



Geostatistics made accessible

ISATIS.NEO



Release Notes

Isatis.neo 2024.04

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Legal Disclaimer

The product described in this documentation may be connected to, and/or communicate information and data via, a network interface, which should be connected to a secure network. It is your sole responsibility to ensure a secure connection to the network and to establish and maintain appropriate measures (such as but not limited to the installation of firewalls, application of authentication measures, encryption of data, installation of antivirus programs, etc.) to protect the product, the network, your systems, and the interface against any kind of security breach, unauthorised access, interference, intrusion, leakage, damage, or corruption or theft of data. We are not liable for damages or losses related to any such security breach, unauthorised access, interference, interference, intrusion, leakage, damage, damage, damage, or corruption or theft of data.



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Overview

Isatis.neo is a powerful, intuitive, and highly customizable software solution in geostatistics. It provides geologists and resource teams with an unrivaled range of geostatistical tools, machine learning, and Python coding to enable precise resource modeling and confident decision-making. Isatis.neo allows in-depth data analysis and visualization, complex geological and geometallurgical analysis, and in-situ and recoverable resource estimation. The software also enables extensive uncertainty and risk analyses based on simulations.





Licensing

Before installation of the new Isatis.neo version, please check that your license is still covered by a maintenance contract and/or your license key is still available. By default, license keys are valid for 12 months. They are compatible with all the software versions that will be released during the validity period of your maintenance contract.

Site licenses need to be installed on your license server by your license administrators. For the cloud licenses, a new license file will be automatically deployed on Geovariances' servers.

For **Isatis.neo-mining**, we now provide a version on Datamine's Freshdesk <u>website</u> and on Geovariances' <u>website</u> compatible with **Datamine License services** and **Geovariances License Manager** (RLM). You will only have to choose one of the License system during the installation.

Please contact us at <u>support@geovariances.com</u> for any information regarding your license and maintenance contract.

Project compatibility

Your projects are automatically converted into the new format when you open them.

Platforms and Requirements

Before installing Isatis.neo, please make sure that the following software products are also installed on your Personal Computer:

- Windows 10 or 11 (64 bits only) or Linux Ubuntu 20.04 or higher on PCs with Intel compatible processors are supported by Isatis.neo.
- An HTML 5.0 compliant browser such as Google Chrome (recommended, Firefox or Microsoft Edge are also supported).

Note: NVIDIA graphic cards with the most recent drivers are recommended for the use of the 3D Viewer. AMD/ATI cards with recent drivers are also supported. Intel graphic cards are known to cause some problems during 3D graphic rendering.



Further Information

This document includes cumulative release notes for Isatis.neo. Release notes for other versions of Isatis.neo are available via the <u>Support Portal</u> or via the Geovariances' <u>website</u>.



Isatis.neo 2024.04

General Improvements

Python 3.11

The Python version embedded in Isatis.neo has been **upgraded** from version 3.7 to **version 3.11**.

This allows you to use more recent versions of the secondary Python modules and benefit from the latest functionality of those packages.

The main Python modules that have been updated to their latest versions are the following: **NumPy**, **Scipy**, **Pandas**, and **Scikit Learn**. Other secondary packages are also updated (**Matplotlib**, **PySide2**,..)

Python scripts migration advice

There are no major changes in the Python syntax between versions 3.7 and 3.11. Most of your scripts should only require minor modifications.

Those minor modifications should be mostly some methods / classes renamed in the 3rd party Python packages mentioned above. If you encounter deprecated functionality in those modules, please refer to the changes in those Python packages.

For users that embed additional external Python modules, in **Batch files** for example, extra attention must be paid to them.

Their version might also need to be updated if they are not compatible with the more recent base Python modules that are installed with Isatis.neo.

If the package of the concerned module was specific to Python 3.7, you will also need to replace it with the version of that package that is distributed for Python 3.11.

Impact on Vulcan imports/exports

The tools in Isatis.neo to access Maptek Vulcan data rely on a Python module provided by Vulcan. Up to Vulcan 2023.3, the needed Python version was 3.7. From Vulcan 2023.4, that Maptek module needs Python version 3.11. This means that starting from Isatis.neo 2024.04, The Vulcan tools will require at least Maptek Vulcan 2023.4 installed (multiple Vulcan versions can be installed to keep compatibility with older Isatis.neo versions and the new version).



Move drag/drop

It is now possible to organize your **Data tree** with **drag & drop**. You can move several **files/folders** into another folder more easily than before (you had to use the task **Move Data** to move each file individually).

Quit Isatis.neo	Move Data				×
Project	Data to move	Block model 75x75x15n	n		
Data	Destination directory	Folder 2		8	
+ 🖪 🖊 0 0	Destination name	Block model 75x75x15m			0
12 3 🗊 🖿 🛛		Ready to run.			
Y≣= >- Y≣ Name Y	?		► Move		se ,
Folder 1				Block mo	
Folder 2				DIOCKINO	uer / Jx
Block model 75x75	(15m				
> 🕅 Drillholes 🕂	Create variable				
> 🌐 stats block 📭	Duplicate				
÷	Move				
L .	Rename				
J	Edit	►			
0	Information	•			
e e e e e e e e e e e e e e e e e e e	Print variables				
n ,	Export	•			
, é.	Compress				
節	Delete				

Note: The drag & drop can also be recorded in a Batch file.

