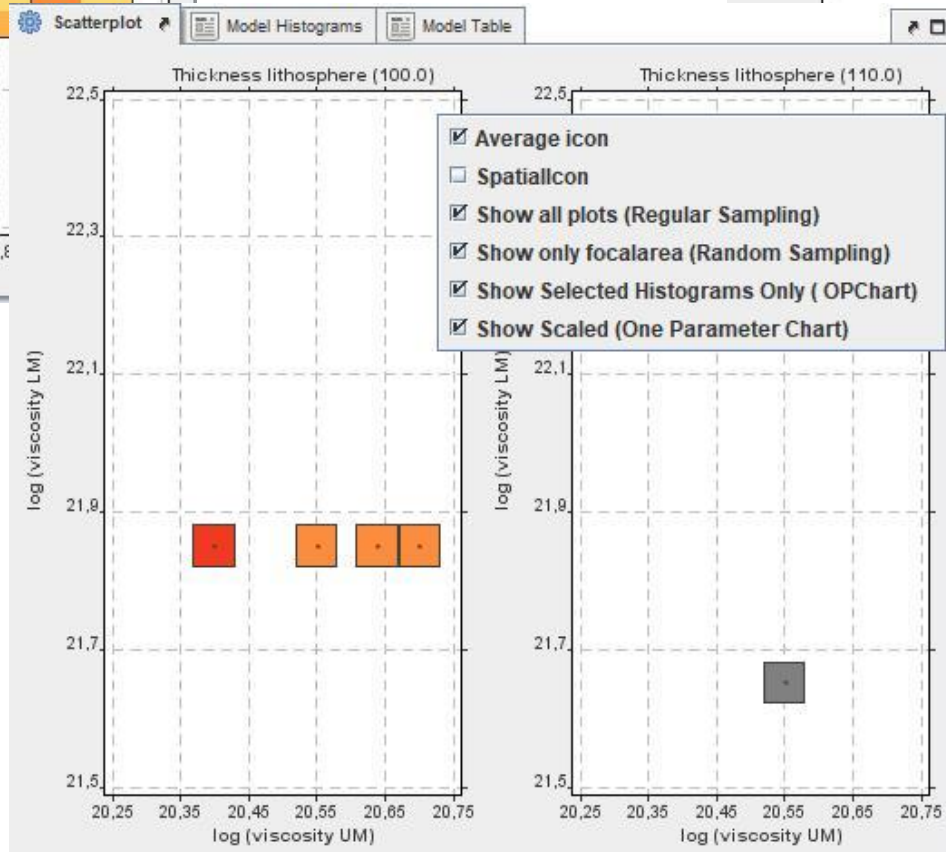
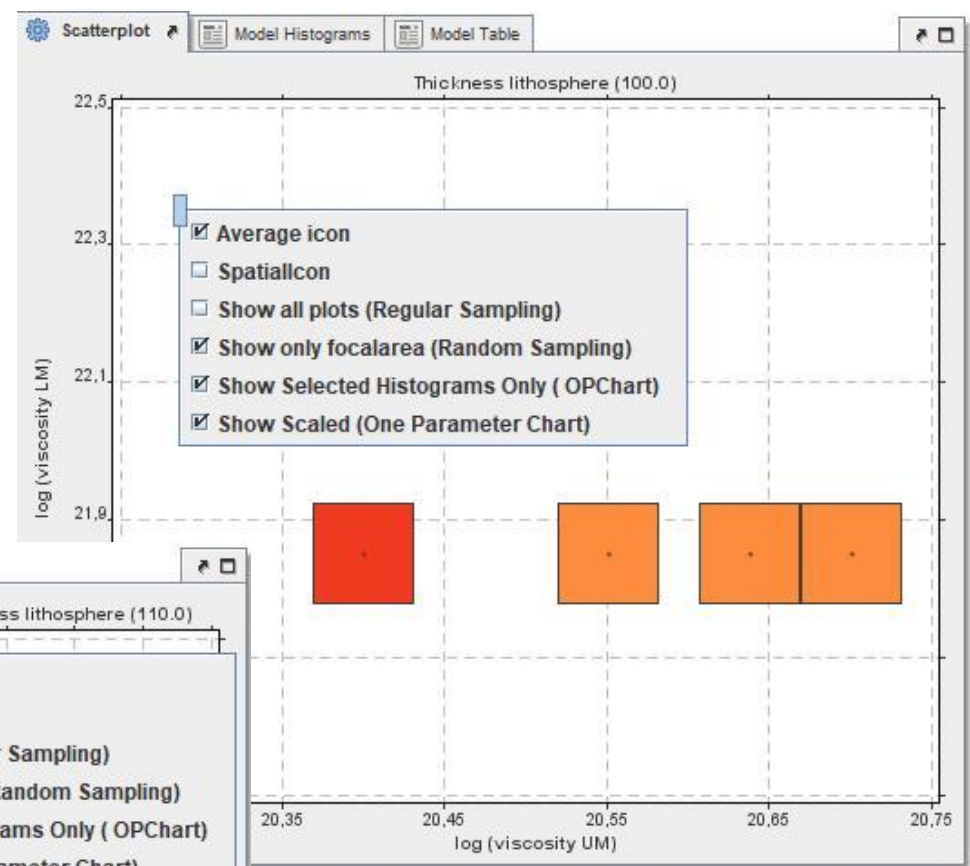
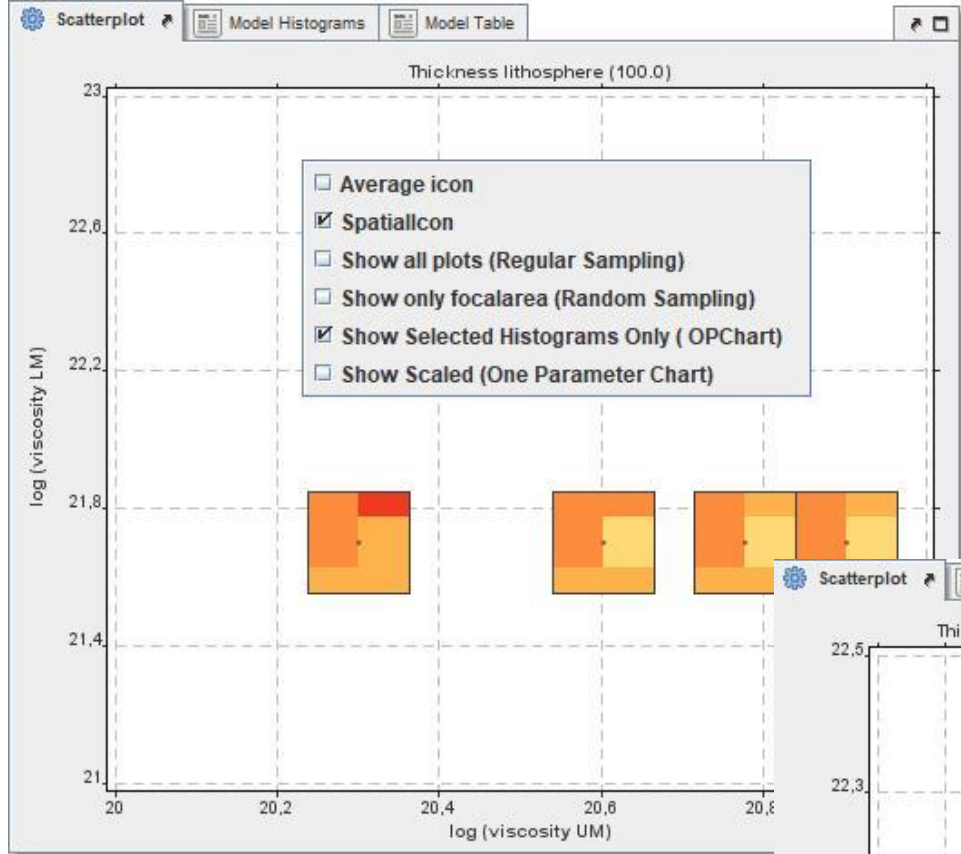


