DATAMINE

ISATIS.NEO

Isatis.neo 2024.12

Release Notes

ISATIS.NEO

DATAMINE

Contents

Overview

Isatis.neo is a sophisticated solution offering unmatched flexibility for geostatisticians and mineral resource estimation geologists. It provides a wide range of statistical and geostatistical tools designed to efficiently achieve precise resource estimations while adressing unique project challenges. Automatic parameter settings streamline processes, while advanced users can modify parameters for greater precision and control. Its intuitive interface, combined with cutting- edge parallelised algorithms, ensures both ease of use and high-performance computing. With Python integration for enhanced extensibility and batch processing capabilities that guarantee traceability and reproducibility, Isatis.neo enables seamless adaptation to various configurations and empowers users to customise their workflows with confidence.

ISATIS.NEO   DATAMINE
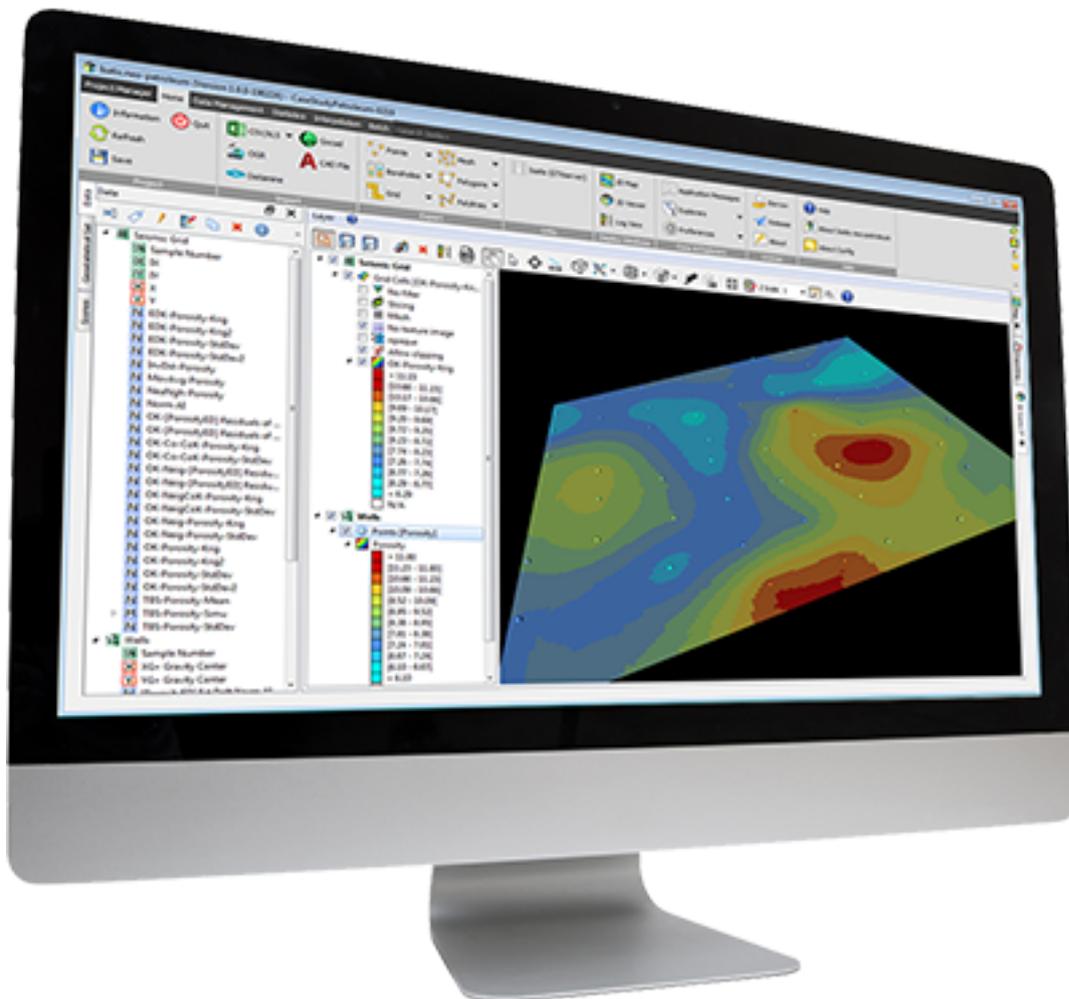
Licensing

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 the Customer Support Portal and on Geovariances' website 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 via the Customer Support Portal 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 Customer Support Portal or via the Geovariances' website.

Isatis.neo 2024.12

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Python

Isatis.neo 2024.12 has **additional packages** added to the distribution:

- **netCDF4**: A Python library for creating, reading, and writing **NetCDF** files, commonly used for scientific multi-dimensional data.
- **xarray**: A library for labeled multi-dimensional data analysis, extending NumPy with metadata and **NetCDF-like** functionality.
- **pyarrow**: A library for efficient, columnar memory storage, data serialization, and interoperability with big data tools. It can be used to read / write to Apache **Parquet** and Apache **Feather** formats.

Import / Export

In **Isatis.neo Mining edition**, the interoperability of Isatis.neo with other products has been improved by the addition of:

- A SEG-Y Import / Export task to deal with geophysical data.

  The **SEG-Y Import** interface is designed to load into Isatis.neo seismic data from a seismic cube stored in a SEG-Y binary file. Only one seismic attribute may be loaded at one time. Only SEG-Y files in which specific fields are filled can be read. It will create a grid file, traces or points, depending on the file content, in the current project of Isatis.neo with one variable only.

  The **SEG-Y Export** interface is designed to save data coming from Isatis.neo and defined on a regular 3D grid into the SEG-Y format.

- A **LAS Import** task to load log curves stored in LAS v2* files into Isatis.neo. More information about LAS file format can be obtained on Canadian Well Logging Society Web site.