Batch and Python tutorial

A **new tutorial** is available in the Tutorials section of the Project manager. It aims at showing with examples how to **interface Python and Isatis.neo** through the use of the **Calculator and the Batch**. It makes use of some Python packages installed by default in Isatis.neo like **matplotlib**, **pandas**. The **Batch logic** and the production of **graphics** are also illustrated in this tutorial.



Home

Import Fusion

A new import task is available to **import drillholes from Fusion databases**. This import is reachable from the Home section in the ribbon, under the Datamine (*.dm) import:



Note: This task is very similar to the ODBC import task.

👔 In	nport Fusio	n Drillho	les - Input						— [⊐ ×
Load	previous imp	oort paran	neters							
Se Se	elect the Jso	n file to Lo	oad							
Conn	ection parar	meters								
Oper	n Fusion Exp	orter assi	stant Advanced co	nnection parameters	; ~					
			Import data							
Data	tables									
Ta	able role	Table n	ame (from Fusion)	New table na	me					
Col	lars	DRILL_H		Collars						
Dev	viations	DRILL_H	IOLE_DIRECTION	DRILL_HOLE_DIRE	CTION					
Cor	re Samples	HOLE_A	SSAY_SAMPLE	HOLE_ASSAY_SAM	MPLE					
				·						
	Add	Delete	•							
Previ	ew									
						ent: table DRILL_HO	DLE_COORDINATE			
	HOLE_N				orthsouth_minute	orthsouth_decima	eastwest_degrees			
	(TEX		(TEXT)	(FLOAT64)	(FLOAT64)	(FLOAT64)	(FLOAT64)	(FLOAT64)	(FLOAT64)	(FL
1	AU-BRI-20	0-001	Р	[null]	[null]	6962011.031000	[null]	[null]	502760.058200000	232.55
2	AU-BRI-20	0-002	Ρ	[null]	[null]	6464064.475000	[null]	[null]	502758.951400000	228.39!
3	AU-BRI-2	0-003	P	[null]	[null]	6464057.861000	[null]	[null]	502765.197400000	243.43(∨
	rt options									-
· ·	veying meth	nod Sphe	rical Arcs	\sim						
					Ready for next ste	ep: Variable Assignme	ent.			
?							< Back	Next >	► Import	X Close





To import your drillholes, you have to connect to the server where the database is stored. You have 2 ways to do that:

 Open the Fusion Exporter assistant: Having Fusion on the same machine is not required here because when installing Isatis.neo, the Fusion Exporter Assistant is installed too. It is an interface provided by Fusion to access your databases easily.

Please enter v	alid Fusion Credentials
Username:	
Password:	•
Authorization:	DatabaseAuthentication 🔻
Connection Type:	Manual Configuration
Server:	
Database:	
Conne	ect To Database
Import Template:	Test-All
In	nport Data





• Load a previous import parameters file: You can select a previously generated .json file containing the parameters needed to connect your Fusion database.

Then, you have to define the roles of your data tables:

- The Tops/Collars table which corresponds to the Collar is mandatory.
- The **Deviations table** which corresponds to the Survey.
- The **Core samples/Assay**, **Logs**, and **Markers** tables can be added by pressing the **Add** button.

You can choose one of the following 4 desurveying methods: **Spherical Arcs**, **Interpolated Azimuth and Dip**, **Tangential**, **Balanced Tangential**.

Once all the parameters are filled, you can **choose each role/unit class**... for each **variable** of each **data table** (*as in the different drillholes import tasks*). A **summary** of your **import** is displayed at the end of the task.

Import Isatis.neo

Another new import task is available to import different objects **between Isatis.neo projects**. This import is reachable from the Home section in the ribbon:



You select the input project containing the data you want to import: it must come from **compatible projects**: same coordinate system, same version, same application (standard, mining, petroleum), same database version, etc.





🚡 Imp	port Isatis.neo objects				×
Input pro	oject Mining				❷ ~
Q=	Data				
	¥ 6				
	Name	Size			^
	> 🔲 🏢 Block model 25x25x5m	0 bytes / 204.60 MB			
	> 🔲 🌐 Block model 75x75x15m	0 bytes / 21.83 MB			
0	🗌 🐼 Domains	0 bytes / 295.00 kB			
	> 🔲 🕅 🖓 drill	0 bytes / 488.00 kB			
æ	> 🔲 🕅 Drillholes	0 bytes / 787.69 kB			
	> 🔲 🕅 Drillholes bis	0 bytes / 453.00 kB			
60	> 🔲 🕅 fusion	0 bytes / 23.04 MB			
	> 🔲 🕅 odbc	0 bytes / 766.05 kB			
	🗌 🏠 Orebody	0 bytes / 38.00 kB			
►	> Orebody Sub-block model	0 bytes / 4.60 MB			~
	Read	y to run.			
?			► Import	X	Close

You can import several types of data at the same time (available in the multiple tabs located on the left part of the task):

- Datasets (2D/3D points, grid, drillholes, meshes...):
 - If the dataset selected already exists in your project (grid/data table...), the variables selected will be copied into your dataset, only if the geometry matches.

If the geometry doesn't match, the name of the dataset will be renamed (ex: XXXX (2)).

