DATAMINE

Geovariances

ISATIS.PY

CUSTOMER STORY

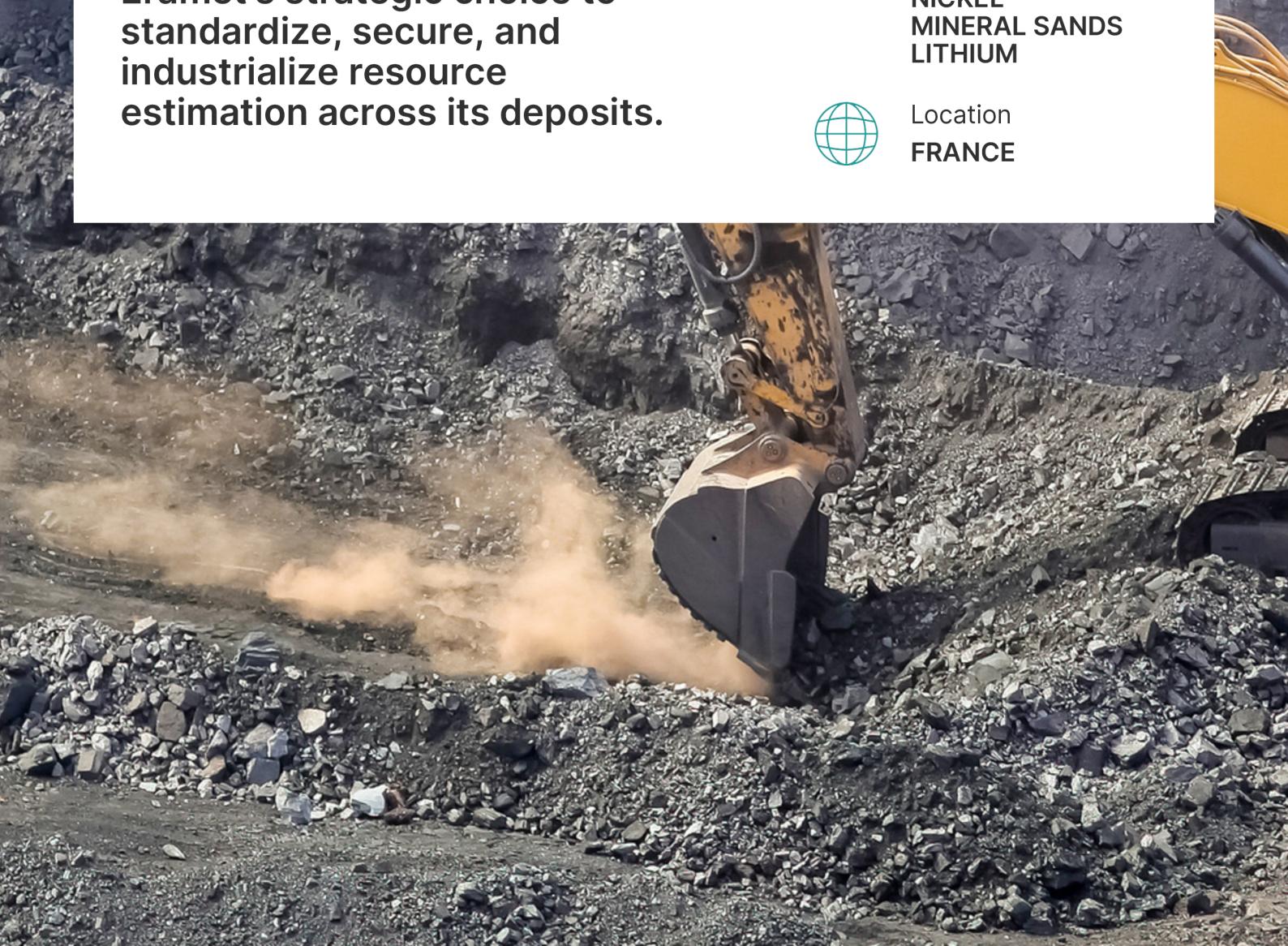
eramet

Isatis.py, the Python geostatistics library developed by Geovariances, is Eramet's strategic choice to standardize, secure, and industrialize resource estimation across its deposits.

Client
ERAMET

Industries
MANGANESE
NICKEL
MINERAL SANDS
LITHIUM

Location
FRANCE



Eramet is a leading international mining player, specialized in the extraction and processing of critical metals for the energy transition (manganese, nickel, lithium, etc.). Present in more than 20 countries, the group relies on innovation to optimize its processes and contribute to the development of a more sustainable mining industry.

THE CHALLENGE

Before adopting the **Isatis.py** Python geostatistics library, resource estimation at Eramet relied on a legacy of Isatis batch processes, later Isatis.neo, and various Python scripts often customized by each geologist.

This approach had several limitations:

Complex maintenance, requiring experts with combined skills in geosciences, Python, and knowledge of Isatis.neo.

Risk of errors due to manual modifications of scripts by users.

Lack of uniformity, with estimates varying from one site to another, one user to another.

High reparameterization times during model updates, particularly in the production phase.

Weak traceability, with little historical tracking of inputs and outputs related to calculations.

The ambition was clear: to deeply rethink the process to ensure standardization, reliability, and transparency of resource estimation workflows, while guaranteeing their scalability, regardless of the deposit type.

THE SOLUTION

After a phase of comparative testing of different Python libraries, including both open-source and proprietary solutions, Eramet chose **Isatis.py**.