These tasks were already available in the Standard and Petroleum editions.
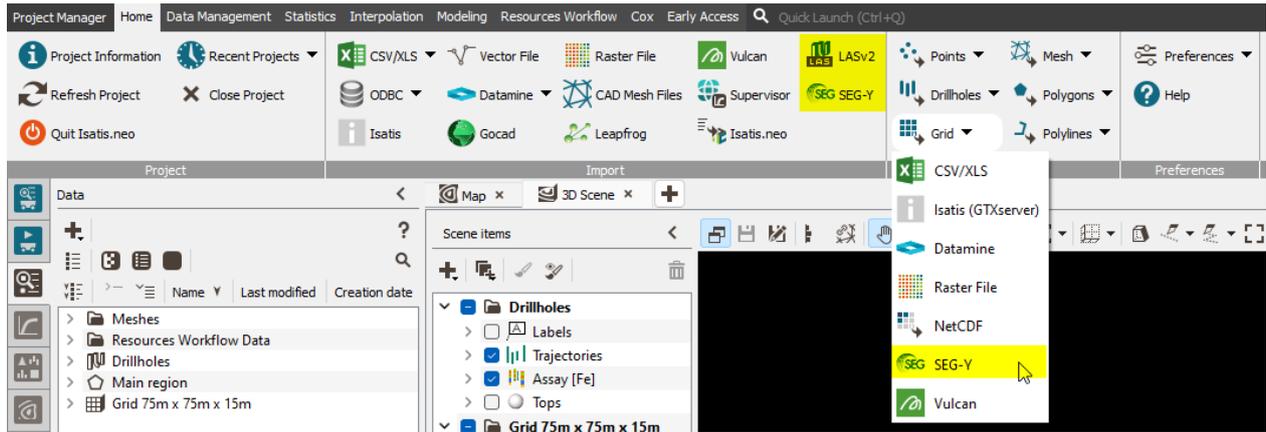
In the **Eclipse import / export** *(available in Standard and Petroleum versions)*, a new field has been added to specify the numerical value which encodes the **undefined values**.
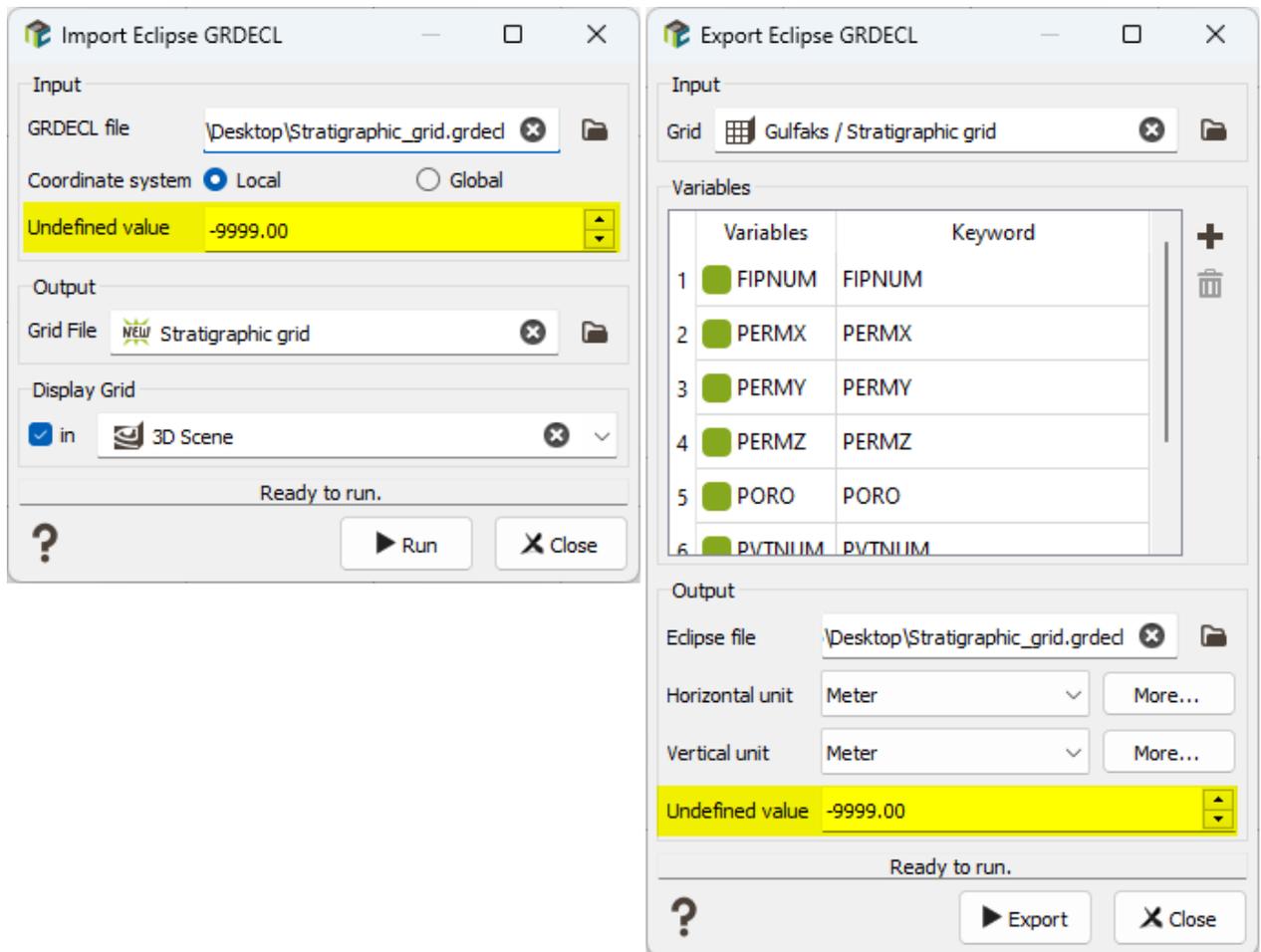
Import Supervisor improvements – multi-domains

The import of variograms from Supervisor has been improved. This import can now take into account a combination of several variables / domains in order to create a selection variable representing the samples used to calculate the variogram.

The following logical conditions are supported for the import (categorization in Supervisor):

- == or != for Numerical, Categorical, and Alphanumeric variables
- <, <=, >, >= for Numerical variables
- IN, NOT IN for Categorical and Alphanumeric variables

Statistics

Multivariate data imputation

Heterotopic data analysis is very common in resource estimation processes, for instance due to historical database completion. Multivariate transformations such as PCA, MAF or PPMT are more and more used in order to model complex geological deposits but require homotopic samples, i.e. samples where all the variables are defined. By consequence, you take less information into account that you have.

To help using all the available information, a new **Multivariate Data Imputation** task has been created to complete missing samples. It offers three different algorithms:

- one very basic which assigns the mean value of the variable
- one based on collocated simulations which works well in the case of linear correlations
- the gaussian mixture model which proposes an alternative to handle more complex correlations

The task shows an interface similar to the EDA interface with four sections: **Input**, **Charts**, **Parameters**, and **Controls**.