- If the variable already exists in the dataset, the name will be replaced (ex: XXXX (2)).
- etc.
- Geostatistical sets, Chart files (graphics and tables), Scenes (2D/3D), Color scales, Neighborhoods, Files in the public folder, Batch files

The objects will be copied, and if one or several objects with the same name already exist, the names will be changed (ex: XXXX (2)).

For the Scenes, if a section exists and is linked to the scene, the section will be imported too.

A summary of the imported data is displayed in the Messages window.



Data
Block model 75x75x15m
Block model 75x75x15m / Grid Cells
Block model 75x75x15m / Grid Cells / OK-Indicator rich ore-Krig
Block model 75x75x15m / Grid Cells / InvDst-Fe-rich ore
Block model 25x25x5m => Block model 25x25x5m (5)
Block model 25x25x5m / Grid Cells => Block model 25x25x5m (5) / Grid Cells
Block model 25x25x5m / Grid Cells / OK-Indicator rich ore-Krig => Block model 25x25x5m (5) / Grid Cells / OK-Indicator rich ore-Krig

If any data has been renamed, the table line is colored orange.

Export NetCDF

A new export task has been created to export **NetCDF files as Grid or Points** (2D or 3D).



There are 2 modes available: Export as grid and Export as points.

• Export as grid: only regular grid datasets can be selected to run the export.

Note: If the grid is rotated, you cannot export **Text** or **Categorical** variables.

• Export as points: all the data tables can be selected to run the export.



A **Selection** can be applied to the data table to only export a part of your dataset. You can **Export All Variables**, or only some of them. You can also choose the **coordinate system** in which you wish your data to be stored. A **projection header** file (.prj) can be stored with the output file. If the chosen coordinate system is different from the original one or if the grid is rotated, a re-interpolation will be applied.

Export	🚡 Export NetCDF 🛛 🗆 🗆					
Input						
Mode	Export a	as grid				~
Input File	Gri Gri	d			8	
Selection						~
Export A	ll Variable	s				
Variables						
	Alsace	2				~
	Altitu	de				
	CCL-N	VO2-Krig				
	CCL-N	VO2-StdDev				
	Emi_N					
		i_NOx+1)				
		02-Krig				
		02-StdDev				
	Pop99					
		cl-NO2-Mear				~
	t TDC -	el MO2 Deab	- T			
Output						
Out	put File	ng\Air_Quality	y\public\	netCDF	nd 🕴	
Coordinate	System	WGS 84 / UTI	M zone 3	32N \	Mor	e
Export projection header						
		Ready to	o run.			
?			► Ex	port	Xo	lose

Note: It is not possible to write netCDF files that exceed 2 GB.



Statistics

EDA - Variogram lag slider

In the 2023.12 version, a new interactive feature was added to the **Exploratory Data Analysis** task for the computation of variograms: the **lag slider**. The **Slider**

can be activated by clicking on the **button**. With the **Slider** enabled, it will **pre-compute all the variograms** for all multiple lags of the Slider step value up to a maximum (= Maximum distance / 2).

The pre-computation of the variograms was extremely long (mainly with omnidirectional variograms) so we improved the performance by changing several computation parameters. When the slider is activated:

- The lag tolerance is now fixed to 50%
- No refined lag can be computed.



The calculation time is now much better than before: with or without the slider activated, the task takes the same amount of time.





Performances of variogram calculation (~300,000 samples)

We also fixed several issues due to the new slider mode:

- In the original version (2023.12), the interactive slider management broke some update mechanism in EDA. It was especially visible when the Auto apply was off: modifying any parameter related to the slider (i.e. granularity, lag or maximum distance) led to a recalculation update while it should not.
- Isatis.neo asks the user to define a lag value and a maximum distance. But internally, to copy the behaviour of Isatis Classic, the latter parameter used to be converted to a number of lags. A new maximum distance would be calculated, replacing the user-entered value.
- No mechanism existed to globally set the **vertical bounds** for the different slider-step-lag values leading to many changes in the vertical axis bounds when using the interactive slider. So we fixed it to the **90% quantile** (in order to filter possible high values).

Quantiles calculation

Isatis.neo previously calculated quantiles by first sorting the data. Sometimes this sorting is necessary (when computing NP-plots), but when only a fixed set of quantiles is needed, another algorithm to find the wanted quantile(s) will usually be faster. So we implemented **Andrei Alexandrescu's adaptive quickselect** to improve the performances when computing the quantiles.



This improvement is visible in the **Statistics** and **Statistics by Category** tasks. With large datasets, quantile calculation was sometimes not possible (*Not enough memory*) and sometimes very slow.

Here is some comparative tests between 2 versions of Isatis.neo (2023.12.1 and 2024.04):



PCA/MAF backward transformation

It is now possible to generate the backward transformation of macro variables as simulations. The index **All indices** can be selected in each row. In this case, a macro variable (one index per realization) will be automatically generated on output.







