

# MAP

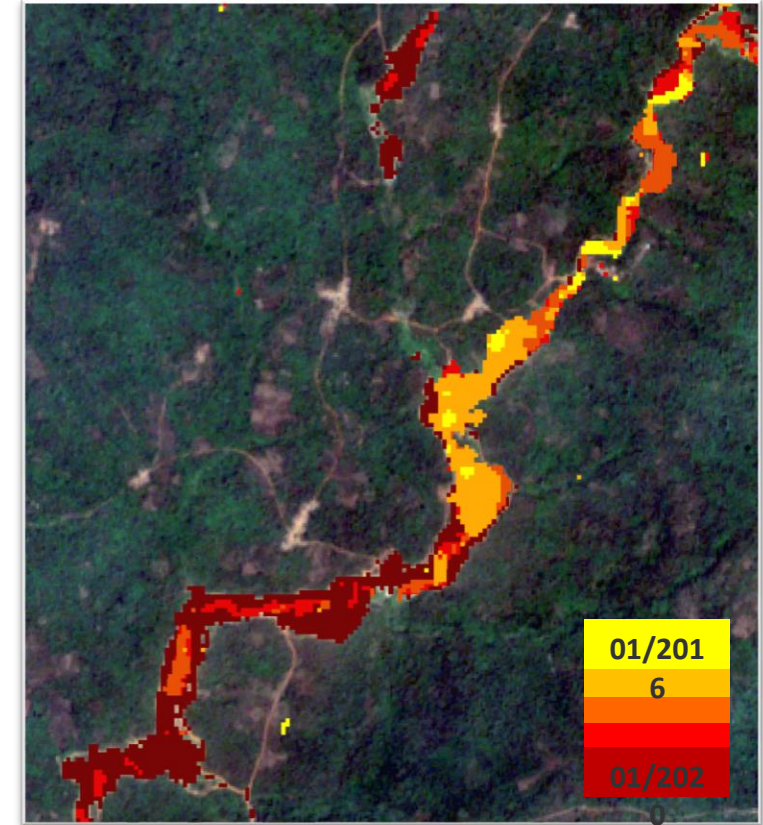
## Mineral Resource Assessment Platform



This activity has received funding from the European Institute of Innovation and Technology (EIT), a body of the European Union, under the Horizon 2020, the EU Framework Programme for Research and Innovation

# advangeo® 2D/3D Prediction Software

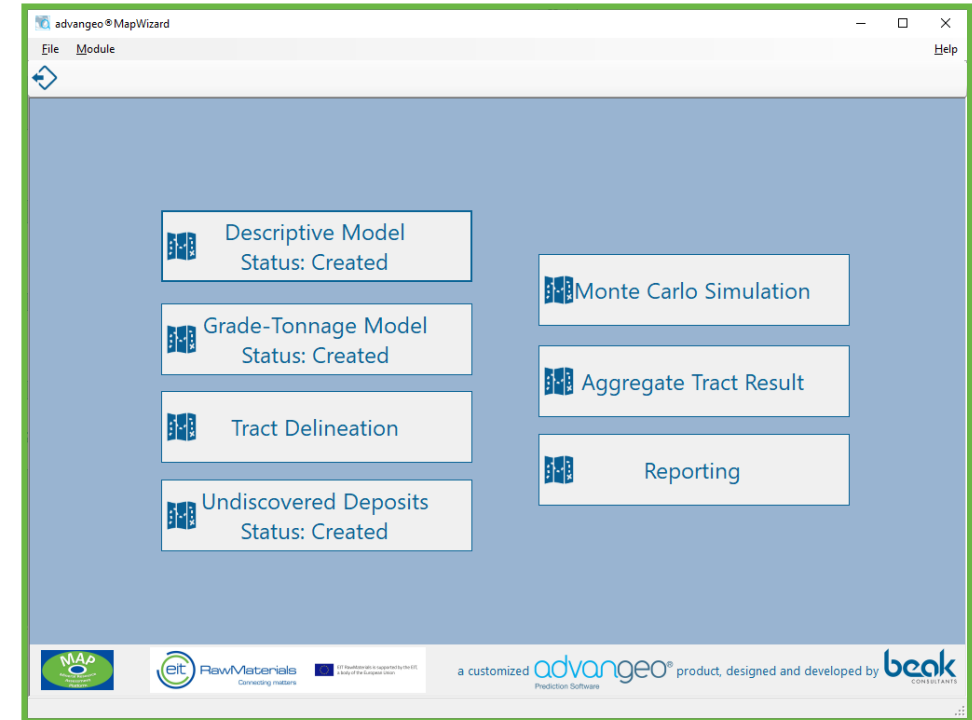
- Applications:
  - Mineral Predictive Mapping in 2D and 3D Space
  - Georisk Analyse
  - Processing and Interpretation of Remote Sensing Data
  - Time Series Analyses
  