The task generates cross-plots (with associated correlation coefficients) and histograms to compare the results before and after the computation.
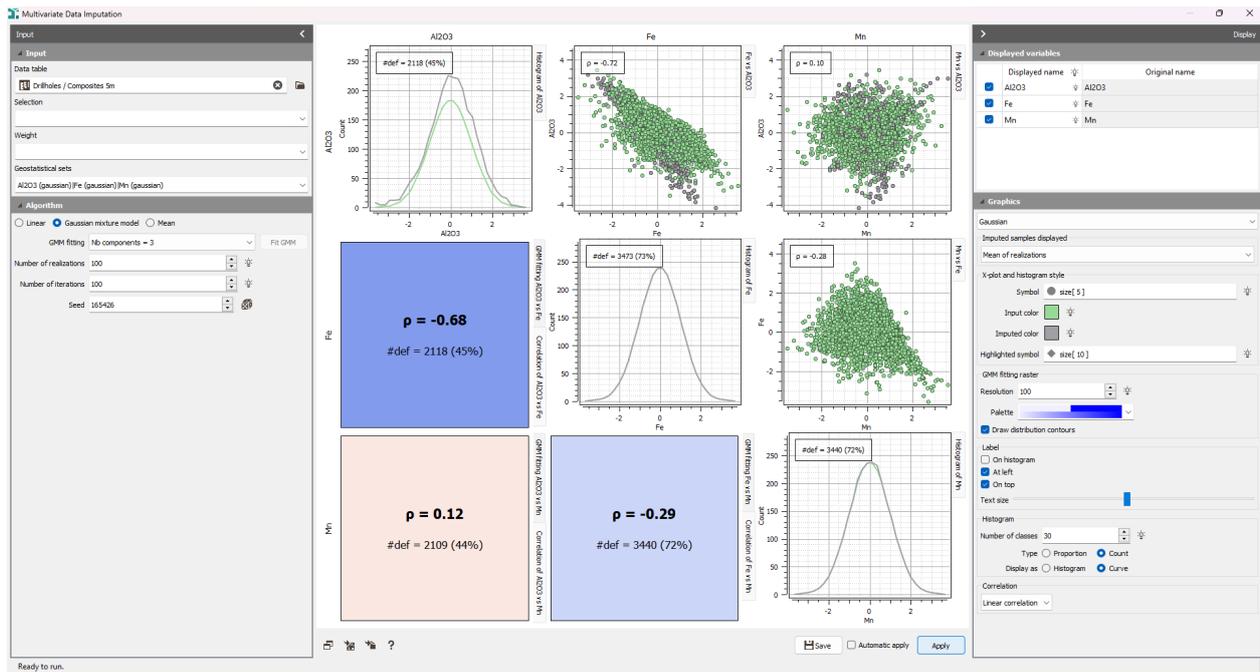
Exploratory Data Analysis - Display variograms

You can **Activate** or not several directions: the activated directions will be drawn in the graphics and the other ones will not.

> **Note:** All the experimental variograms in all the directions are computed and used for the variogram fitting step (even when not activated). This feature is mainly used to compare variograms on a direction-by-direction basis without having to recompute for each change of direction.
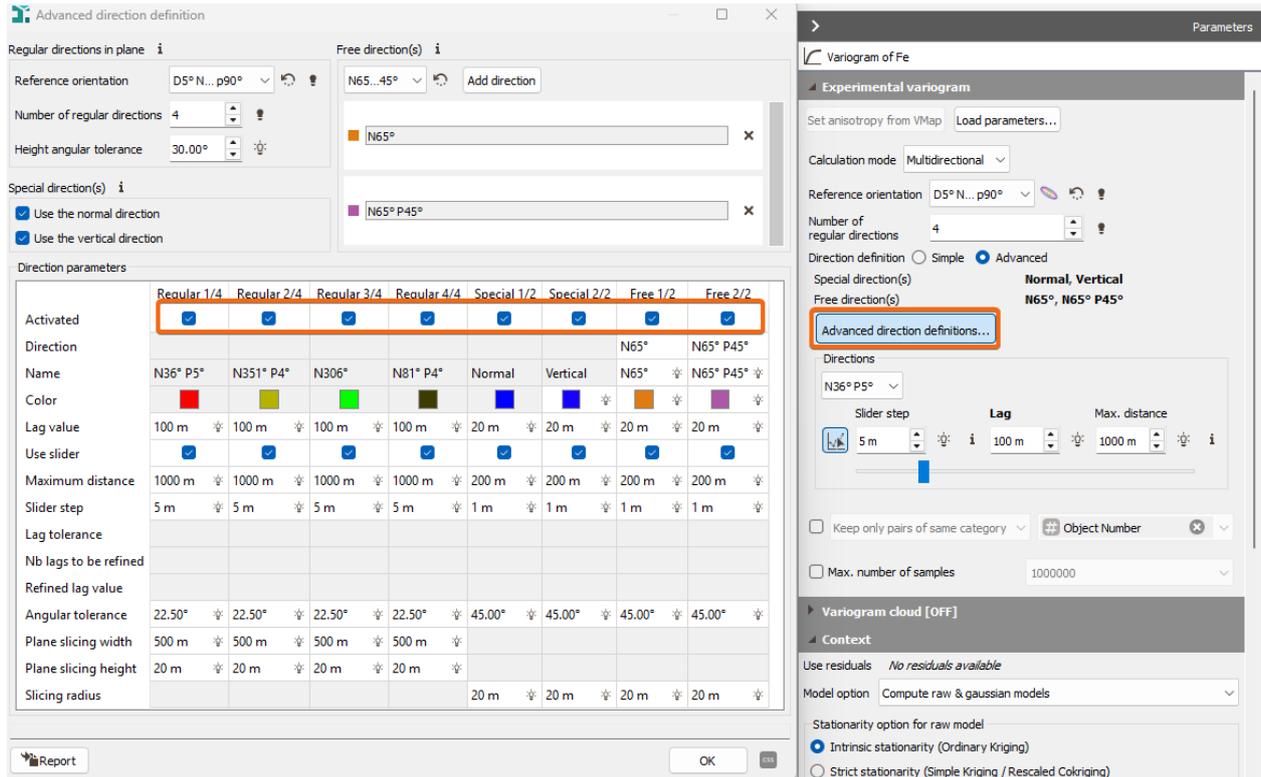
Support Correction – Display SMU Gaussian experimental variogram

The quasi- experimental SMU Gaussian variogram obtained from a Gaussian change of support (DGM2) can now be displayed through the Geostatistical Sets Explorer.This allows you to verify if the automatic model fitted from the Support Correction task is appropriate. If needed, you can edit the SMU Gaussian variogram model and modify the associated parameters.

Print Geostatistical Set — ☐ ✕

Geostatistical Set [▨] Fe (raw + gaussian) - Rich ore ⊗ ∨

4/12

- ☐ Statistics
- ☐ Gaussian Statistics
- ☐ Gaussian Correlation Matrix
- ☐ Raw Experimental Variogram
- ☐ Gaussian Experimental Variogram
- ☑ Raw Point Variogram Model
- ☑ Gaussian Point Variogram Model
- ☐ Point Anamorphosis
- ☐ Support Correction
- ☑ Gaussian SMU Experimental Variogram
- ☑ Gaussian SMU Variogram Model
- ☐ SMU Anamorphosis

Rotation convention Isatis.neo ∨

Ready to run.