PCA/MAF	PCA/MAF Transformation Backward - 🗆 🗙								
Input data									
Transformatio	Transformation								
PCA/MAF macro 🕘 Drillholes / Composites 5m / test macro-PCA 🛛 🖓									
Mod	Mode from PCA \checkmark to Raw \checkmark Print								
Data table	Block model 75x75x15m		8						
Selection	1		~						
Contex	t		:ģ:						
Variable patterr	%context-%label[%index]		<u>ې</u> د						
Use Hint	Variable		•						
☑ 1	TBS-test-test macro-PCA_#1-Simu	_ ⊗ √ [All indices \vee						
2	TBS-test-test macro-PCA_#2-Simu		All indices						
☑ 3	TBS-test-test macro-PCA_#3-Simu		2						
			3						
Output data			5						
Save as ma	010								
Contex	Back Transformation		0 1						
Variable patterr	%context-%var		🥴 🤤						
Save Hint	Name		:ĝ:						
🗹 Fe	Back Transformation-Fe		-\$r						
Mn	Back Transformation-Mn		÷						
🗹 Р	Back Transformation-P								
Display									
Variable in			~						
	Ready to run.								
?	? Run X Close								

Interpolation

Accuracy plot

A new tool is available to check the **model of local uncertainty**: the **Accuracy plot**. It compares the probability interval against the actual fraction of true values that are inside the probability interval.

Example: For a probability interval of 50% (defined by the P25 and P75), we expect that over the study area, 50% of the true values are inside this probability interval.

The procedure is repeated for a series of probability intervals to create the accuracy plot.

To create the plot, the task needs several parameters:





- The input geostatistical set which contains an anamorphosis (gaussian variable). You can select an optional Selection variable and modify the Variable of interest (if several Gaussian variables are available in the Geoset)
- A Neighborhood (unique or moving).

Note: With a moving neighborhood, the parameters of the 2 tabs **Capping** and **Nested** are disabled in this task.

- The Computation Mode. Two modes are available:
 - **Simple Kriging**: This mode uses the cross-validation calculator to cross-validate the Gaussian variables and create the standardized error.
 - **Turning Bands Simulations**: Non-conditional simulations are performed on input data and for each simulation, we cross-validate the variable and create the estimated residual variable r* on input data. For this computation mode, several parameters are mandatory:
 - The number of realizations to be performed.
 - The number of bands (used in the simulations task).
 - The **seed** used in the TBS computation.

The graphic can be saved in a **Chart File** by clicking on the **Store chart file** button available at the bottom left of the interface.





Cross-Validation - Output selection

In this new version, we have added a new item to the Special option section: **Use customized output selection**. It is now possible to calculate cross-validation on a sub-part of the data by using either a selection variable or a categorical variable.

Cross-Validation - Main	Parameters	– 🗆 X
Input		
Geostatistical set	In-SiO2 (raw + gaussian)	🛿 🗸 Print
Data table Drillholes	/ Composites 5m	
Selection		~
Estimate 🖲 Raw Va	ariables 🔿 Gaussian Variables 🔿 Residuals	
Stationarity option Ordinary		
Raw variables Fe, Mn, Si	02	
Special Options Collocated cokriging Rescaled cokriging	i Use local anisotropies i Use customized output selection	
Filtering model components	i 🗌 Take faults into account i	

Early Access

Grade post-processing

The new task **Grade Post-processing** is located in the **Early Access** tab. It is designed to downscale the resolution of your block model. This tool calculates local grade tonnage curves on a panel grid (variables for the quantity of metal Q, tonnage T, and mean grade above cutoff M) from estimated or simulated grade variables on a block model.

To generate the output variables, the task needs several parameters:

- The input data table which contains the estimated / simulated grades:
 - You can select a Selection and / or a Weight variable.
 - The **Main variable** and the **Secondary variables** can be either a **Macro** or a **Simple** variable (simulations or estimation).
- You have to choose on which cutoffs the computation will be performed and how to replace your N/A values (skipping the samples or replacing by zero or by the mean value).
- The **output grid** can be either created or selected from existing ones.



You may then specify several output variables:

- The QTM tab computes the Q, T, M for each cutoff, over all realizations and stores all these Q, T, M. The output is a *macro* variable for each grade variable defined on input (main and secondary variables) and for each cutoff. Each output variable has one index for each realization. The Coarsen mean, Proportions and Count variables are simple variables. They are of particular interest to be stored in case of nonmatching grids.
- The Statistics tab is only available if the Main variable is a macro variable. It computes the Q, T, M for each realization, one by one, and stores only the different statistics of these Q, T, M. The output is a macro variable for each grade variable defined on input (main and secondary variables). Each output variable has one index for each cutoff. Tick the statistics you want to compute: Mean, Standard deviation, Variance, Minimum, Maximum and/or Quantiles.

Grade Post-proce	ssing							—	×
Input			0	utput					
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Weight variable		~		Selection [Orebody					ø
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Secondary variables	_ <u>var</u>]		Ou	Output variable pattern %context-%var-%qtm-%label			tm-%label	:ġ:	
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				i					
			ſ		Name	Label	:ģ:	Preview	
				\checkmark	Q	Q	:ģ:	TBS-Fe-Simu x SIS Simu-Q_0.00 %	
				\checkmark	т	т	:ģ:	TBS-Fe-Simu x SIS Simu-T_0.00 %	
				\checkmark	М	м	:ģ:	TBS-Fe-Simu x SIS Simu-M_0.00 %	
Macro-variable indices	All	~		\checkmark	Coarsen mean	CoarsenMean	:ģ:	TBS-Fe-Simu x SIS Simu-CoarsenMear	n
Parameters				\checkmark	Proportions	Prop	:ģ:	TBS-Fe-Simu x SIS Simu-Prop	
Replace N/A values) skip sample \bigcirc by zero \bigcirc by the mean $ \mathbf{i} $			\checkmark	Count	Count	÷ģ:	TBS-Fe-Simu x SIS Simu-Count	
Main variable cutoffs	0.00; 7.00; 14.00; 21.00;00; 56.00; 63.00; 70.00 %	~ 💉 ig:							
Display scene									
in		~] Overv	vrite macro-varia	bles			
		Ready	to ru	ın.			_		
? 🐄	? 🗽								



