MINESTIS, THE ROUTE TO RESOURCE ESTIMATES

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Geovariances

Geovariances

Where no one has gone before

LEADER IN ADVANCED GEOSTATISTICS WITH NEARLY 30 YEARS OF EXPERTISE

LEADER IN ADVANCED GEOSTATISTICS

Independent Software Vendor

Founded **in 1986**

Specialized in **Geostatistics**

Strong Partnership with the
Center of Geostatistics (Paris School of Mines)

Helps Mining Companies to meet their
Resource Estimation & Risk Assessment challenges

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COMPLETE SOLUTION

BASED ON GEOSTATISTICS

Software

technical support included

Consulting

mentoring & technical assistance

Training

software use & methodologies

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ALL-IN-ONE SOFTWARE SOLUTION FOR GEOSTATS

The most complete, general purpose geostatistics software

Industry benchmark geostatistics software

Leading technology: development in partnership with **Paris School of Mines**

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ALL-IN-ONE SOFTWARE SOLUTION FOR GEOSTATS

Robust software resulting from **20+ years R&D**

Tried & tested software solution **used for 20+ years** by top mining / consulting companies

1993

1st release of Isatis

800 licenses

275 companies

Geovariances

TRAINING SERVICES

Last 2 years

550+

Geoscientists trained worldwide

Gain your autonomy:

→ dedicated to **software use** / **geostatistics**

→ **public** / **private** sessions

→ **classroom** / **web-based** training

→ **standard** / **customized** content

→ for **beginners** / **advanced** users / **awareness of project leaders**

Geovariances

CONSULTING SERVICES

Last 2 years

150+

studies / assistance worldwide

High quality studies accomplished by highly skilled consultants

→ **Resource evaluation**

Exploration feasibility & production

→ **Resource classification**

→ **Answers to resource reporting codes**

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OUR REFERENCES IN MINING

Our clients deal with **various commodities**

→ Base metals

→ Precious metals

→ Bulk commodities

→ Energy

→ Diamond

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OUR REFERENCES IN MINING

THE ROUTE TO RESOURCE ESTIMATES

NEW GENERATION SOFTWARE FOR MINERAL RESOURCE ESTIMATION

1 Dedicated to the Mining industry

2 Windows-Native Application

3 User-Friendly

4 Fast & Secure Workflow

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FOR ANY SIZE COMPANY

Top & mid-tier mining companies

- Technical Services / Exploration / Resource Estimation departments
- Mine sites

Junior mining companies

Consulting firms

Auditors and financial analysts

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SIMPLIFIED & OPTIMIZED WORKFLOW