?   ▶ Run   ✕ Close

	Sill
	625 %²
	934 %²

	Sill
	2536
	5203
	2983

Gaussian SMU Variogram Model

Variogram Model

Structure Type	Dip	Dip Azimuth	Pitch	Ranges UVW [m]			Sill
Spherical	15°	270°	150°	283.0	285.5	113.0	0.6329
Spherical	15°	270°	150°	2630	1003	506.5	0.3671
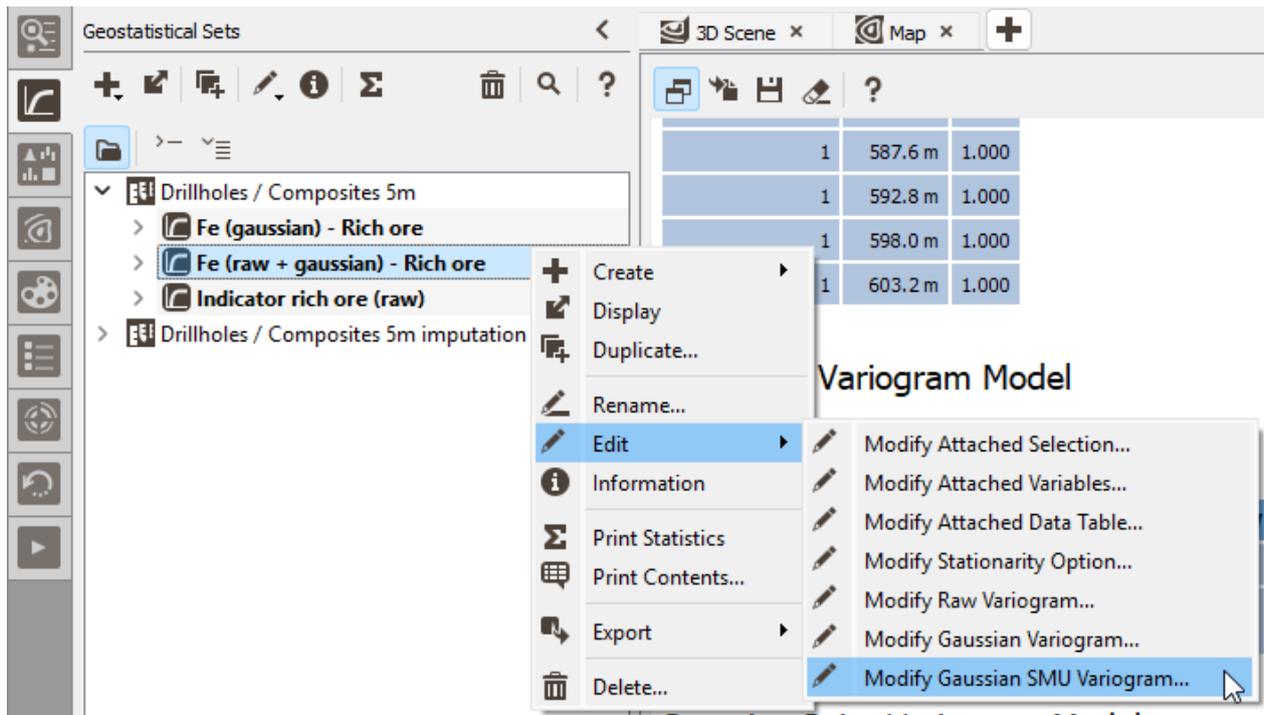
PPMT – Performance improvements

The Projection Pursuit Multivariate Transform (PPMT) tool has been improved in multiple ways:

- The calculation of Legendre polynomial derivative was incorrect: the derivative of a constant term now returns 0 instead of 1.

- An error appeared when the weight variable was undefined on some samples: the temporary selection created now excludes the samples where the weight variable is undefined.

- The Spearman correlations were calculated when not necessary: we now only calculated Spearman correlations when the user selects this option.

- Forward-transform performance are now better than the previous versions:
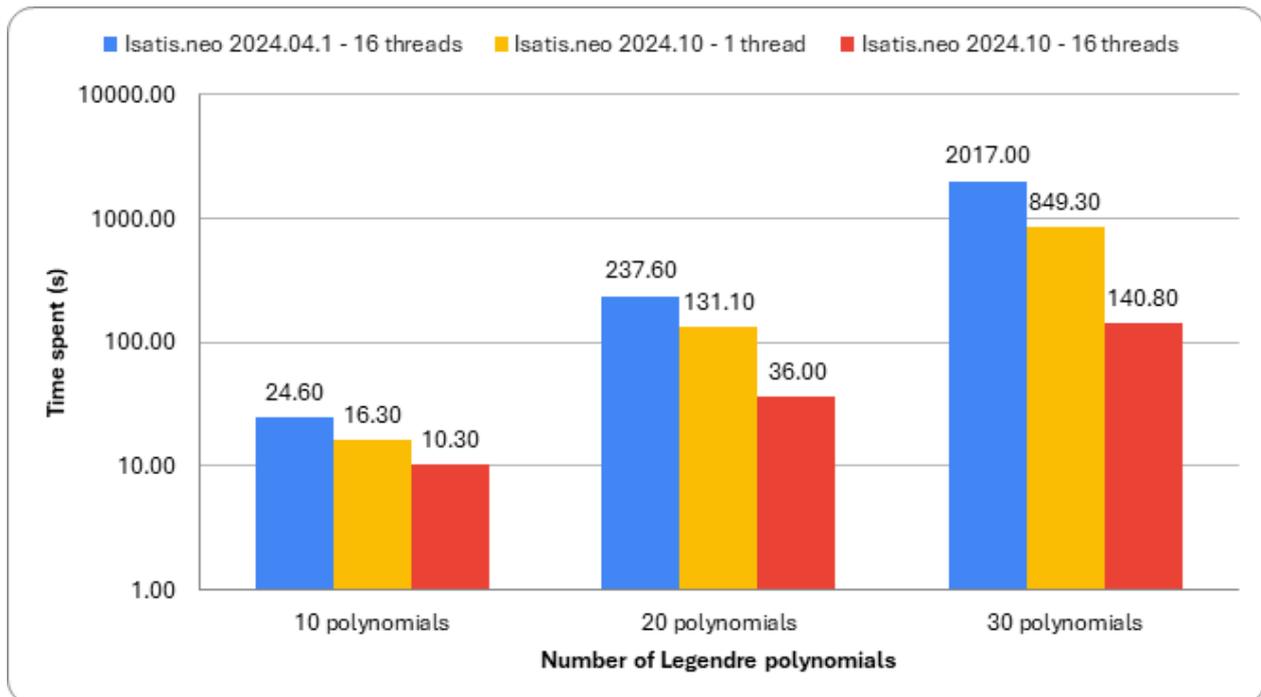
Statistics by category with macro-selection

The Statistics by Category feature has been improved to **allow categories** to be defined using a **macro selection**, including cases with overlapping domains. When a macro selection is chosen, the system creates **temporary selection variables** to intersect the main selection with each macro index, ensuring accurate categorization. This process enables the **calculation of detailed statistics or quantiles** for each category, enhancing flexibility and precision when working with complex data sets.