2.3 Scatterplot



Scatterplot

- The selected plot from the Scatterplot Matrix in detail
- Moving the mouse over an instance shows details as tool tip



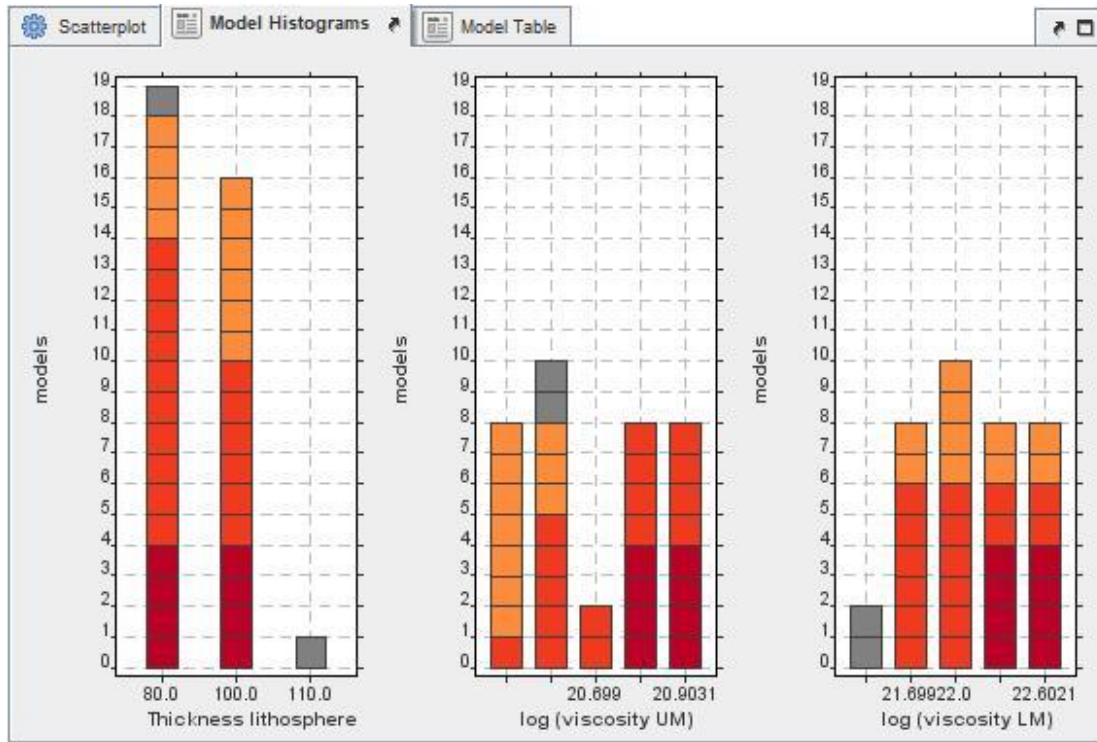
Right click opens a popup menu with the view settings.

2.4 Model Histogram

The screenshot displays the Slivisu software interface with several panels:

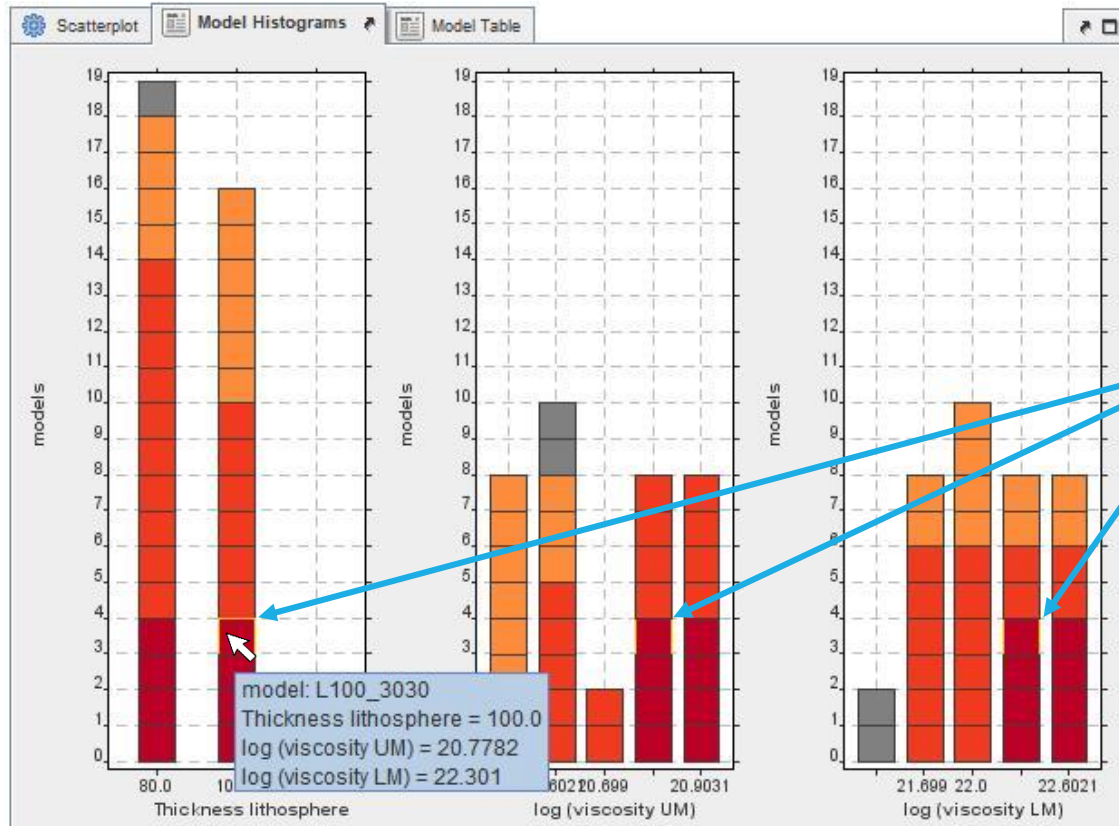
- Time scale:** A horizontal axis ranging from -14300 to 0.
- RSL categories:** A control panel with 'Edit' and 'Order' buttons, and checkboxes for 'upper', 'lower', 'band', and 'none'.
- Sea Level Curve:** A plot showing sea level data over time, with a y-axis from -1 to 290 and an x-axis from -10000 to 1000.
- SLI Time Histogram:** A stacked bar chart showing data distribution over time, with a y-axis from 0 to 60 and an x-axis from -9444 to 0.
- Map:** A geographical map showing data points and a highlighted region, with a legend 'tab_name -> dyke -> Hudson ->'. A 'Layer' button is at the bottom left.
- Model Explorer:** A panel with a 'Fit scale' slider (0.0 to 1.2) and a '3D Scatterplot' view showing a 3D coordinate system (X, Y, Z) and a 'Reset' button.
- Model Histograms:** Three histograms showing the distribution of models for different parameters: 'Thickness lithosphere', 'log (viscosity UM)', and 'log (viscosity LM)'. The y-axis for all is 'models'.
- SLI Table:** A table listing data for 'dyke' with columns: gid, tab_name, curve, default cate, f, and lat.
- SLI Hierarchy:** A tree view showing a hierarchy of geographical regions, with 'Hudson [20 / 657 / 657]' selected.