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MINESTIS KEY ADVANTAGES

User-friendly

Smart, intuitive, modern user interface

Geostatistics made available to non-experts

Fast

Just one click to get deterministic and risk models all at once

Powerful technology

Fast learning curve

Secure

All-in-one **streamlined workflow**

Focus on **most useful parameters** only

Provides **support tools to the parameter setting**

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HIGH QUALITY ESTIMATES

Coherent management of estimation domains and block models

Tried-and-tested geostatistics derived from Isatis well-proven key algorithms

23 YEARS expertise

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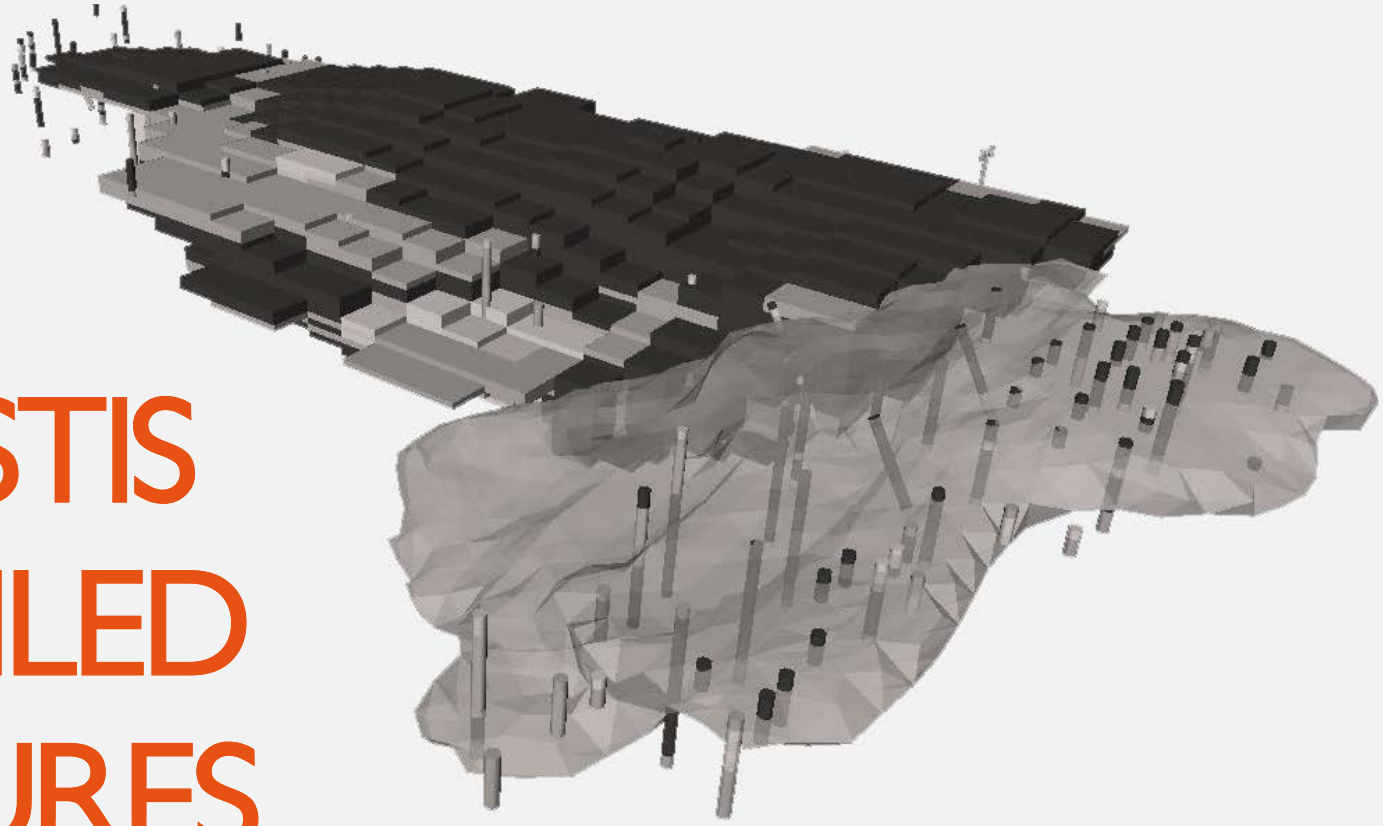
MINESTIS DETAILED FEATURES



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PRESENTATION CONTENTS

- → User interface
- → Background technology
- → Integrated workflow

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SMART USER INTERFACE

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Minestis (Version 0.80-141104) - case study

File Boreholes Domaining Estimation Import Export Tools Windows View Preferences Help