Interpolation

Grade tonnage curves improvements

The **Grade Tonnage Curves & Tables** task has been completely remodeled and looks like the other tasks as Estimation Validation or EDA. The same functionalities have been maintained, but the new task offers more flexibility:

- You can compute multiple tables or curves,
- Duplicate parameters between the different data sets,

- Easily define several categories / domains,
- Customize the tables to meet your specific needs and to directly copy the results in your reports,
- Display at once curves with macro simulations as an envelope. You can choose to highlight the mean or a realization of your choice.
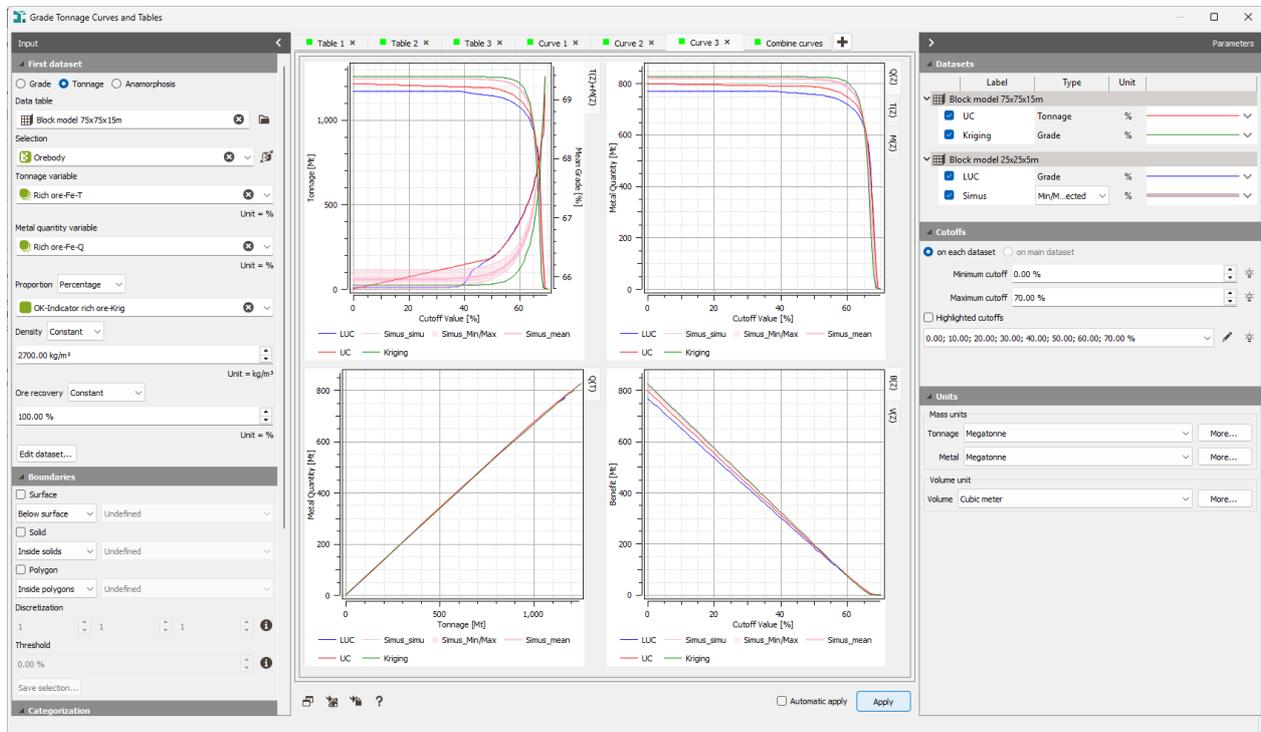
Faults in Quick Interpolation

A **Take faults into account** option is now available in **Quick Interpolation** (compatible with all the interpolation types). This method enables taking into account geographical discontinuities in interpolation. Basically, faults are used as "screens" when searching for neighbors during estimation. A sample will not be used as neighboring data if the segment joining it to the target intersects a fault. When checking the option in the first page and clicking on next, an additional page will ask you the definition of the faults to be considered. Two kinds of faults can be selected: 2D faults which are defined as polylines or 3D faults which must be defined as meshes.

Simulations Post-processing

A new **Simulation Post-processing** task has been created to perform statistical calculations on the results of *numerical* simulations (*macro* variables), such as the average of simulations, confidence intervals, probability of exceeding a threshold, etc. The tool offers the same post-processing results as in the Simulations task, but you can easily add a new statistical output without recomputing the entire set of simulations, which can be time consuming.

Negative Kriging weights improvements

A new **Reset negative weights to zero** option has been added in the **Kriging** and in the **Cross-Validation** tasks. The aim of this option consists in resetting negative weights values to zero when applying an Ordinary Kriging or a Simple Kriging. Modifying the weights generally avoids getting values outside the original range of values (greater than the minimum input value and smaller than the maximum input value).

Kriging - Main Parameters

Input

Geostatistical set   Fe (raw + gaussian)

Data table   **Drillholes / Composites 15m**

Selection   final lithology-sel   Rich ore

Estimate   ● Raw Variables   ○ Gaussian Variables   ○ Residuals   ○ Conditional Expectation

Stationarity option   **Ordinary Kriging**

Raw variable   **Fe**

Output

Data table   Grid 75m x 75m x 15m

Selection   orebody

Calculation Mode

● Point Kriging   ○ Block Kriging   i

Special Options

☐ Collocated cokriging   i   ☐ Use local anisotropies   i   ☐ Use customized block sizes   ☑ Reset negative weights to zero

☐ Rescaled cokriging   ☐ Use uncertain data   i   ☐ Use sampling density variance

☐ Filtering model components   i   ☐ Take faults into account   i   ☐ Multiple kriging

Advanced

☐ Use parcelling   i

Ready for next step: Neighborhood Definition.

?   < Back   Next >   ▶ Run   ✕ Close

Defect Fixes

ING-5010 - Collocated Co-Kriging

When running **collocated co-Kriging** with a global (**unique**) neighborhood, some auxiliary statistics were computed **without including the collocated point**, leading to incorrect values for these variables. This affected the **covariance** between true and estimated values, **variance of the estimator**, **slope of regression** between true and estimated values, and the **correlation** between true and estimated values. The calculations have been corrected to include the collocated point.

ING-5024 - Windows decorations

In a Windows 11 environment, certain **decorations** were no longer visible:

- in the kriging task, when you want to view the various objects, the **blue square** disappeared.
- in all 3D views, when you want to invert colors or display the compass / gnomon, the blue square also disappeared.

We now use another style to display those decorations *(This bug will be completely fixed when the QT version will be modified)*.

ING-5031 - PCA/MAF

An issue in PCA/MAF caused a misleading **"Generating charts" message** to briefly appear in the progress bar when unchecking the normalization option, even though chart updates were incomplete. The message has been removed to avoid confusion, ensuring the progress bar reflects only relevant status updates.