- Available Machine Learning Algorithms:
  - Artificial Neural Network
  - Random Forest
  - Self-Organizing Maps
  - Weights-of-Evidence
  - Fuzzy Logic



# advangeo® MapWizard for advangeo® 2D Prediction



- Software Development:
  - Standalone Application
  - Assessment Tools based on MapWizard Tools of GTK (<https://github.com/gtkfi/MapWizard>)
  - Connection to advangeo® 2D Prediction



# advangeo® MapWizard for advangeo® 2D Prediction

The screenshot displays the advangeo MapWizard interface, which is used for configuring and running 2D predictions. The interface is divided into several sections:

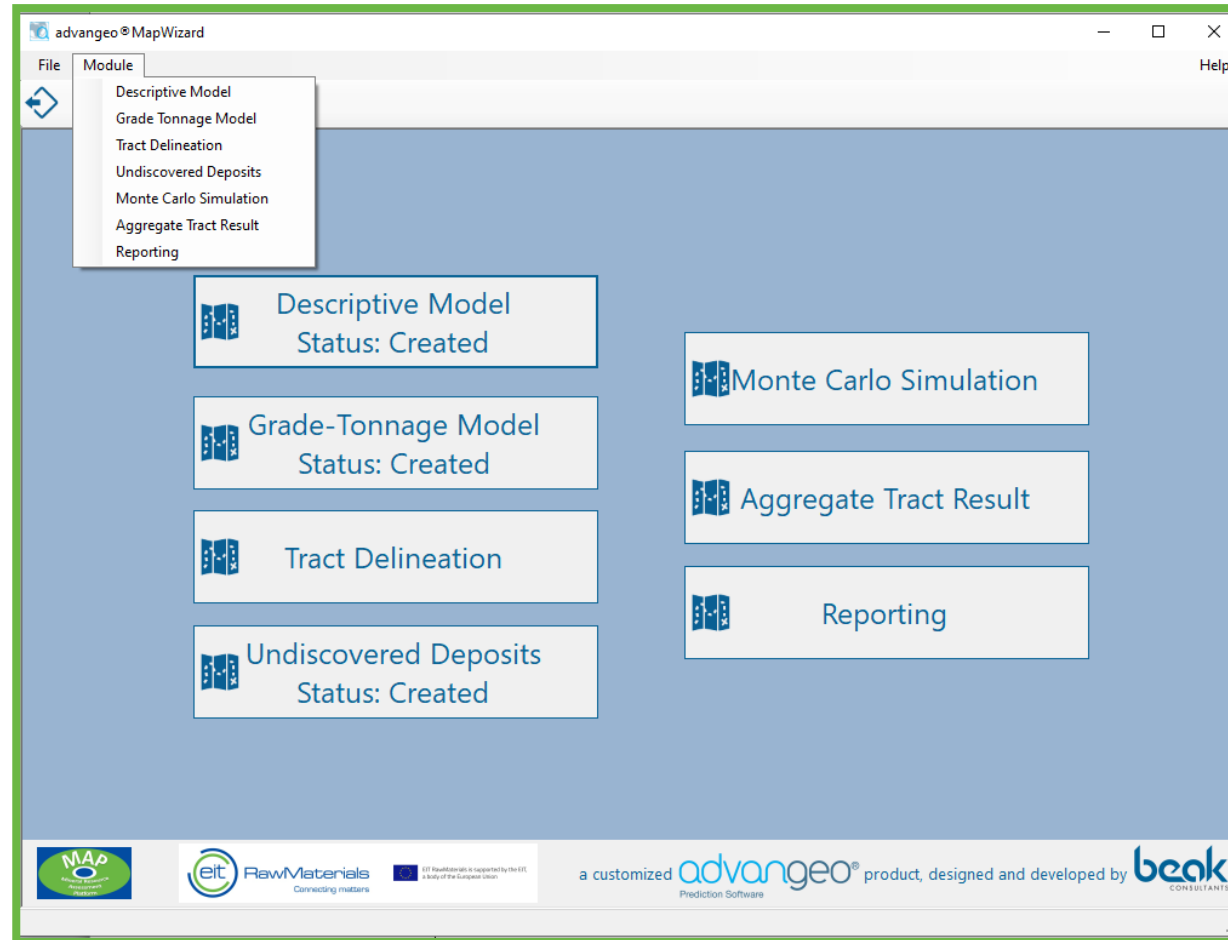
- Left Panel (Project Tree):** Shows a hierarchical view of the project structure. The selected project is "FP\_Boden\_Meissen". The tree includes folders for "Base Data", "Source Data", "Processed Source Data", "Model Input Data", "Parametrized Model", and "IKSB 4d Advangeo".
- Top Menu:** Includes "Application", "Data Processing", "Extensions", "GIS Tools", and "Help". The "Extensions" menu is open, showing options like "Erosion", "Minerals", "DEM Derivatives", and "MapWizard" (which is highlighted).
- Right Panel (Project Details):** Displays the configuration for the selected project. Fields include:
  - Projects:** A list of projects, with "FP\_Boden\_Meissen" selected.
  - File Name:** "FPBoden\_Mei.advangeo"
  - Data Path:** "D:\0\_Projekte\20150172\_FP\_Boden\Advangeo\FPBode"
  - Description:** "advangeo für das FP Boden, Blatt Meissen"
  - Author:** "BEAK\hertwig"
- Map View:** A large central area showing a map. It contains two buttons: "Open Project" and "New Project". Below the map, there are logos for "eit RawMaterials" and "advangeo Prediction Software".
- Bottom Panel (Info/Error):** A section for displaying messages, with tabs for "Info" and "Error".