gid	tab_name	curve	default cate	f	lat
DYKE-05059	Hudson	Fort George, QC	lower		53,74
DYKE-05060	Hudson	Fort George, QC	band		53,35
DYKE-05061	Hudson	Fort George, QC	band		53,35
DYKE-05062	Hudson	Fort George, QC	lower		53,333
DYKE-05064	Hudson	Fort George, QC	band		53,333
DYKE-05065	Hudson	Fort George, QC	band		53,333
DYKE-05066	Hudson	Fort George, QC	lower		53,7
DYKE-05067	Hudson	Fort George, QC	lower		53,578
DYKE-05068	Hudson	Fort George, QC	lower		53,733
DYKE-05069	Hudson	Fort George, QC	lower		53,758
DYKE-05070	Hudson	Fort George, QC	lower		53,467
DYKE-05071	Hudson	Fort George, QC	lower		53,747

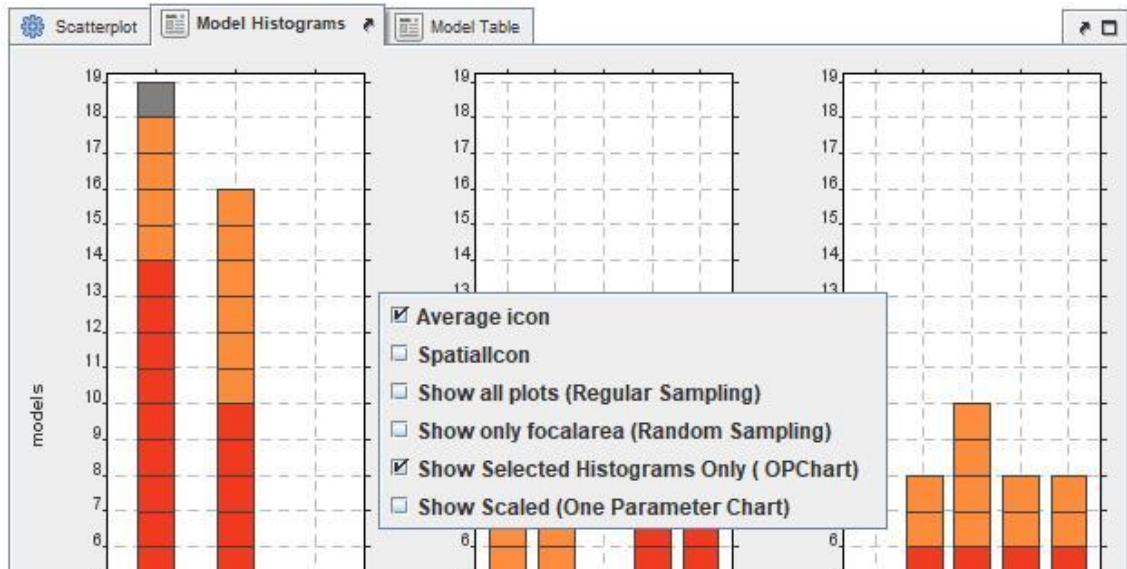


Model Histogram

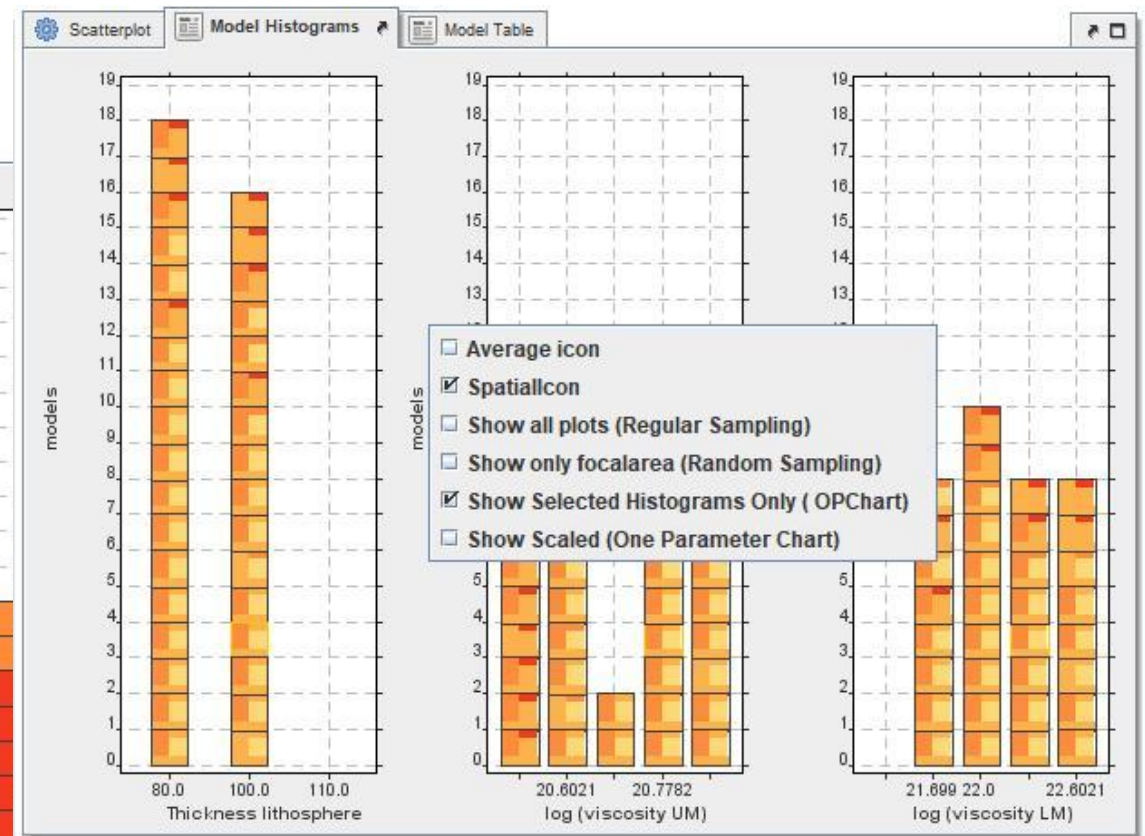
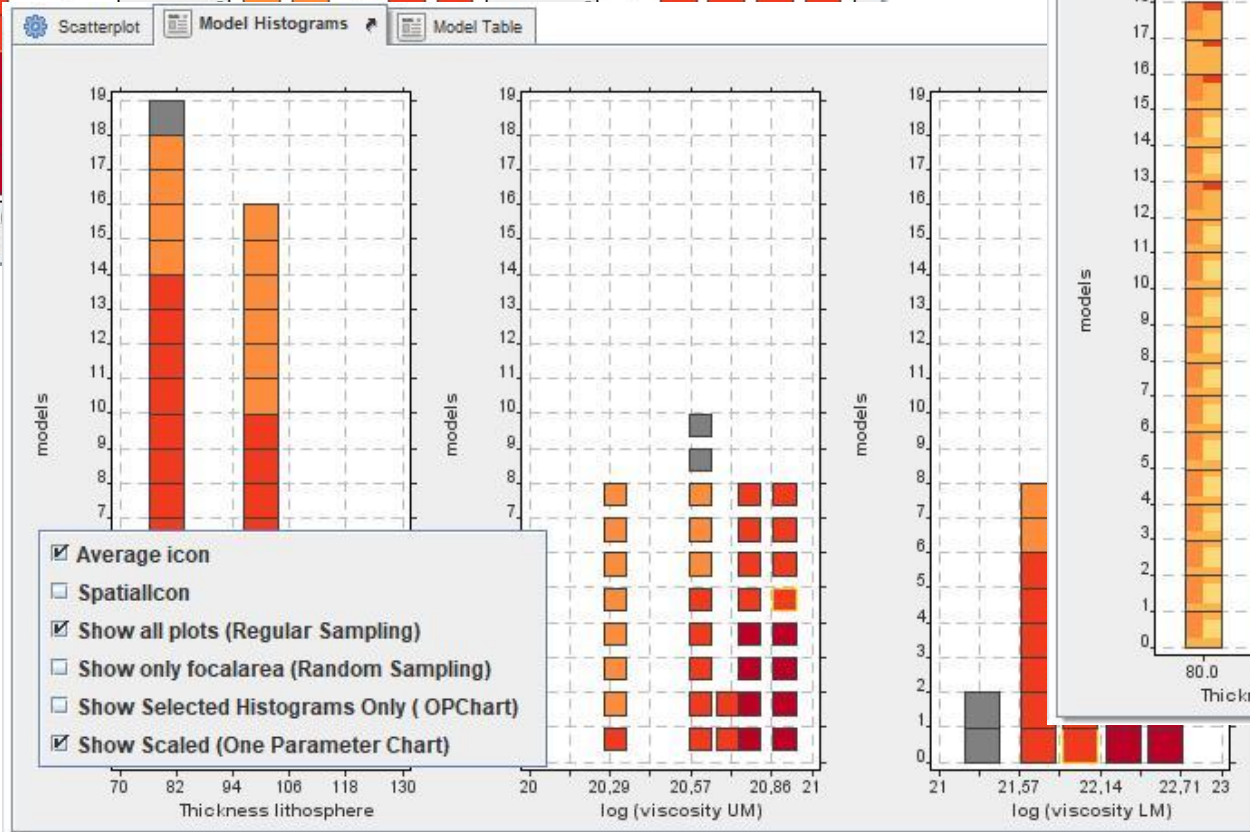
- One histogram for each model parameter
- X: parameter value
- Y: stack of model instances sorted by goodness of fit