Defect Fixes

ING-4256 - Simulations

The **accumulation above threshold** calculation was wrong. The results are now transformed using the volume and **density** (or only the surface in 2D) like it is done in the kriging.

ING-4362 - Modify 2D/3D

It was possible to change the dimension of several files but in all cases, the **compound variables** which rely on those dimensions were not updated. Now, the compound variables are also modified when changing dimensions.

ING-4505 - Variography

The variogram map did not change when you set an input weight variable.

ING-4654 - Unfolding

Increasing the number of pillars for bend unfolding could lead to very sparse unfolding models and so neglect much data to unfold. The algorithm has been changed, possibly changing results.

ING-4736 - Exploratory Data Analysis

EDA wrongly let the user create Gaussian or residuals transformation on a PPMT variable, leading to a crash when creating a variogram item on it.

ING-4814 - Unfolding

Lines Unfolding could fail and pop an error message about an existing Sel_ count variable when relaunching unfolding.

ING-4875 - EDA / Variography

The experimental variogram was recalculated after the first modification of the variogram model in multidirectional mode.

ING-4880 - Import Datamine

'DM "Ellipsoid" files (with fields XP, YP, ZP, AZI, DIP, ROLL, RAD1, RAD2, RAD3) can now be imported as points files.

23



ING-4943 - LAS Import

When importing LAS files in the mode "customized tops coordinates", it was not possible to run a single las import in a **loop** to import multiple files.

Note: The recommended simpler way of doing this is to do a single LAS import with all the LAS files directly, so the top coordinates can be defined in the UI instead of having to write a script.

ING-4947 - Variography / Chart files

Two problems linked to the **variance scaling option** have been corrected in EDA and Display Geostatistical Set tasks:

- In the Display Geostatistical Set task, if the variance scaling was checked, the chart files saved were empty. Moreover when recording a Batch file, if you popped up the task, saved without the variance scaling option, this one was activated again.
- In the EDA, if you:
 - saved a geostatistical set with the variance scaling activated in the fitting window,
 - then, you saved it in a chart file.
 - when you popped up the chart file, everything was ok. But if you closed your lsatis.neo session and reopened it, the chart file appeared empty.

ING-4958 - Cross-Validation

A parameter has been created to generate output variables for selected variables only. It is now possible to save only output variables linked to a subset of the input variable.

ING-4963 - Isatis Migration

When trying to **restore an Isatis classic backup**, an error might indicate that only projects greater than 16.0.0 can be upgraded even if it is. This would generally happen if the customer never installed Isatis on this machine. The error does not appear anymore and we can now restore an Isatis backup even if we never installed Isatis.



ING-4965 - Simulation Reduction

There was an error when the charts were empty so we fixed it and we add an status error when the number of simulations or combinations are too low for the genetic algorithm.

ING-4966 - EDA

The **display of pairs** in experimental variogram **as histogram or curve** was broken when using the lag slider.

ING-4970 - Uniform Conditioning

We have set the **tonnage correction maximum** to 10 and a status error is displayed if the value is 0.





Isatis.neo 2024.04.1

Defect Fixes

ING-3800 - Import Mesh

In the CAD Mesh import, the import of some files that contains meshes POLYFACE polylines fails. Teigha Library we are using to import those file cannot handle such wireframes described with too many vertices, because the original format specification don't support them. Now, a new error message is displayed:

Too many vertices in Polyface mesh. Unsupported file format. Please consider STL/OBJ/MSH.

ING-4800 - PCA/MAF

When performing MAF transformation with several variables (at least 1 of which is **purely heterotopic** with the others), an **error** appears:

```
PCA/MAF update failed.
```

Operation GgcPca failed: GgmVariogramExpData::_getTable: invalid direction rank or tables not created

Indeed, PCA and MAF algorithm are based on the correlation matrix, which can't be computed in case of pure heterotopy. Now, an early and explicit error is thrown to explain that PCA needs **at least three homotopic samples** to work.

ING-4884 - 3D Viewer

In the 3D viewer, when activating clipping, moving the plane manipulator changed the orientation. The final orientation of the plane was well kept but the angles looked strange. This also had an impact on the sections created for the 3D scene with a default rotation for the section also showing a strange value.



ING-4944 - Calculator

When using the calculator, a simple call to **plt.show()** would **crash** the application. This has been a longtime issue in the calculator linked to the multi-threaded aspect of the calculator. However, sometimes, even calling savefig to save a png image might crash the application on some configurations. Now we force the matplotlib backend to agg in calculator.py before running any operation in the calculator. It is still possible to call plt.show() in Batch python scripts.