Why Isatis.py? Four key reasons

Performance
Comparable computation times to Isatis.neo and much faster than many other solutions.

Reliability
High-quality results, aligned with the group's geostatistical standards, validated through cross-checking.

Documentation and support
Clear documentation and highly responsive technical support.

Geovariances' expertise
A world-renowned reputation in geostatistics.

Implementation

The library is encapsulated within an internal platform with a web interface. Geologists no longer handle code directly; they only enter the key parameters (such as variograms and neighborhood). The entire estimation logic is industrialized within a **configurable and automated workflow**, with automatic generation of figures and analysis files. **The core of the process remains invisible, but fully controlled**.

THE BENEFITS

One single codebase, dozens of deposits estimated consistently

Standardization ensures total consistency of results and strengthens data quality for planning.

Drastic reduction of human errors

The final user does not handle scripts, focusing only on relevant geostatistical parameters.

Speed and agility

Estimates are relaunched within minutes. Updates (e.g., infield or grade control) become virtually instantaneous.

Resilience to turnover

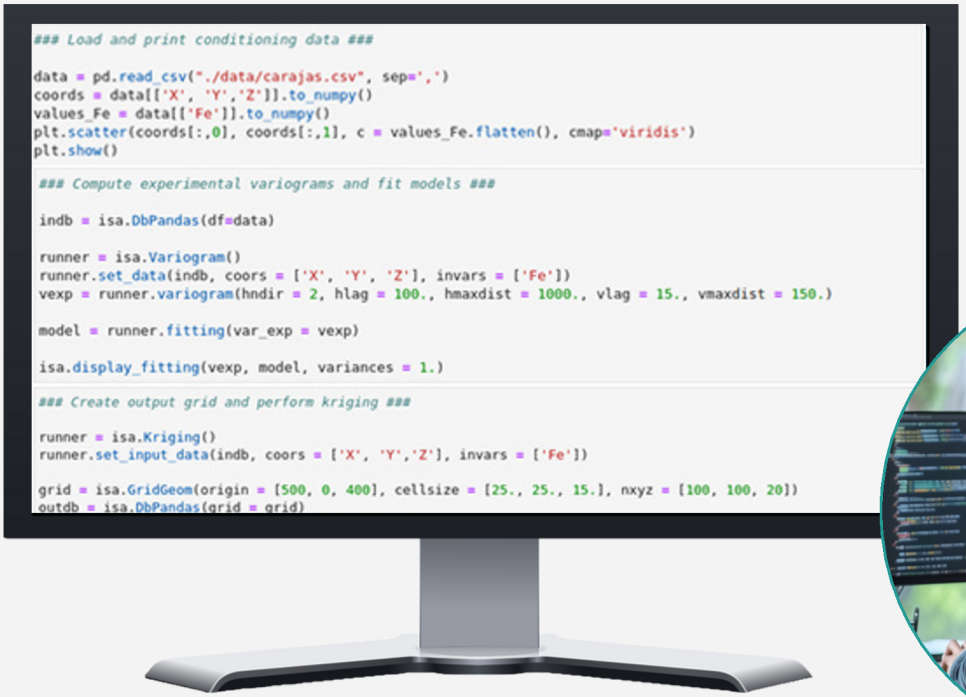
Integrated documentation, stored histories, and process unification ensure operational continuity.

Interoperability with Isatis.neo

All intermediate files can be exported for advanced analysis or visualization in Isatis.neo.

Overall improvement of the process

Structuring the workflow standardizes data formats, clarifies methodological choices, and brings greater rigor across the processing chain.



```
### Load and print conditioning data ###

data = pd.read_csv("./data/carajas.csv", sep=',')
coords = data[['X', 'Y','Z']].to_numpy()
values_Fe = data[['Fe']].to_numpy()
plt.scatter(coords[:,0], coords[:,1], c = values_Fe.flatten(), cmap='viridis')
plt.show()

### Compute experimental variograms and fit models ###

indb = isa.DbPandas(df=data)

runner = isa.Variogram()
runner.set_data(indb, coors = ['X', 'Y', 'Z'], invars = ['Fe'])
vexp = runner.variogram(hndir = 2, hlag = 100., hmaxdist = 1000., vlag = 15., vmaxdist = 150.)

model = runner.fitting(var_exp = vexp)

isa.display_fitting(vexp, model, variances = 1.)

### Create output grid and perform kriging ###

runner = isa.Kriging()
runner.set_input_data(indb, coors = ['X', 'Y','Z'], invars = ['Fe'])

grid = isa.GridGeom(origin = [500, 0, 400], cellsize = [25., 25., 15.], nxyz = [100, 100, 20])
outdb = isa.DbPandas(grid = grid)
```

CONCLUSION

Isatis.py is more than just a geostatistics library.

It is the cornerstone of a **group-wide standardization strategy**. By centralizing estimations around a **single, configurable, and documented script**, Eramet drastically reduces the risk of human error and eliminates methodological inconsistencies. Each run maintains a complete history of parameters, input data, and generated results, ensuring **rigorous traceability and transparency**. This approach ensures **homogeneous, reliable, and auditable estimates** while accelerating updates in production contexts.
The goal is set: to generalize the use of standardized workflows for a unified and controlled resource management.

With Isatis.py, Eramet has transformed its geostatistical approach: a single code encapsulated in an intuitive platform, delivering consistent estimates across 25 deposits, reducing errors, and achieving major gains in speed and reliability.

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