- Moving the mouse over an instance shows details as tool tip
- Select a model instance by clicking on the square
- A yellow frame shows which instance is selected
- Ctrl + click to add further models
- Unselect by clicking outside an existing model



Right click opens a popup menu with the view settings.



2.5 Model Table

Slivisu - \new workspace

Program

Time scale: -14300, -12870, -11440, -10010, -8580, -7150, -5720, -4290, -2860, -1430, 0

RSL categories: Edit, Order, upper, lower, band, none

Sea Level Curve

Model Explorer

Fit scale: 1-Norm, 0.0, 0.2, 0.4, 0.6, 0.8, 1.0, 1.2

Scatterplot Matrix, 3D Scatterplot

Scatterplot, Model Histograms, Model Table

model	Thickness I...	log (viscosi...	log (viscosi...	1Thickness...	1log (visco...	1log (visco...
L100_-vm2	110	20,602	21,301	110	20,602	21,301
L100_1010	100	20,301	21,699	100	20,301	21,699
L100_1020	100	20,602	21,699	100	20,602	21,699
L100_1030	100	20,778	21,699	100	20,778	21,699
L100_1040	100	20,903	21,699	100	20,903	21,699
L100_2010	100	20,301	22	100	20,301	22
L100_2020	100	20,602	22	100	20,602	22
L100_2025	80	20,699	22	80	20,699	22
L100_2030	100	20,778	22	100	20,778	22
L100_2040	100	20,903	22	100	20,903	22
L100_3010	100	20,301	22,301	100	20,301	22,301
L100_3020	100	20,602	22,301	100	20,602	22,301
L100_3030	100	20,778	22,301	100	20,778	22,301
L100_3040	100	20,903	22,301	100	20,903	22,301
L100_4010	100	20,301	22,602	100	20,301	22,602
L100_4020	100	20,602	22,602	100	20,602	22,602
L100_4030	100	20,778	22,602	100	20,778	22,602
L100_4040	100	20,903	22,602	100	20,903	22,602
L80_-vm2	80	20,602	21,301	80	20,602	21,301
L80_1010	80	20,301	21,699	80	20,301	21,699

SLI Time Histogram

SLI Table

gid	tab_name	curve	default cate...	lat
DYKE-05059	Hudson	Fort George, QC	lower	53,74
DYKE-05060	Hudson	Fort George, QC	band	53,35
DYKE-05061	Hudson	Fort George, QC	band	53,35
DYKE-05062	Hudson	Fort George, QC	lower	53,333
DYKE-05064	Hudson	Fort George, QC	band	53,333
DYKE-05065	Hudson	Fort George, QC	band	53,333
DYKE-05066	Hudson	Fort George, QC	lower	53,7
DYKE-05067	Hudson	Fort George, QC	lower	53,578
DYKE-05068	Hudson	Fort George, QC	lower	53,733
DYKE-05069	Hudson	Fort George, QC	lower	53,758
DYKE-05070	Hudson	Fort George, QC	lower	53,467

SLI Hierarchy

- Devon [0 / 0 / 232]
 - Ellef Ringnes [0 / 0 / 7]
 - Ellesmere [0 / 0 / 732]
 - Greenland E [0 / 0 / 189]
 - Greenland NE [0 / 0 / 112]
 - Greenland NW [0 / 0 / 131]
 - Greenland SW [0 / 0 / 311]
 - Hudson [20 / 657 / 657]
 - King William [0 / 0 / 6]
 - Labrador [0 / 0 / 276]
 - Lougheed [0 / 0 / 7]
 - Mackenzie E [0 / 0 / 139]
 - Mackenzie W [0 / 0 / 104]
 - Melville I [0 / 0 / 59]
 - Melville P [0 / 0 / 95]