ING-4972 - EDA

With a multidirectional variogram, if you sent an individual direction's graphic to the report, then the caption said that the angular tolerance was 90°. And if you sent the 'all directions' or 'horizontal directions' graphs to the report, then the caption showed the parameters for the first direction.

ING-4973 - EDA

When saving a geoset with the zero effect option (anamorphosis + zero effect + gaussian model) an error message appeared:

```
Create Geostatistical Set failed!

Operation GgcZeroEffect failed:

Operation GgcGibbs failed:

Operation GgcGibbsIter failed:

'__cdecl GgcGibbsIter::BigMatrix::BigMatrix(int,const class

QString &,bool)' in file 'simu\GgcGibbsIter.cpp' failed:
```

Unable to reate a file in

The number of data was great enough to use the option "save big matrix on disk" during the Gibbs sampler. Unfortunately, the path was not defined in EDA.

ING-4974 - EDA / Variography

When using the multidirectional mode to make a variogram with only one direction, the default was to set a slicing width to "distance max / 2" (not expected by the user).

Now the default slicing width is set to undefined with only one direction. And if the angular tolerance is 89.9+ degrees, the default slicing width becomes undefined, otherwise it is reset to "distance max / 2".



ING-4683 - Variography

The variogram sills normalization was wrong when using the **zero-effect mode** with a high proportion of zeros. We fixed the Hermite calculation of truncated variance and did a post-hoc correction so that the transformed variance agrees with the sample variance.

ING-4984/4998 - Kriging / Neighborhood

In the neighborhood parameters, the target block mode caused several problems:

- Several parameters were taken into account during the kriging computation when they shouldn't be (*Spread samples over categories*).
- An error appeared when using the option **Local anisotropies** (on the variogram structures) and the target block mode:

```
Some kriging runs failed:
Kriging :'class std::unique_ptr<class
GgcKrigingExt,struct std::default_delete<class
GgcKrigingExt> > __cdecl
PttKrigingTaskPrivate::createCalculator(bool,const class
GgdDataSetPoints *,const class GgdADataSet *,const class
GgdDataSetPoints *,const class GgdDataSetPoints *,const
class GgdDataSetPoints *,int)' in file
'interpol\PttKrigingTask.cpp' failed:
```

Cannot get the neighborhood rotation convention

• The status error when using **Local anisotropies** was not working well when the target block mode was activated (it was not a blocking error as it should be).

ING-4985 - Accumulation variables

The accumulation variables were always overwritten even after a re-run (the already existing accumulation variables are compatible with the run):

- In the **Kriging** task, the variables were overwritten without a message.
- In the Simulations and MPS tasks, a popup message was always sent to warn the user that the accumulation variable will be overwritten.

ING-4986 - Create list of value

When saving in batch the **Create list of values** task, the application **crashed**.





ING-4987 - Grade Tonnage Curves

An error message was sent when using a 2D subblock file even if we defined a volume variable:

```
Error during build report tables.
Operation GgcReporting failed:
Operation GgcReportingStats failed:
'void __cdecl GgdVariableRules::_checkRoles(void)' in file
'data\GgdVariableRules.cpp' failed:
In the dataset 'Input' the number of variables associated to
role 'BLOCK_SIZE' is invalid.
Number of variables = 2
Expected number = [0,0]
```

Now, a thickness variable can be used. It is not mandatory except if we choose the tonnage option.

ING-4989 - Kriging

Since the 2023.12.2 version, when checking the Sampling density variance option, DU/DV/DW parameters required for defining the super block size had disappeared. Moreover it was possible to set a super block size smaller than the block size of the output (which was a nonsense).

ING-4990 - Catalog

When creating a new catalog from the explorer, an error appeared:

Run task **Create catalog** failed. No name given to create a catalog.

ING-4991 - Variography

In the variogram fitting with constraints, in multidirectional mode, the global orientation could remain locked when disabling it and **Deduce raw model from gaussian** was not usable with mixed rotations.

ING-4992 - PCA/MAF

Several problems fixed:







- Any modification of the **Color** variable wasn't applied (only when launching the first calculation)
- Setting a **litteral** variable **crashed** the application (automatic apply)
- The documentation was wrong about the illustrative variables.

ING-4993 - Variography

The variogram lag sliders can become unusable if reducing the maximum distance to zero. Doing so with the granularity might lead to a **crash** of the application.

ING-4994 - Variable Capping

When running the variable capping with 'auto percentiles' chosen and a custom cutoff entered, there was a crash when **running** the task. It was due to a wrong rank assigned to the output variable.

ING-4995 - Create Mesh from Isovalue

The application crashed when using the volumetric mode in the task **Create mesh from Isovalue**. It was due to the update of the CGAL library.

ING-4996 - Simulation Validation

When a project contained a dataset with a **lot of macro variables** (>1000 with 100 realizations in each), opening the project took a little time and **opening** the Simulation Validation task took a **very long time**. The same fix has been applied to the following tasks: **EDA**, **PCA/MAF**, **PPMT**.

ING-4997 - Compositing

When there is a gap in an assay table, the mode '**spread residual sample in all others**' could include the gap in a composite.

ING-4999 - Grade Tonnage Curves and Tables

In the **Grade Tonnage Curves and Tables** application, if you chose to report results by mesh (i.e. checking the Solid Selection option and selecting Per Mesh) with only one selected solid, Isatis.neo **crashed** when running the task.