ING-5059 - Calculator

In the Calculator, when opening the task, the first column for aliases was by default very small and we only saw the cross to make empty the field. Moreover, if you clicked a bit on the left to expand the column, it clicked on the bulb icon, which could reset to automatic all the aliases that you had just changed. Some improvements have been made to avoid this bad interface behaviour:

- Add back the label on alias column so that is more explicit and larger by default,
- Remove the Clear icon in the alias column (indeed in any table trying to remove the X from the table in string fields),
- Do not animate the auto button on mouse hovering if also on the resize handle, do only check for mouse release on the auto button if originally mouse pressed.

ING-5073 - Quantiles calculation

The calculation of the quantiles of a variable could be **slower** than expected in some cases. This was most severe on very large data tables in which many (but not all) of the values were equal to a constant.

ING-5076 - SPDE

An error occurred when running the Simulations task (SPDE mode) **without local anisotropy** due to an incorrect number of neighboring points in the mesh building process. The process now adjusts the number of neighbors dynamically, ensuring consistent and reliable results.

ING-5078 - Estimation Validation

Deleting one of the columns in Estimation Validation's table of variables did not work properly, with the final variable not being deleted, and possibly duplicated.

ING-5079 - Estimation Validation

When activating some weights or using subblocks plus a selection on one dataset, the calculation of the Swath Plots could **crash** the application.

ING-5080 - PluriGaussian Simulations

When manually creating a lithotype rule, the application could **crash** after deactivating the automatic computation of the lithotype rule (cleaning task missing).

ING-5081 - Compositing

In the Compositing task, if you set a domain variable but you choose to apply the same parameters for all domains, you will only see one histogram in the

last page (Statistics & Output), while the statistics are displayed by domain. So we change this behavior to have the same as in 2023.12.2, which means several histograms displayed in the last page (one for each domain).

ING-5082/ING-5083 - PluriGaussian Simulations

While trying to use Local anisotropies in PGS, a speed provider **warning** and an **error** were displayed.

ING-5084 - Sequential Indicator Simulations (SIS)

SIS returned an error if the Local Anisotropies were used on variogram only, and not on the neighborhood as well:

```
Cannot get the neighborhood rotation convention
```

ING-5085 - Kriging

An issue in the Kriging task caused the **super block rotation** to incorrectly use the previous run's rotation instead of aligning with the output grid rotation when using **SSDV**. The grid rotation is now correctly displayed and applied to ensure accurate alignment during the task.

ING-5086 - Copy Statistics

The output pattern in Copy Statistics required *%var* to be included, which is not necessary when there is only one input variable. Also, the *%label* was mandatory even if only one output is asked for.

ING-5087 - Support Correction

Support correction Information Effect SMU variances did **not update** when switching from manual to automatic mode.

ING-5088/ING-5150 - PGS and SIS

The constant proportions were **not updated** when changing the input selection.

ING-5092 - Kriging

Saving kriging weights with the collocated cokriging option caused the kriging variable to be empty due to an undefined sample number. The issue is fixed by assigning -1 to the additional sample and skipping it during saving.

ING-5093 - Support Correction

When running the Support Correction task, a Statistics table is displayed in the Messages window.

It was unclear wherever the Support Correction displayed in it is a Real Block Support Correction (r) or a Kriged Block Support Correction (s). Indeed, when it has information effect enabled, it was only the Kriged Block Support Correction being dumped when both factors are interesting to get.

The letter of the formulas is now indicated, and two lines will be present in the case of Information Effect.

ING-5096 - Import DXF Meshes

DXF files containing 3DFACE objects with three vertices were imported incorrectly. The DXF format should have 4 vertices for each face, with the last vertex possibly being one of the three first vertices. In some hand-crafted DXF files that don't respect this format, the last vertex was considered to be (0,0,0), resulting in a lot of extra triangles going to the origin. In such a case, no extra triangle would be generated now.

Note that this could break the unlikely case where a 3DFACE has a 4th vertex that is really (0,0,0), but the library we use does not give us the choice to do better.

ING-5097 - Geostatistical Sets & PGS

A crash happened when editing the **stationarity option** of the Geostatistical set created in the **PluriGaussian Simulations** task.

ING-5099 - Installation

Previous versions of Isatis.neo embedded a debug version of liblzma, which prevented users from writing python script that use the lzma module directly or using other modules depending on it.

ING-5101 - Backup files

When running a backup operation, no message was present in the messages window.

Now the information about the location and backup file size are displayed in the messages and debug messages. It is now easier to diagnose problems looking at the messages window (or message log file few days later).

ING-5102 - Sampling Density Variance

Since **Isatis.neo 2023.12.2**, when using Sampling density variance, the customize block size option was forced on BUT its user interface in Page 2 was missing.

ING-5103 - PluriGaussian Simulations

The variables names linked to the Geostatistical set saved at the end of the PGS task were not consistent with what is inside the PGS task.

ING-5104 - Kriging

A crash in the Kriging task occurred when using uncertain data (interval) due to inconsistent checks for splitting the Gibbs sampler. The issue is resolved by storing the split condition as a boolean, ensuring consistent behavior and preventing crashes.

ING-5105 - Border Analysis

An input selection is applied in Border Analysis/Contact Analysis, and an output soft boundary is created. But the soft boundary selected samples could be outside the input selection.

ING-5106 - 2D Map

An issue was identified where changing coordinate units on a map with large coordinate values (>1e7) resulted in incorrect axis labels due to a caching problem with the axis scale labels. The update logic has been adjusted to ensure axis labels are recalculated correctly when coordinate units are changed, resolving this display issue.

ING-5107 - MIK Post-processing

In MIK Post-processing when using the "Class mean" option, the counts of the order-relations errors, printed to the Messages after the calculation, were often incorrect (the output error code variable saved to the data table was, by contrast, correct). This has now been fixed.

ING-5108 - Uniform Conditioning

In Uniform Condition and Localization, an **unclear error message** was shown if the output **pattern** would lead to variable names with the same name, as may happen if *%label* or *%var* were omitted. There is now a status error

message in the window that shows the missing required keyword(s).

ING-5109 - Variable Properties

The **dropdown list** of **color scales** in the Variable Properties window was too narrow, with much of the text abbreviated. The dropdown list has been made wider.

ING-5110 - Export Vulcan

Macro variables could only be imported when "Export all variables" was selected, and not when they were explicitly selected for export.

ING-5111 - Unfolding

When using the method "Bend" on and intermediate reference surface from a block model, an error was displayed: *Invalid reference surface*

Indeed the surfaces unfolded did not build/compute the intermediate surface in this case.

ING-5112 - Multiple-Points Statistics

In the MPS task, the consistency check for the **connectivity** map incorrectly flagged valid maps as invalid when they contained **undefined** values, and changes to inputs or selections sometimes caused outdated results due to caching issues. The check has been fixed to handle undefined values correctly, and the caching system now updates reliably when inputs, selections, or connectivity maps change, ensuring accurate and consistent results in the MPS task.