Map

Layer

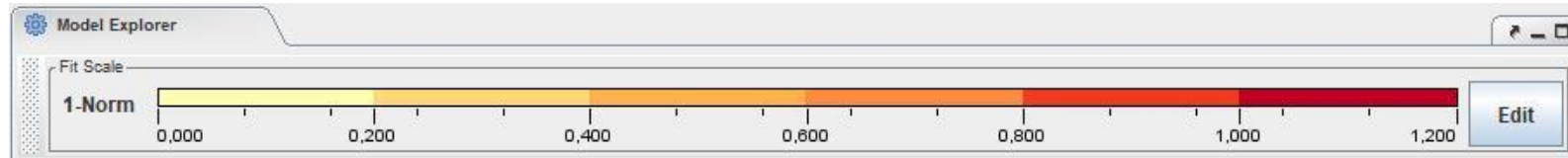
Multiple Table Selection, WHERE, Invert Selection, Start Query

model	Thickness lithosphere	log (viscosity UM)	log (viscosity LM)	fit	fuzzyfit0	fuzzyfit1	fuzzyfit2
L100_1010	100	20,301	21,699	1	0,8	1,01	0,71
L100_1020	100	20,602	21,699	1	0,787	1,055	0,725
L100_1030	100	20,778	21,699	1	0,868	0,805	0,635
L100_1040	100	20,903	21,699	1	0,908	0,705	0,595
L100_2010	100	20,301	22	1	0,668	1,585	0,89
L100_2020	100	20,602	22	1	0,759	1,155	0,76
L100_2030	100	20,778	22	1	0,909	0,7	0,59
L100_2040	100	20,903	22	1	0,989	0,52	0,51
L100_3010	100	20,301	22,301	1	0,643	1,75	0,935
L100_3020	100	20,602	22,301	1	0,838	0,89	0,665
L100_3030	100	20,778	22,301	1	1	0	0
L100_3040	100	20,903	22,301	1	1	0	0
L100_4010	100	20,301	22,602	1	0,657	1,655	0,91
L100_4020	100	20,602	22,602	1	0,93	0,65	0,57
L100_4030	100	20,778	22,602	1	1	0	0,001
L100_4040	100	20,903	22,602	1	1	0	0,001
L100_2025	100	20,602	22	1	0,858	0,83	0,645
L80_1010	80	20,301	21,699	1	0,819	0,95	0,69
L80_1020	80	20,602	21,699	1	0,811	0,975	0,7
L80_1030	80	20,778	21,699	1	0,882	0,77	0,62
L80_1040	80	20,903	21,699	1	0,912	0,69	0,59
L80_2010	80	20,301	22	1	0,69	1,465	0,855
L80_2020	80	20,602	22	1	0,781	1,075	0,735
L80_2025	80	20,699	22	1	0,858	0,83	0,645
L80_2030	80	20,778	22	1	0,917	0,68	0,585

- Model table containing all the information from the model data file plus the model fits
- yellow rows are marked model instances
- In the model column, the color shows the average model fit for the selected SLIs

- sort the table by clicking on a column header
- right click opens the pop up menu where the fit column can be chosen



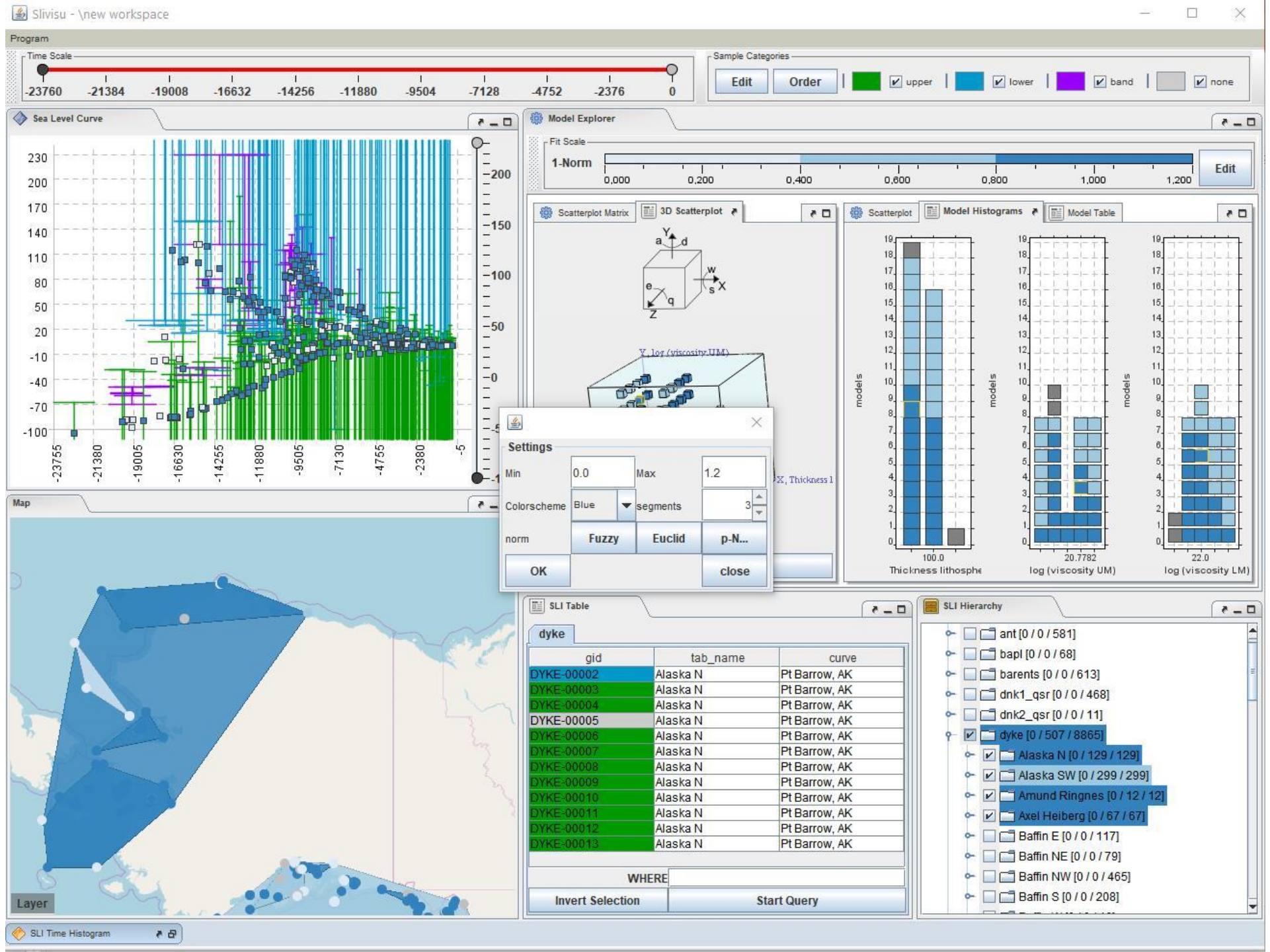


The **Fit Scale** shows

- which norm is used to calculate the goodness of fit
- the color scale for the goodness of fit
- click on edit to open the settings menu
 - min/max: scale range, default it 0 to 1.2
 - Colorscheme: colors for the goodness of it, default is red
 - segments: number of different colors, default is 6
 - norm: Fuzzy: 1- norm, Euclid: 2 -norm, p-Norm:

$$fit = \left(\frac{1}{N} \sum_{i=1}^N fit_i^p \right)^{1/p}$$

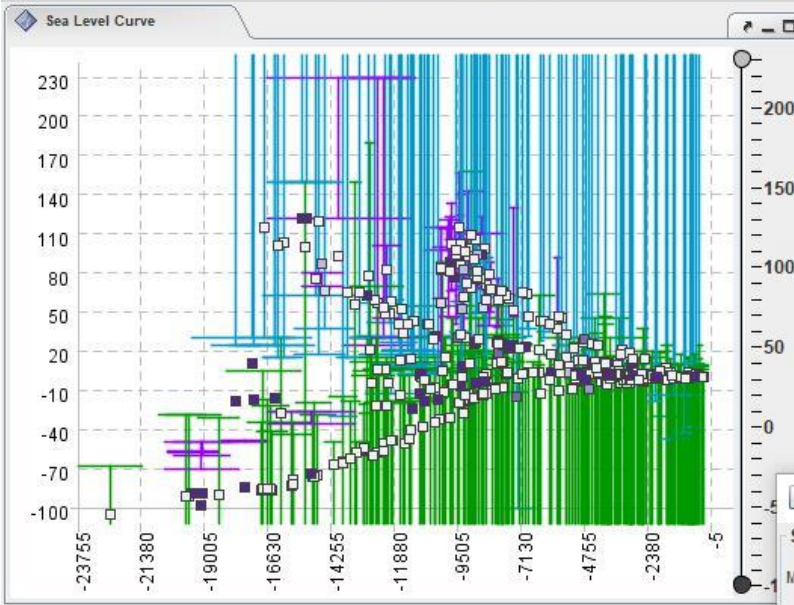




Program

Time Scale: -23760, -21384, -19008, -16632, -14256, -11880, -9504, -7128, -4752, -2376, 0

Sample Categories: Edit Order upper lower band none



Model Explorer

Fit Scale: 1-Norm 0,000 0,200 0,400 0,600 0,800 1,000 1,200 Edit

Scatterplot Matrix 3D Scatterplot Scatterplot Model Histograms Model Table

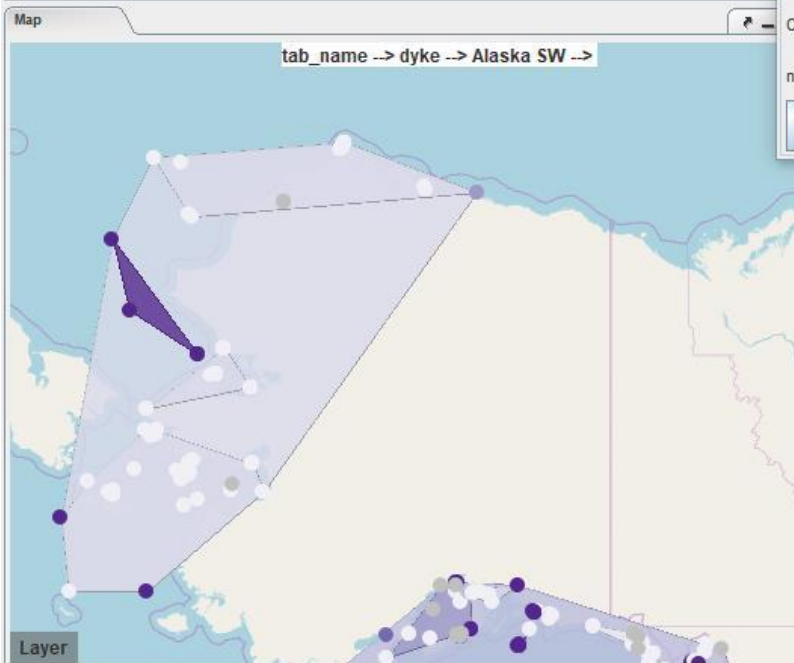
Settings

Min: 0.6 Max: 2.4

Colorscheme: Purple segments: 6

norm: Fuzzy Euclid p-N...

OK close



SLI Table

gid	tab_name	curve
DYKE-00002	Alaska N	Pt Barrow, AK
DYKE-00003	Alaska N	Pt Barrow, AK
DYKE-00004	Alaska N	Pt Barrow, AK
DYKE-00005	Alaska N	Pt Barrow, AK
DYKE-00006	Alaska N	Pt Barrow, AK
DYKE-00007	Alaska N	Pt Barrow, AK
DYKE-00008	Alaska N	Pt Barrow, AK
DYKE-00009	Alaska N	Pt Barrow, AK
DYKE-00010	Alaska N	Pt Barrow, AK
DYKE-00011	Alaska N	Pt Barrow, AK
DYKE-00012	Alaska N	Pt Barrow, AK
DYKE-00013	Alaska N	Pt Barrow, AK

WHERE

Invert Selection Start Query

SLI Hierarchy

- ant [0 / 0 / 581]
- bapl [0 / 0 / 68]
- barents [0 / 0 / 613]
- dnk1_qsr [0 / 0 / 468]
- dnk2_qsr [0 / 0 / 11]
- dyke [0 / 507 / 8865]
 - Alaska N [0 / 129 / 129]
 - Alaska SW [0 / 299 / 299]
 - Amund Ringnes [0 / 12 / 12]
 - Axel Heiberg [0 / 67 / 67]
 - Baffin E [0 / 0 / 117]
 - Baffin NE [0 / 0 / 79]
 - Baffin NW [0 / 0 / 465]
 - Baffin S [0 / 0 / 208]