Project

Boreholes Variables

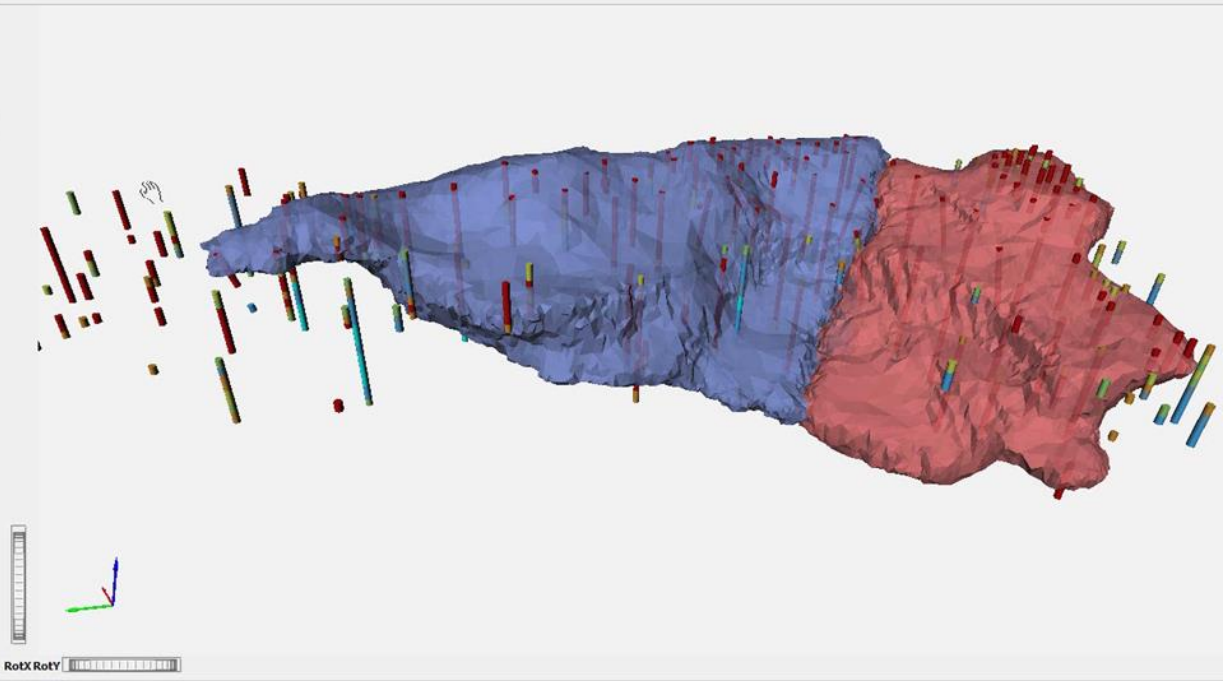
- Grades
  - Al2O3
  - Fe
  - Mn
  - P
  - SiO2
- Auxiliary Numerical
  - Oxy
- Auxiliary Categorical
  - Geol Code

Domains & Results

- Partitions
  - WHOLE_FIELD
    1.7729E+10 m³
  - mineralized
    6.32581E+08 m³
    - North_0
      3.98097E+08 m³
      - Variable Set : Fe
        - Panel
          - RESULT_Kriging_Fe
          - RESULT_Q(Cutoff = 0 %)
          - RESULT_Q(Cutoff = 5 %)
          - RESULT_Q(Cutoff = 10 %)
          - RESULT_Q(Cutoff = 15 %)
          - RESULT_Q(Cutoff = 20 %)
          - RESULT_Q(Cutoff = 25 %)
          - RESULT_T(Cutoff = 0 %)
          - RESULT_T(Cutoff = 5 %)
          - RESULT_T(Cutoff = 10 %)
          - RESULT_T(Cutoff = 15 %)
          - RESULT_T(Cutoff = 20 %)
          - RESULT_T(Cutoff = 25 %)
          - RESULT_M(Cutoff = 0 %)
          - RESULT_M(Cutoff = 5 %)
          - RESULT_M(Cutoff = 10 %)
          - RESULT_M(Cutoff = 15 %)
          - RESULT_M(Cutoff = 20 %)
          - RESULT_M(Cutoff = 25 %)
        - SMU
    - South_0.5
      2.34484E+08 m³
- Raw Domains

Z Scale 2

- Raw Boreholes
- Validated Boreholes
- Surfaces
- Partition Meshes
  - WHOLE_FIELD
  - mineralized
    - North_0
    - South_0.5
    - -
- Raw Domains
  - Mesh Cells
  - Mesh Vertices