The interface also features a "Save" button in the top right corner and a "MapWizard" logo in the bottom right corner.



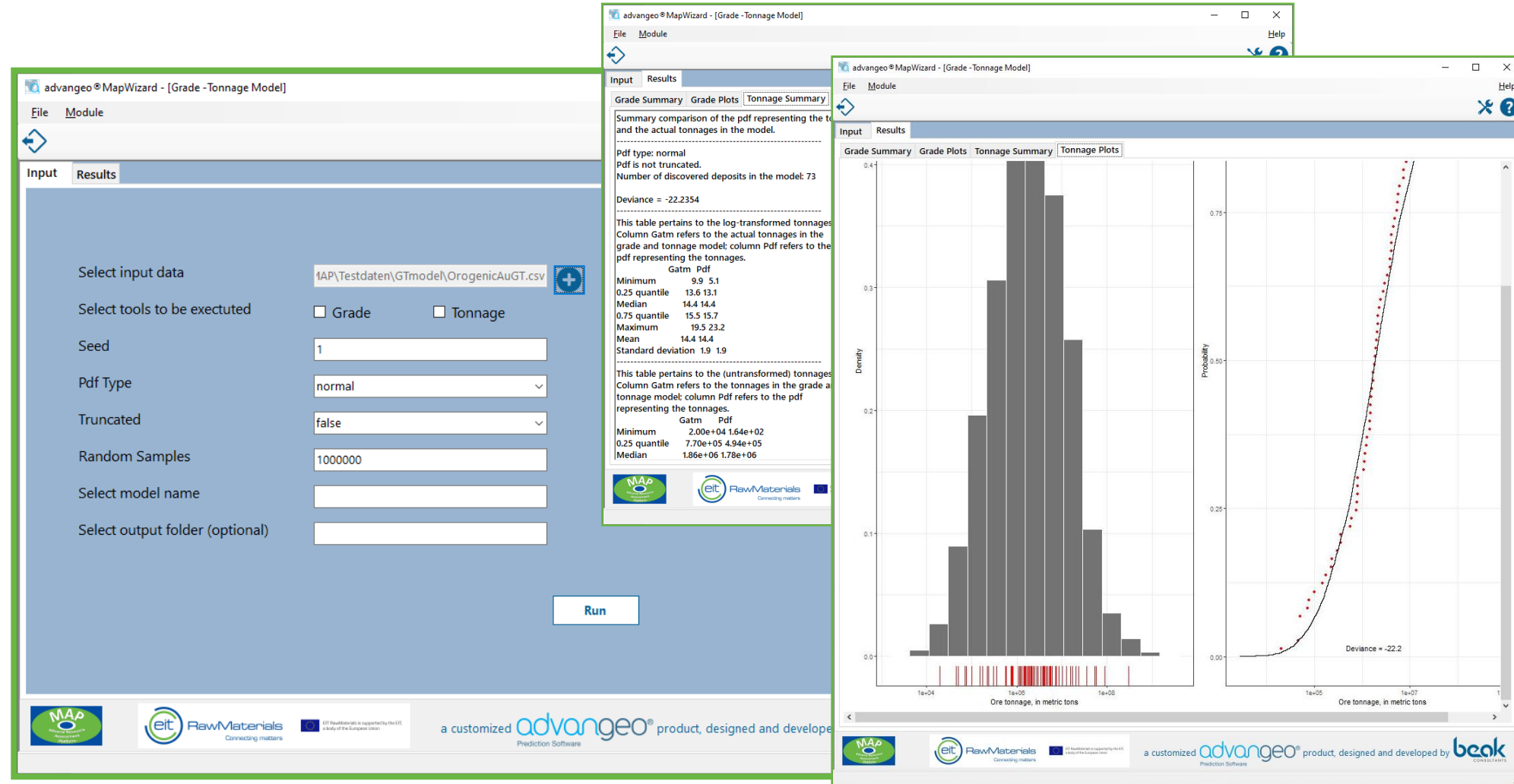