ING-5113 - Copy Statistics

Copy Statistics calculator from a fine 3D grid to a coarse 2D grid crashed. Now, it perform the statistics on every cells of the corresponding columns in the fine grid.

ING-5115 - Import Boreholes (CSV/XLS)

When importing drillholes from CSV in "Add Drillholes" mode from batch, the dip option was set to "Positive Downwards", even if it was set to "Positive Upwards" in the batch file.

ING-5117 - License

Under Linux, trying to verify a license key crashed the License Activation Tool.

ING-5121 - Export Vulcan

The performances of the Export Vulcan task were really bad: with a 10 millions cells grid, it took more than 10 minutes to export 1 realization of a macro.

ING-5123 - Variography

Activating‑Deactivating regular directions in advanced mode erroneously triggered variogram model fitting updates.

ING-5124 - Convex hull

Convex hull extension values to create a 3D mesh do not need to be sorted in descending order.

ING-5126 - PluriGaussian Simulations

In the lithotype rules page, the **Next** button was authorized even if the number of Gaussians provided by the variogram models and by the rules were not the same. So, we add an error message to avoid further issued in the calculator.

ING-5127 - Import Datamine

When trying to import a Datamine file that is readonly, one would get an error about the file needing read / write access with no good reason for this.

ING-5128 - UC/LUC

An issue was identified in UC tasks where Kriging/VarEstim variables were incorrectly selected when the automatic state was set to 'no', leading to unintended default behavior or missing error messages. The logic has been updated to respect the automatic state for variable selection and correctly save the pattern in the task configuration.

ING-5141 - Simulations

When taking into account faults in the Simulations task, the status ignored the change of parameters and the user could be blocked in the Faults definition page because of the wrong status error.

ING-5142 - Unfolding

Unfolding from block model could lead to non‑flat block model data in unfolded space due to a wrong fitting of the generated reference surface.

ING-5143 - Quick Interpolation

When using the Nearest Neighbor method with the parcelling option on, it led to a blocking status error:

```
Please extend the parcelling size
```

We moved this message in the Neighborhood page instead of the Parcelling page.

ING-5144 - Calculator

A **tooltip** was added in the Calculator interface to explain the variables' behavior.

ING-5146 - Multiple-Points Statistics

Simulated results using MPS were **rotated incorrectly** when a **global rotation** was applied, leading to inverse rotations in 2D (clockwise instead of counter-clockwise) and scrambled angles in 3D. For **local rotations**, results were **inconsistent** depending on the rotation convention, with the DeeSse convention working correctly, but other conventions producing similar inverse or scrambled outcomes. The rotation mechanism has been corrected to ensure alignment with the specified rotation directions and conventions, delivering accurate and predictable simulation results.

ING-5147 - Calculator

In the Calculator task, when there are input macro variables, it is possible to use an option "repeat code for each macro index". However, if the macro variables had incompatible indices, then an unclear error would be shown. This has been replaced with an error message describing the problem of incompatible indices.

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Defect Fixes

ING-4471 - 2D Map

An issue occurred when attempting to display a very large grid (160 million cells) on the 2D map, resulting in repeated memory error messages and failure to display the grid, despite the layer being created.

ING-4471 - 2D Map / 3D Viewer

An issue prevents displaying very large 2D grids (300 million cells) or equivalent 3D grids in both the 2D map and 3D scene, resulting in memory allocation errors in the 2D map and non-responsiveness in the 3D scene. Unlike Isatis Classic, which handles these grids without issue, this limitation blocks functionality without a workaround, requiring grid display improvements to resolve.

ING-5153 - UC/LUC

The infinite nested neighborhood option is now available in UC/LUC.

ING-5155 - Import Geographic Raster File

The batch task "Create Scene in batch" failed with an error when the "Lambert II etendu" coordinate system was missing from the user's configuration. The issue is now resolved by ensuring the project's coordinate system is correctly recognized and applied.

ING-5157 - 2D Map

Exporting a scene as an image produced incorrect previews and shifted or empty views when the coordinate units were changed from meters, due to improper handling of axis label values. The issue is now resolved by saving coordinate parameters in storage units, ensuring correct previews and exports regardless of the chosen display units.

ING-5159 - Exploratory Data Analysis

In EDA, cross-plots sometimes appeared empty after changing the selection or weight, with drift and residual variables also showing as empty in the Data Table. The issue has been fixed by ensuring variables are properly updated in the Data Table when selections are changed.

ING-5161 - Grade Tonnage Curves and Tables

The negative precision now works with thousand separators.

ING-5164 - Estimation Validation

An error occurred when the same variable was used twice in a cross-plot, followed by a crash if the variable was changed afterward. This issue has been resolved by adjusting the update process to occur at the correct time, preventing crashes.

ING-5165 - Cutoffs list

When editing the cutoffs list, the popup window could appear outside the visible screen area if multiple screens were used. The issue has been resolved by ensuring the window is displayed centered within the current screen.

ING-5167 - Create selection from Polygon(s)

Creating a selection with multiple polygons could select incorrect samples when multithreading was enabled, particularly on Linux systems. The issue has been fixed by correcting the cache handling for polygon bounding boxes in multithreaded operations.

ING-5168 - Grade Tonnage Curves and Tables

When "Auto apply" was selected and an error occurred in one view, other views could no longer be updated because the auto apply feature became stuck. The issue has been fixed by automatically unchecking the auto apply button when an error occurs.

ING-5169 - Estimation Validation

Adding a new column in the input table of the Estimation Validation task could cause several variables to disappear after duplicating a column or changing parameters. This issue has been resolved by updating the method used to fill

the input table when confirming changes.

ING-5170 - Grade Tonnage Curves and Tables

When using a tonnage variable as input, the unit displayed was always shown as a percentage (%), causing errors when trying to display multiple curves with different units. This has been fixed by correctly displaying the unit of the tonnage variable.

ING-5171 - About Config

In About Config, Windows 11 2024.H2 was incorrectly displayed as Windows 12 when the build number exceeded 22000. This issue has been resolved to ensure the correct Windows version is displayed.

ING-5172 - Grade Tonnage Curves and Tables

An error occurred when displaying multiple macro simulations in curves or tables, particularly when using macros with different numbers of indices, which could also lead to a crash. The issue has been resolved by fixing the check of macro indices during calculations.

ING-5173 - Exploratory Data Analysis

In the VMap of EDA, the ellipsoid axis colors were incorrect in the 2D sample map, and the anisotropy orientation was not displayed. The issue has been resolved by correcting the axis colors in 2D.

ING-5174 - Neighborhood Statistics

In Neighborhood Statistics, editing and saving a parameter in a 3D moving neighborhood with a 2D data table caused the table to disappear, requiring a task restart. The issue has been resolved, including the ability to remove input datasets in the neighborhood modification task.