Application Messages

Variables Statistics

	Total Count	Defined Count	Minimum	Maximum	Mean	Standard Deviation	Variance
Panels Kriging	183900	10637	6.49605 %	69.1047 %	51.6064 %	18.4063 %	338.791 %²
Tonnage (0 %)	183900	10637	100.00 %	100.00 %	100.00 %	0.00 %	0.0000 %²
Tonnage (5 %)	183900	10637	100.00 %	100.00 %	100.00 %	0.00 %	0.0000 %²
Tonnage (10 %)	183900	10637	0.00 %	100.00 %	75.18 %	43.20 %	1865.9186 %²
Tonnage (15 %)	183900	10637	0.00 %	100.00 %	75.00 %	43.30 %	1874.8825 %²

minestis

POWERFUL TECHNOLOGY

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New Generation Platform

Sound Geostatistics

Innovation with Domaining

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New Generation Platform	Flexible Code in C++, Multiplatform, Windows Native		
Sound Geostatistics	Modern User Interface	3D Visu GIS	Reporting Tools
Innovation with Domaining	Calculator with Easy Scripting	Raw and Validated Databases	Domain & Borehole Manipulation

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New Generation Platform	EDA, Automatic Fitting, OK, Change of Support, UC, LUC, Simulations, derived from Isatis
Sound Geostatistics	Algorithms recoded, Parallelized, Optimized in C++
Innovation with Domaining	Secure Process with Data and Domain Validation

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New Generation Platform

Sound Geostatistics

Innovation with Domaining

Domain Import and Validation

More to come next year…

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New Generation Platform

Sound Geostatistics

Innovation with Domaining

WORKFLOW

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ALL-IN-ONE WORKFLOW: FROM DOMAINING TO RESOURCE ESTIMATION

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Data import from **CSV file** or **Isatis study**

Original data kept unchanged in the database for complete data traceability

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Control of **borehole geometry consistency**

Management of **duplicates** and **measurement detection limits**

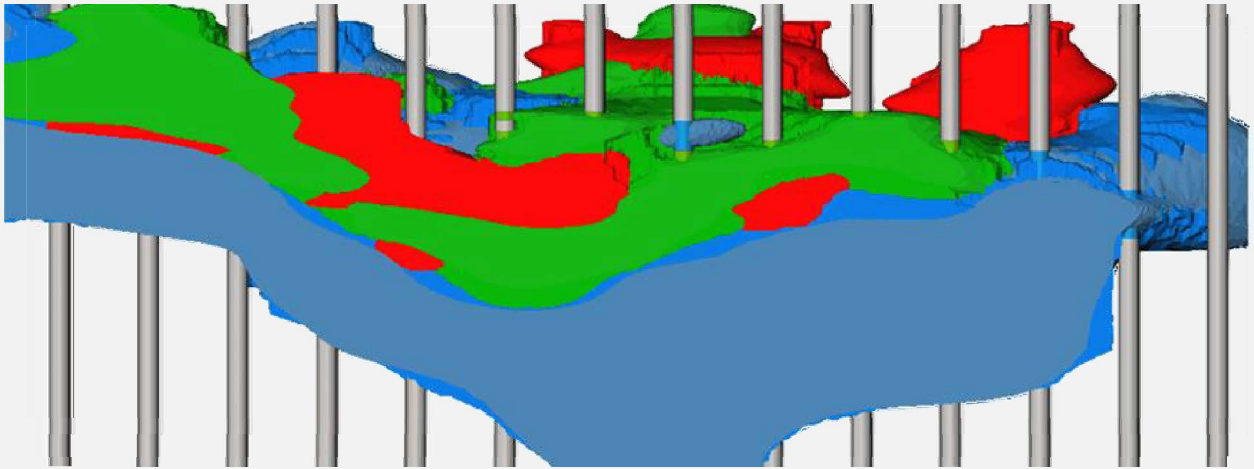
Global compositing

Exploration data analysis

Geovariances

Data Import → Validation → **Domaining** → Resource Estimation → Recoverable Resources

Partition validation



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→ **Compositing** per domain