# advangeo® MapWizard - Modules

- partly independent
- switching between the modules
- status information



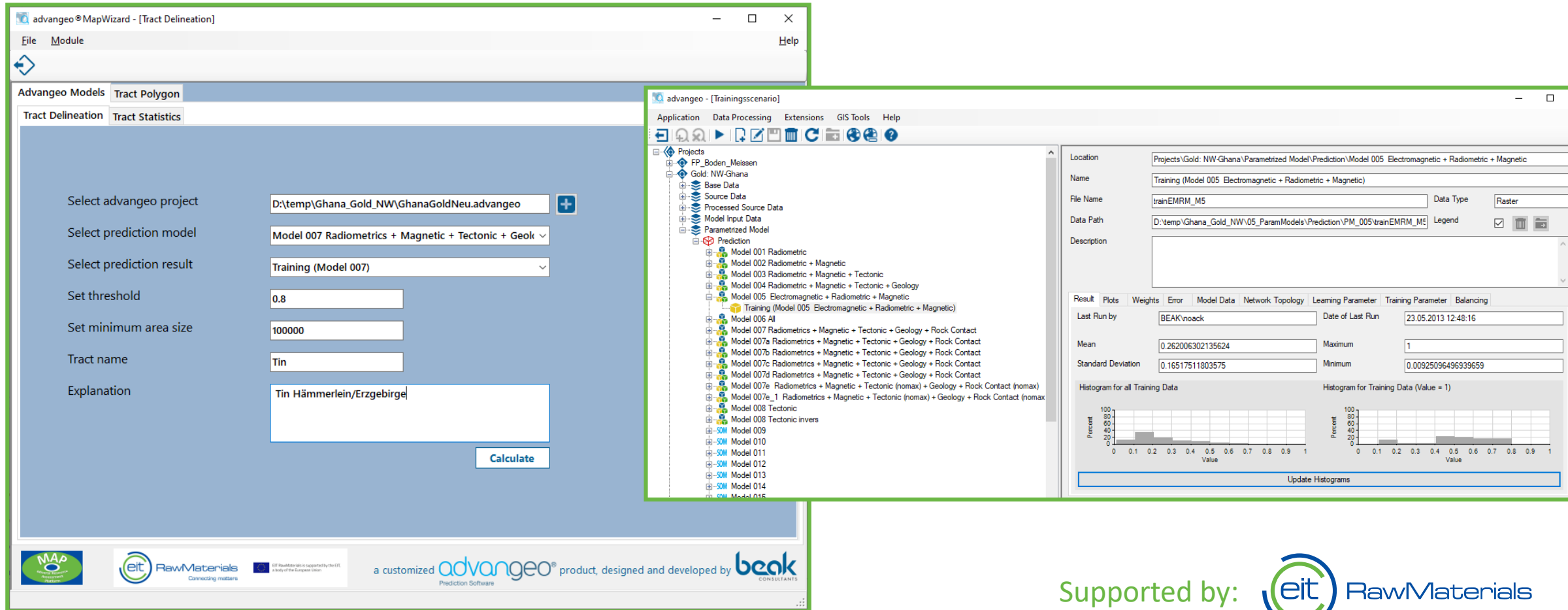
# advangeo® MapWizard – Grade-Tonnage Model