ING-5000 - Estimation Validation

In Estimation Validation, if one tries to use a subblock file and its Block definition Volume as weights, the error **Create weights failed** pops up and no calculation occurs. Indeed, the block definition volume is already taken into account, so this is wrong to select it as it would weight by weight²! A warning has been added in the UI and if one still selects it, it will be ignored in the calculation of the final weights being the product of the weight variable selected and the subblock volume.

An internal copy of the input weights variable is done and does not work with the Volume compound. Duplicating the volume to a single variable would workaround the issue.

ING-5001 - Variography

In EDA, if you have a lag slider activated, then the **lag tolerance** is necessarily 50%, and there can be **no refined lags**. But these fields were **still editable** in the experimental variogram advanced parameters. So we fix the enabled state of the refined parameters.

ING-5002 - Import Isatis (GTXserver)

Using the GTX server borehole importer or the Isatis migration project, if the coordinates of the header was below the first begin coordinates of its corresponding line, the **desurveying modified the coordinates** of the line. So the import gave some tiny differences from Isatis to Isatis.neo. So we removed the desurveying in the import and did what it is done in the Datamine boreholes import.

ING-5004 - Explorers

Using **html tags** (or uncompleted html tags like "<") as names for **Geostatistical sets** of **Neighborhoods**, did some display issues in the different **trees**.

ING-5005 - PCA/MAF Forward

If no completion was defined to reassign the undefined values, **Scatter plots** were based on points common to each pair of variables, while correlation coefficients were calculated on points common to all variables. This could be a bit confusing if the data show strong heterotopy. The cross plot and raw histogram in "no completion" mode now use a selection to use only valued samples for all variables.





ING-5011 - Calculator

After installing or upgrading to Isatis.neo 2024.04, running the software might with a user profile containing **non-ascii characters**, it showed an **error** dialog indicating:

Python Initialization failed. This might lead to further problems.

And the calculator was not working. Now, the non-ascii characters does not cause any issue with the Python initialization.

ING-5012 - Exploratory Data Analysis

Non-ergodic correlograms were calculated **incorrectly** when using **weights**, because the sum of weights was wrongly rounded down to the nearest integer. For very small numbers of pairs and small weight values, this could lead to correlogram values being plotted at a value of zero.

ING-5013 - Calculator / Batch Run

The **scikit-learn** installation was broken in 2024.04. Using it (for example kmeans fitting) in the batch or in the Calculator would get a python error about cpu_count. The fix was to replace the joblib component in the installation.

ING-5016 - Import Datamine

Import did not support cases where all the **samples in a borehole** were **not contiguous**, and only threw an **error** during import, aborting it. The import of boreholes now supports the case where all the samples in a borehole are not consecutive in the file (by sorting them before importing).

ING-5026 - Import Mesh

We improved the **error message** displayed when trying to import a **DWG object** which has no **3D mesh data** in it:

The DXF/DWG Mesh Import can only read DXF/DWG files that contain 3DFace or Polyface objects. To import 2D files, you can use the Import Geographic Vector file from the 2D Map (the file will be visible as a layer from the view) or the Import Vector File (OGR) from the ribbon (the file will be added in the Data tree).



ING-5027 - Import Isatis.neo

In the Import Isatis.neo task, when importing several times the same datasets without deleting the previously imported one, some errors were displayed:

- Delete component 'Grids / MB / Grid Cells / rot / rot:Angle 1 (+Z)' is forbidden.
- Cannot get int value: SQL Query: 'SELECT support_id FROM SupportChild WHERE SupportChild.sc_id = 42904;'.

To avoid these problems, a special case has been added to the task when copying compound variables as rotations.

ING-5028 - Geostatistical sets

When a project had **thousands of geosets**, the model was reset often and could **take a very long time**:

- creating/ deleting variables
- closing the PPMT window after calculation...



Isatis.neo 2024.04.2

Defect Fixes

ING-4971 - MIK Pre-Processing

If you were in quantile mode without the auto values, the indicator values corresponding to the **quantiles** were not modified if the weight variable changed.

ING-5014 - Kriging

Kriging or Quick interpolation tasks **takes longer and longer** to run each time you choose a different configuration. This was particularly visible with a batch that would run over a lot of domains or indicators for example. It was because of the folder where the **Estimation Manager** task stored its estimations: it was madly managed and the only workaround was to clear it from time to time.

ING-5025 - Mixed Support Kriging

When ticking the 'Raw variogram is considered as fitted on a non-point support' option, you have to enter the sample size. This size had a **minimum** of 25m x 25m x 25m which have been changed.

ING-5029 - 3D Viewer

The clipping manipulator was not updated when moving the clipping plane with the arrows.

ING-5032 - Installation

Isatis.neo could not be started under Linux if they were launched from a symlink to INSTALLATION_FOLDER/bin/isatis.neo. It is now functional.

ING-5036 - Migration

We fixed the migration of **text variables** using the 'Migrate from nearest neighbor' option with the toggle 'Use anisotropic distances' (causing an error), and the statistics print of the migration when there are text variables.



ING-5037 - Multiple Points Statistics

The **Proportion acceptance threshold** was not taken into account in the calculator (it was hard coded at one step of the computation to a value of 0.001).