3. Brushing and Linking



BRUSHING AND LINKING

- Select data (SLIs, Model Instance) in one view
- See selection in other views

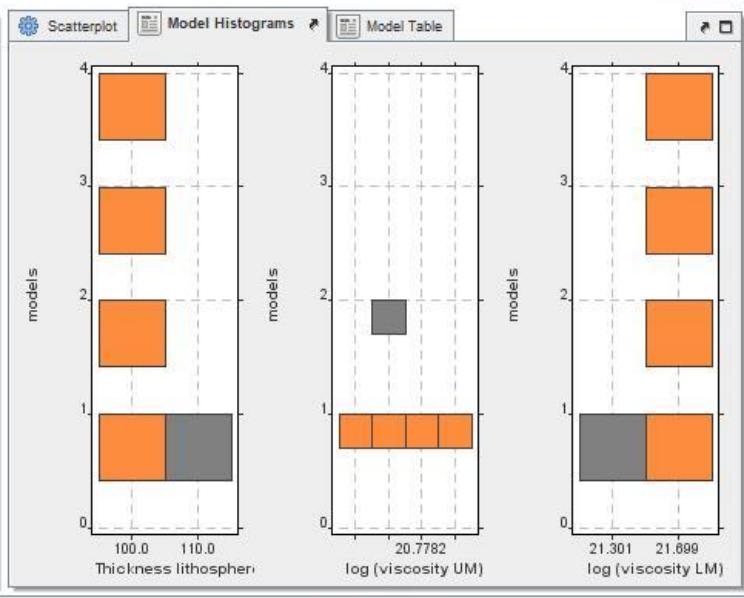
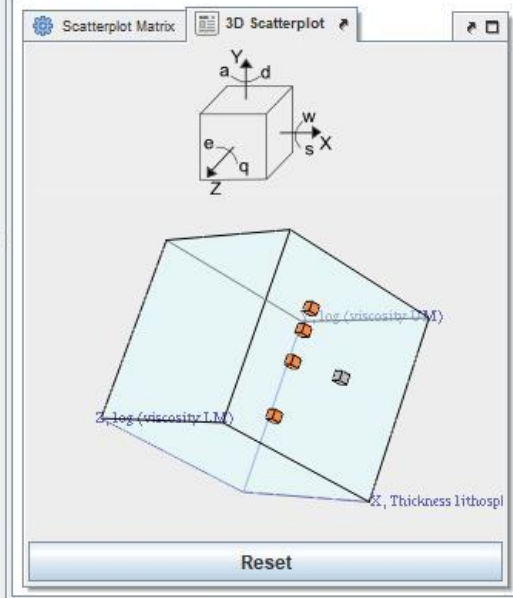
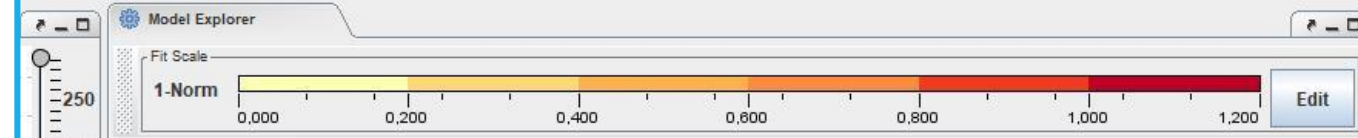
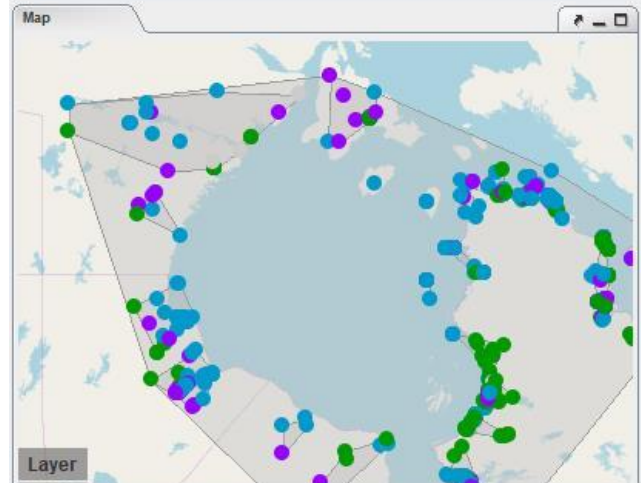
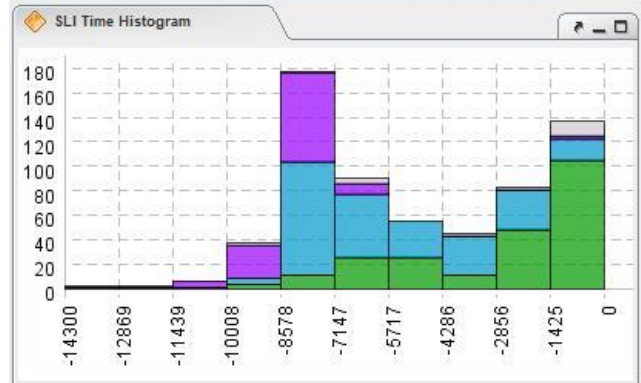
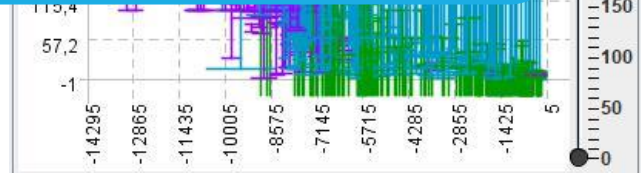
The interface displays several interconnected views for data analysis:

- 3D Scatterplot:** Shows data points in a 3D space with axes labeled a, d, e, q, s, X, Y, Z. A color scale for 'Fit Scale' (1-Norm) ranges from 0.000 to 1.200.
- SLI Time Histogram:** A stacked bar chart showing the distribution of data across time intervals from -14300 to 0.
- Map:** A geographical map showing the spatial distribution of data points (red and yellow dots) on a landmass.
- 3D Scatterplot Matrix:** A 3D visualization of data points with axes labeled Y, log (viscosity UIM), X, Thickness, and Z, log (viscosity LM).
- Model Histograms:** Three histograms showing the distribution of models for 'Thickness lithosphere', 'log (viscosity UM)', and 'log (viscosity LM)'. The y-axis for all is 'models'.
- SLI Table:** A table listing data points with columns for 'gid', 'tab_name', and 'curve'.

gid	tab_name	curve
DYKE-05205	Hudson	Nelson River, MB
DYKE-05206	Hudson	Nelson River, MB
DYKE-05207	Hudson	Nelson River, MB
DYKE-05209	Hudson	Baker Lake, NU
DYKE-05210	Hudson	Baker Lake, NU
DYKE-05211	Hudson	Baker Lake, NU
DYKE-05212	Hudson	Baker Lake, NU
DYKE-05213	Hudson	Baker Lake, NU
DYKE-05214	Hudson	Baker Lake, NU
DYKE-05215	Hudson	Baker Lake, NU
DYKE-05218	Hudson	Baker Lake, NU
DYKE-05217	Hudson	Baker Lake, NU
DYKE-05219	Hudson	Baker Lake, NU
- SLI Hierarchy:** A tree view showing a hierarchy of regions: British Columbia, Cornwallis, Devon, Ellef Ringnes, Ellesmere, Greenland E, Greenland NE, Greenland NW, Greenland SW, Hudson (selected), King William, Labrador, Loughheed, Mackenzie E.

BRUSHING AND LINKING

- Example: selecting a subregion in the map...

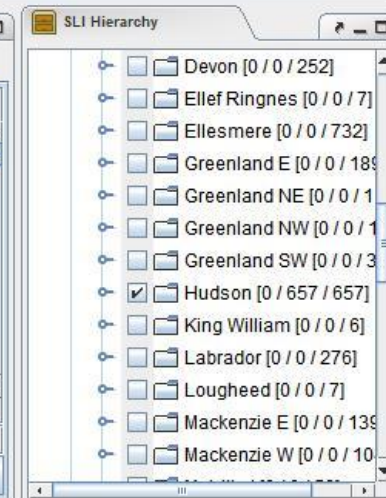


SLI Table

gid	tab_name	curve	default cate...
DYKE-04558	Hudson	Ungava Bay W, QC	lower
DYKE-04559	Hudson	Ungava Bay W, QC	upper
DYKE-04560	Hudson	Ungava Bay W, QC	upper
DYKE-04561	Hudson	Ungava Bay W, QC	upper
DYKE-04562	Hudson	Ungava Bay W, QC	lower
DYKE-04563	Hudson	Ungava Bay W, QC	upper
DYKE-04564	Hudson	Ungava Bay W, QC	band
DYKE-04565	Hudson	Ungava Bay W, QC	upper
DYKE-04566	Hudson	Ungava Bay W, QC	upper
DYKE-04567	Hudson	Ungava Bay W, QC	band
DYKE-04568	Hudson	Ungava Bay W, QC	band