→ **Declustering**

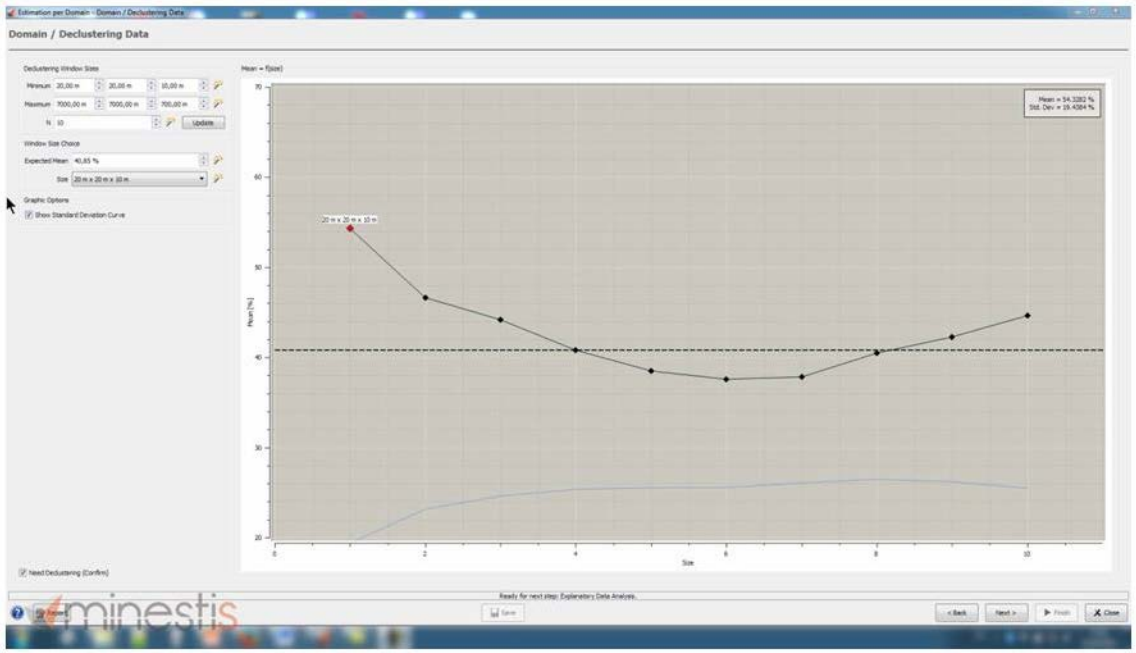
→ **EDA**: histogram modeling, variography

→ Global **change of support**

→ **Kriging, UC, LUC, simulations**

Geovariances

Data Import → Validation → Domaining → **Resource Estimation** → Recoverable Resources

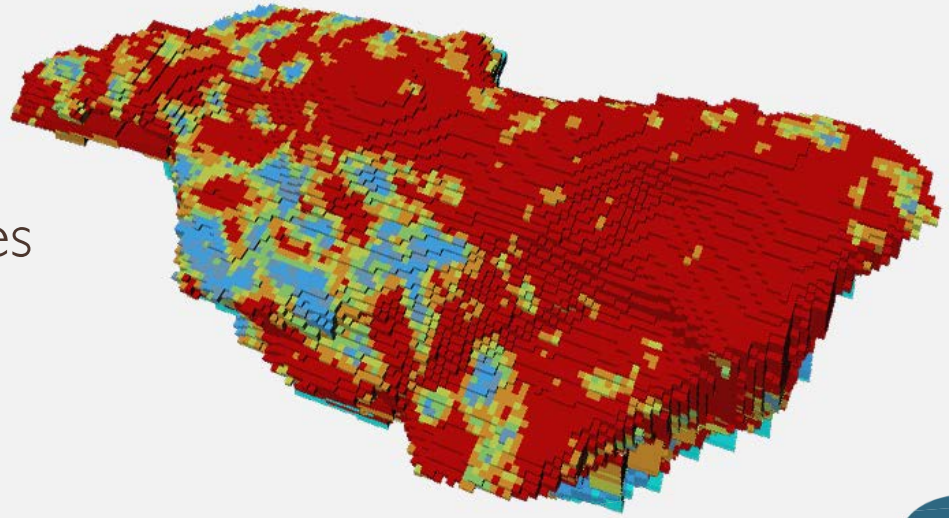


Geovariances

Data Import → Validation → Domaining → **Resource Estimation** → Recoverable Resources