ING-5179 - Grade Tonnage Curves and Tables

After enabling the display of multiple macro simulations with different numbers of indices, some curves and legends were not shown correctly. The issue has been resolved by updating item references and ensuring proper display of legends and curve items.

ING-5180 - Grade Tonnage Curves and Tables

The discretization in Boundaries and Categorization had no minimum value, leading to potential errors or crashes. A minimum value of 1 has been set, and direction labels ("X=", "Y=", "Z=") have been added to improve usability.

ING-5182 - Calculator

In the Calculator, a warning message about the "MPLBACKEND" appeared after Matplotlib crashes and persisted in later executions. This issue has been resolved by implementing a backend enforcer to correctly manage and revert the Matplotlib backend during execution.

ING-5183 - Quick Interpolation

An error occurred when running Quick Interpolation with advanced neighborhood settings that used top or low cuts on a different variable from the interpolation variable. The issue has been resolved by aligning the input list for capping with the input variable.

ING-5184 - Neighborhood Explorer

In the Neighborhood Explorer, information about a neighborhood was sometimes incorrect after modifying and saving options such as top or low cuts or sample spreading. The issue has been resolved by properly updating neighborhood information.

ING-5185 - Grade Tonnage Curves and Tables

In GTC, renaming tables or curves before saving to a batch file could lead to inconsistent tab names when reopening the task. This issue has been resolved by improving the method used to save tab names.

ING-5186 - Sequential Indicator Simulations

In SIS, when using individual angle variables with the "Mathematical Direction" convention from a pre-2023.12 batch file, the convention could be misread during upgrade. This has been fixed by preserving temporary enum values during conversion to ensure correct interpretation.

ING-5187 - Import Boreholes (CSV/XLSX)

When importing boreholes, the angle difference between deviation samples was incorrectly calculated, causing overestimated values and warnings based on a 5-radian threshold. The formula has been corrected to properly check angle differences in degrees.

ING-5190 - Multigaussian Transformation Backward

In the Multigaussian Transformation Backward task, the pattern preview did not correctly replace "%method", and selecting a non-PPMT macro variable could cause a crash. These issues have been fixed to ensure the preview displays correctly and invalid variable selections no longer cause errors.

ING-5191 - Exploratory Data Analysis

In EDA, the linear correlation coefficient in the view label changed when switching to a log10 scale. Documentation has been updated to clarify that the displayed coefficient represents the correlation of the log-transformed variables.

ING-5192 - Principal Component Analysis

In the PCA Forward task, unselecting categories of a categorical variable did not update the selection, requiring a task restart. The issue has been resolved by properly resetting the temporary selection.

ING-5193 - Import Datamine

When importing a block model with a parent grid into a non-existing folder, the subblock was created but the parent grid was not. This issue, caused by an incorrect directory check, has been resolved.

ING-5194 - Imputation

Simulated imputed variables could present artifacts (visible bands in the cross-plots) due to a too poor resolution to generate random values. It has been refined to improve accuracy, which should impact results and increase the computation time.

ING-5195 - Grade Tonnage Curves and Tables

In GTC, output tables could be incorrectly ordered when using multiple mesh files in a categorization or after updating a customized table. The issue has been resolved to ensure results follow the correct category order as defined by the user.

ING-5200 - Kriging

In the Kriging task, using the Multiple Kriging option with a nested neighborhood triggered an error at the end of the run depending on neighborhood index saving settings. The issue has been resolved by correctly handling neighborhood index creation and role assignment.

ING-5201 - Kriging

In the Kriging task, selecting a geoset linked to a macro variable with many realizations caused slow setup of the multiple kriging table. The issue has been resolved by disabling automatic resizing during table initialization to improve performance.

ING-5203 - Support Correction

In Support Correction, the main variable was incorrectly reset to the first variable of a multivariate geoset when loading a fiche. This issue has been resolved to ensure the correct variable is preserved.

ING-5204 - UC/LUC

In UC/LUC, a crash could occur when the main variable was not the first in the geoset, especially after using Support Correction. This issue has been fixed to support geosets regardless of the main variable's position.

ING-5207 - Neighborhood

In multivariate workflows using a unique neighborhood, the temporary selection incorrectly excluded samples with partially undefined variables, causing an error during cokriging. The selection logic has been corrected to keep samples where at least one variable is defined.

ING-5208 - Declustering

In Declustering, stopping the task from the Batch Run window did not raise an error, causing the batch to continue unexpectedly. This has been resolved by correctly handling task interruption.

ING-5210 - Grade Post-processing

Sub-blocks were incorrectly allowed as input in the Grade Post-processing task, causing execution errors. This has been fixed by disabling sub-blocks as input, as they are not currently supported.

ING-5211 - Calculator

Since version 2024.12, using Matplotlib features like triangulation or transformations in the Calculator could fail on the second run due to backend handling. This has been fixed by setting the backend using `matplotlib.use`, ensuring stable behavior across runs.

ING-5212 - Estimation Validation

In Estimation Validation, clearing the dataset and then selecting a new one could cause a crash if a selection was previously applied. The issue has been resolved by properly resetting domain selections and updating memory tables in the correct order.

ING-5218 - Grade Tonnage Curves and Tables

In GTC, when displaying multiple grade variables with different units in "Categories" mode, the unit shown in the Mean Grade column was incorrectly based on the last variable. This has been fixed by improving table formatting and hiding units when inconsistent.

ING-5226 - Unfolding

In Unfolding, grid creation could fail when working from vertical surfaces due to an undefined azimuth in the unfolded space. The issue has been fixed by setting the azimuth to 90° by default when it is not defined.

ING-5231 - Grade Tonnage Curves and Tables

In GTC, a crash could occur when opening the task if variables or supports from a previous run were missing. This has been fixed by reloading only the available and consistent datasets.

ING-5236 - Grade Tonnage Curves and Tables

In GTC, the auto apply checkbox could become unavailable after certain interactions in a curve tab. This has been fixed by ensuring the widget and its parameter stay synchronized.

ING-5239 - Grade Tonnage Curves and Tables / Simulation Validation

Plotting many simulations in GTC or Simulation Validation could cause slow performance when updating the display. This has been improved by optimizing display updates to avoid redundant operations.

ING-5240 - Border Analysis

In Border Analysis, the transition probability matrices were empty if not all domains were checked. This has been fixed to ensure matrices are correctly extracted regardless of domain selection.

ING-5241 - UC/LUC (Uniform Conditioning)

In UC/LUC, panels with kriged estimates outside the anamorphosis range could still produce invalid tonnage, grade, and metal values. The issue has been fixed by preventing QTM calculations in these cases.

ING-5247 - Grade Tonnage Curves and Tables

In GTC, categorization parameters were not correctly reloaded when opening a project from a version prior to 2024.12. This has been fixed to ensure proper restoration of the categorization settings.

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