ING-5038 - Rotation conventions

In **2D**, the **list of rotation conventions** was still the 3D list, instead of the 2D list (Mathematician of Geologist). We now verify the rotation conventions compatibility in 2D and 3D environments.

ING-5039 - Installation

The uninstaller for Isatis.neo is now a signed executable for the case where the user cannot run unsigned executables. Also, the uninstaller left a copy of FusionExporter that might not be removed during reinstallation.

ING-5041 - Variography

Since the 2024.04.1 version, if you select the **Auto apply** mode, adding a new variogram did not automatically launch the calculation.

ING-5042 - Estimation Validation

In Estimation Validation, if the input data tables are two **non-matching grids**, and you ask to display a cross plot, then there was an error. Non-matching grids were not correctly handled to calculate the X-plot.

ING-5044 - Import / Export Vulcan

Vulcan 2024.1 has an API change/enforcement in maptek.vulcan.block_model constructor now having name and mode as required arguments. This change would make the import fail in current version of Isatis.neo. We now made it compatible with the new Vulcan version.

ING-5048 - Variography

The **Variogram fitting normalization** was wrong when using a **minimum nugget constraint**.



ING-5049 - Tooltips

In the **list of double values** (quantiles, cutoffs, thresholds, etc), there is a **tooltip** when hovering the closed list widget (to show the whole list of values that is otherwise elided). However, when using a not saved to named list item, the **tooltip** could be **wrong**. Now, the tooltip is updated when changing the values.

ING-5050 - Batch Record

Sometimes the **Batch record** of a **new task** did **not update the Batch file** without showing an error. Now, we try to save the Batch file 5 times with a delay. If it still fails, a message is popped.

ING-5052 - Geostatistical Sets

When grouping geostatistical sets by data table, the data tables would likely be **out of alphabetical order**. They are now sorted correctly.

ING-5051 - Create Sparse Grid

It is now possible to create a new sparse grid from a selection defined on a sparse grid.

ING-5056 - Create Grid File

In Create grid file when using an existing sparse grid as input, in combination with the "use only existing cells" option and trying to use one of the "fit to selection" or "Extract from Indices" modes, the generated grid was not at the expected location.

ING-5057 - Geostatistical Sets

A geoset saved with stationarity option Simple Kriging can be **modified to Ordinary Kriging** using the **'Modify Stationarity Option'**. However, if you saved this task and ran it from a batch, it was never modified to Ordinary Kriging.

ING-5058 - Kriging

Conditional expectation could crash after the run when not using thresholds.



ING-5060 - Unfolding

Unfolding lines could lead to them being in **reversed order** in Projection (and Vertical Shift) mode. The lines inversion is now applied only in Bend mode, where it's the most relevant.

ING-5061 - Export Geostatistical Sets

When exporting variograms to CSV/XLS, the **global orientation** can be written once (before the structures) or in each structure, but this behavior was controlled by the orientations values.

Now, when a different orientation is set for each structure, it is written in each structure, and when the orientation is the same for all structures, it is written once before the structures.

ING-5062 - Border Analysis

In the Contact Analysis tab, you can choose a reference domain and which other domains you want to analyze. But when you change the other domains, the graph was the same, except for the color.

ING-5063 - Installation

There were several installation problems under Ubuntu 2022.04 or Redhat 8:

- We add the missing libiuc*.so.66. Each version of Linux comes with its own version, so we just install these ones so that it works everywhere.
- We add the needed dependencies for xcb for Ubuntu 20.04 and Ubuntu 22.04.

ING-5065 - Isatis Migration

If the user has never installed Isatis on their machine, the %APPDATA%/Geovariances/Isatis folder may not exist. When you want to migrate an Isatis Classic project to Neo, the project was not added to the list.

Also when a backup is restored and converted, it uses a temporary folder and attaches it. When the process completes, it is removed but the list still showed this folder being attached.



ING-5066 - Batch Explorer

When renaming a folder's name, the renaming is not applied if the folder contains another folder. It should now work and if, for any reason the folder is locked, a message will now pop up.

ING-5067 - Export CSV/XLS

In some cases, the **custom unit** attached to a variable might **not be properly taken into account** in the CSV Export. For example, if one uses Copy Stats to Tops with a Grade (%) variable with a length Variable (in m), storing the weighted mean, the output would have a custom unit (with no unit class but a unit %*m). Exporting it would store wrongly scaled values.

ING-5068 - Import Supervisor

The Supervisor import was unavailable in the release 2024.04.1 (due to a missing *.dll* file).

ING-5069 - Multiple-Points Statistics

In multivariate categorical simulations, if the variables are not in alphabetical order, the simulations stopped at the end of the run. The application could also crash if we tried to saved some post-processing outputs.

ING-5072 - Variography

If we saved the EDA task in batch with a multidirectional variogram of a 2D dataset, when we try to run the batch, the geoset was not saved. In the Messages window, this warning was displayed:

Last modifications were not applied. Push 'Apply' button to update.

Bug linked to "ING-5041 - Variography" on page 35

ING-5075 - Export Datamine

When exporting a Grid but with coordinate in foot (or in another unit than meter), the centroids coordinates were wrong in the *.dm* file. The conversion of units was done twice, but only for centroids (the cell corners and XINC, YINC and ZINC were correct).





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