Output

- In-situ estimation
- Recoverable resources
- Uncertainty analysis

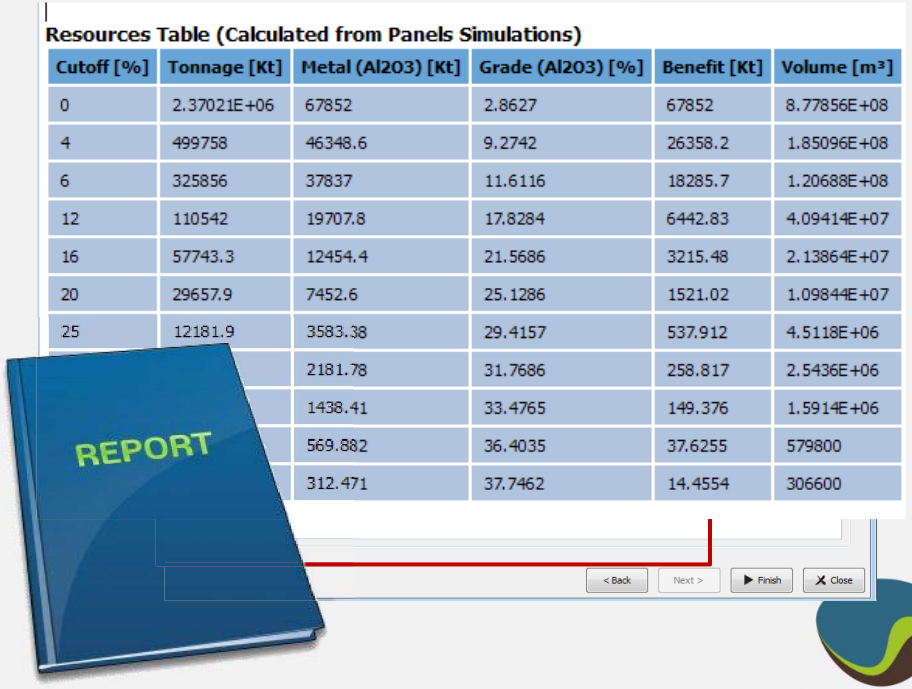


Geovariances

Data Import → Validation → Domaining → Resource Estimation → **Recoverable Resources**

Flexibility in result reporting

- outputs from OK, UC, LUC, and/or simulations
- by panel and/or SMU
- for 1 or several variables
- for 1 or several domains



Cutoff [%]	Tonnage [Kt]	Metal (Al2O3) [Kt]	Grade (Al2O3) [%]	Benefit [Kt]	Volume [m³]
0	2.37021E+06	67852	2.8627	67852	8.77856E+08
4	499758	46348.6	9.2742	26358.2	1.85096E+08
6	325856	37837	11.6116	18285.7	1.20688E+08
12	110542	19707.8	17.8284	6442.83	4.09414E+07
16	57743.3	12454.4	21.5686	3215.48	2.13864E+07
20	29657.9	7452.6	25.1286	1521.02	1.09844E+07
25	12181.9	3583.38	29.4157	537.912	4.5118E+06
		2181.78	31.7686	258.817	2.5436E+06
		1438.41	33.4765	149.376	1.5914E+06
		569.882	36.4035	37.6255	579800
		312.471	37.7462	14.4554	306600

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MINESTIS VERSUS ISATIS

minestis

Dedicated to the **Mining industry**

Windows-native application

Modern & intuitive Graphical User Interface

Fast & secure workflow

iSatis

General purpose geostatistics toolbox

The **most complete** geostatistics software

Advanced geostatistics users

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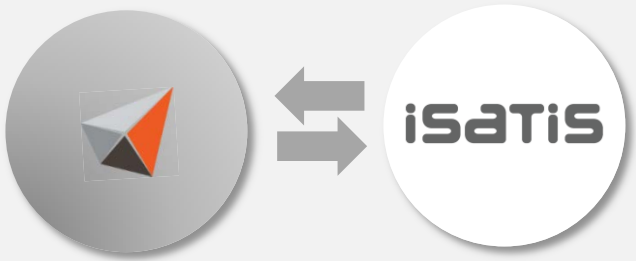
MINESTIS AND ISATIS

Both packages are fully **connected**



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MINESTIS SELLING MODEL

Perpetual license + maintenance

One-year, two-year and three-year subscriptions (including maintenance)

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THANK YOU FOR YOUR ATTENTION

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