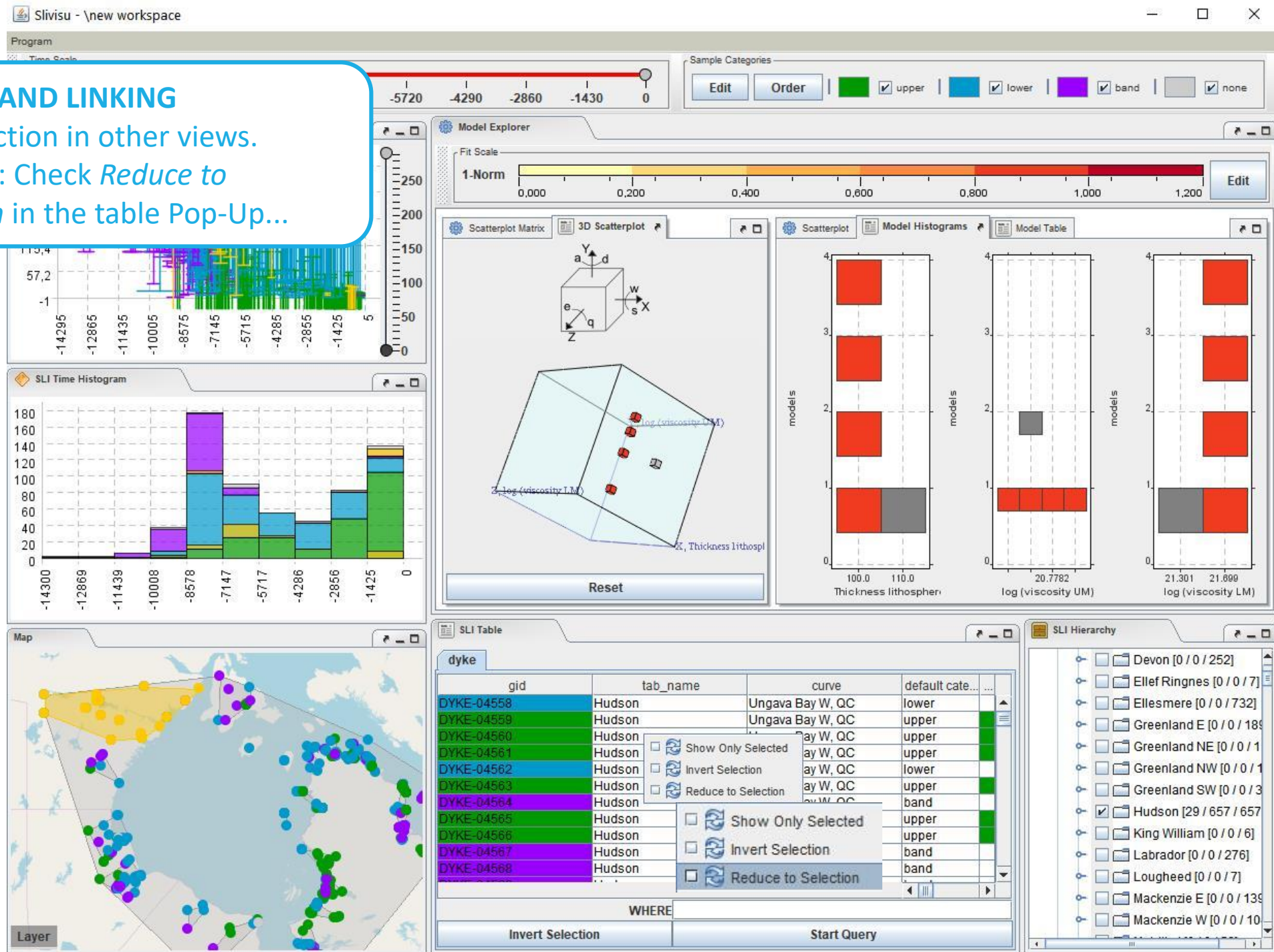
WHERE

Invert Selection Start Query



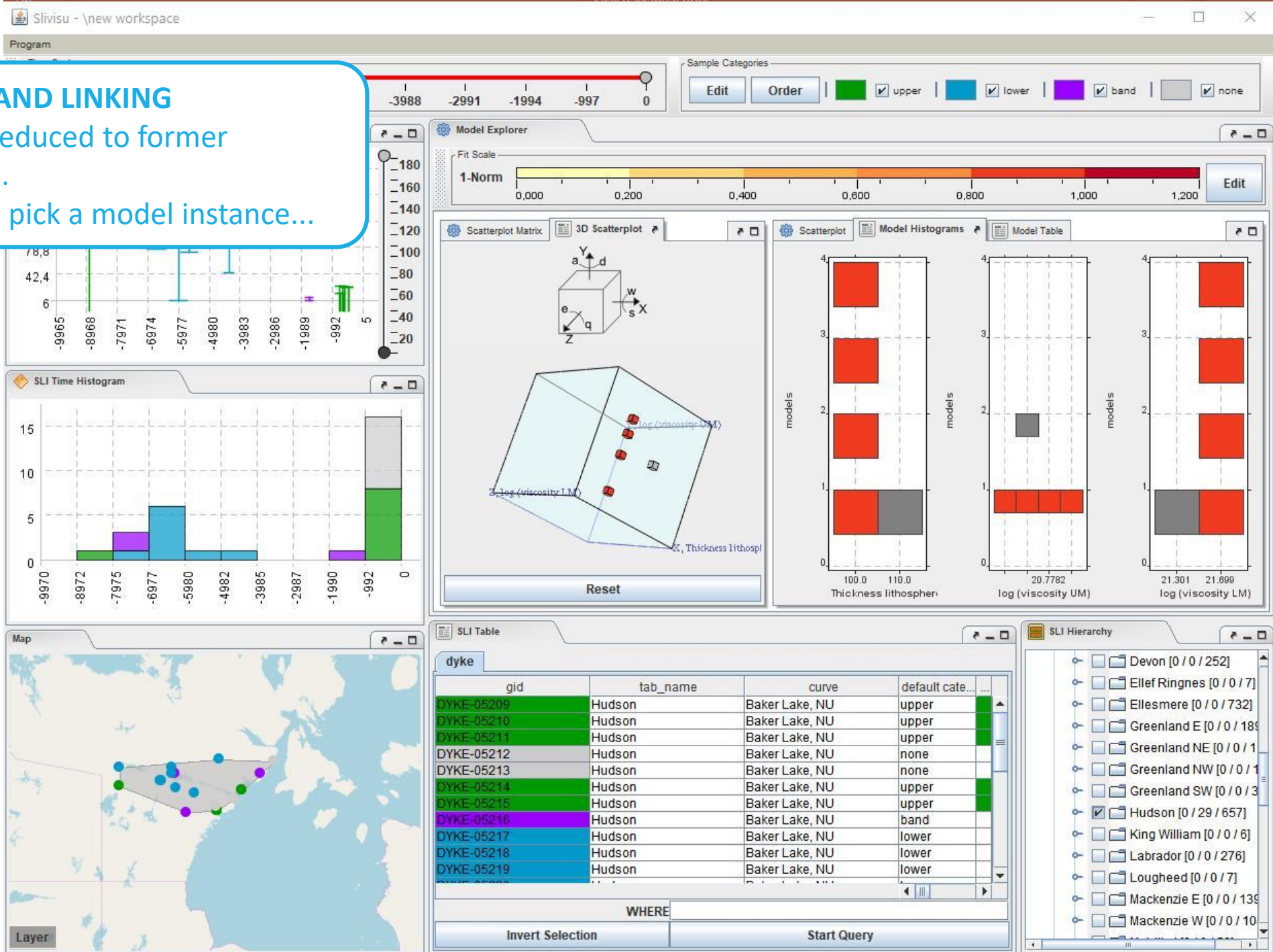
BRUSHING AND LINKING

- See selection in other views.
- Example: Check *Reduce to Selection* in the table Pop-Up...



BRUSHING AND LINKING

- SLIs are reduced to former Selection.
- Example: pick a model instance...



BRUSHING AND LINKING

- See model data in other views.
- Explore!