- calculation of probability density functions for grade and/or tonnage
- input: csv with id, deposit, tonnage and grades



# advangeo® MapWizard – Tract Delineation

- Permissive tract definition



**advangeo® MapWizard - [Tract Delineation]**

File Module Help

Advangeo Models Tract Polygon

Tract Delineation Tract Statistics

Select advangeo project: D:\temp\Ghana\_Gold\_NW\GhanaGoldNeu.advangeo

Select prediction model: Model 007 Radiometrics + Magnetic + Tectonic + Geol

Select prediction result: Training (Model 007)

Set threshold: 0.8

Set minimum area size: 100000

Tract name: Tin

Explanation: Tin Hämmerlein/Erzgebirge

Calculate

**advangeo - [Trainingsscenario]**

Application Data Processing Extensions GIS Tools Help

Projects

- FP\_Boden\_Meissen
- Gold: NW-Ghana
  - Base Data
  - Source Data
  - Processed Source Data
  - Model Input Data
  - Parameterized Model
    - Prediction
      - Model 001 Radiometric
      - Model 002 Radiometric + Magnetic
      - Model 003 Radiometric + Magnetic + Tectonic
      - Model 004 Radiometric + Magnetic + Tectonic + Geology
      - Model 005 Electromagnetic + Radiometric + Magnetic
      - Training (Model 005 Electromagnetic + Radiometric + Magnetic)
      - Model 006 All
      - Model 007 Radiometrics + Magnetic + Tectonic + Geology + Rock Contact
      - Model 007a Radiometrics + Magnetic + Tectonic + Geology + Rock Contact
      - Model 007b Radiometrics + Magnetic + Tectonic + Geology + Rock Contact
      - Model 007c Radiometrics + Magnetic + Tectonic + Geology + Rock Contact
      - Model 007d Radiometrics + Magnetic + Tectonic + Geology + Rock Contact
      - Model 007e Radiometrics + Magnetic + Tectonic (nomax) + Geology + Rock Contact (nomax)
      - Model 007e\_1 Radiometrics + Magnetic + Tectonic (nomax) + Geology + Rock Contact (nomax)
      - Model 008 Tectonic
      - Model 008 Tectonic invers
      - SOM Model 009
      - SOM Model 010
      - SOM Model 011
      - SOM Model 012
      - SOM Model 013
      - SOM Model 014
      - SOM Model 015

Location: Projects\Gold: NW-Ghana\Parameterized Model\Prediction\Model 005 Electromagnetic + Radiometric + Magnetic

Name: Training (Model 005 Electromagnetic + Radiometric + Magnetic)

File Name: trainEMRM\_M5 Data Type: Raster

Data Path: D:\temp\Ghana\_Gold\_NW\05\_ParamModels\Prediction\PM\_005\trainEMRM\_M5 Legend: ☒ ☐ ☐

Description:

Result Plots Weights Error Model Data Network Topology Learning Parameter Training Parameter Balancing

Last Run by: BEAK'noack Date of Last Run: 23.05.2013 12:48:16

Mean: 0.262006302135624 Maximum: 1

Standard Deviation: 0.16517511803575 Minimum: 0.00925096496939659

Histogram for all Training Data

Histogram for Training Data (Value = 1)

Update Histograms

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RawMaterials Connecting matters

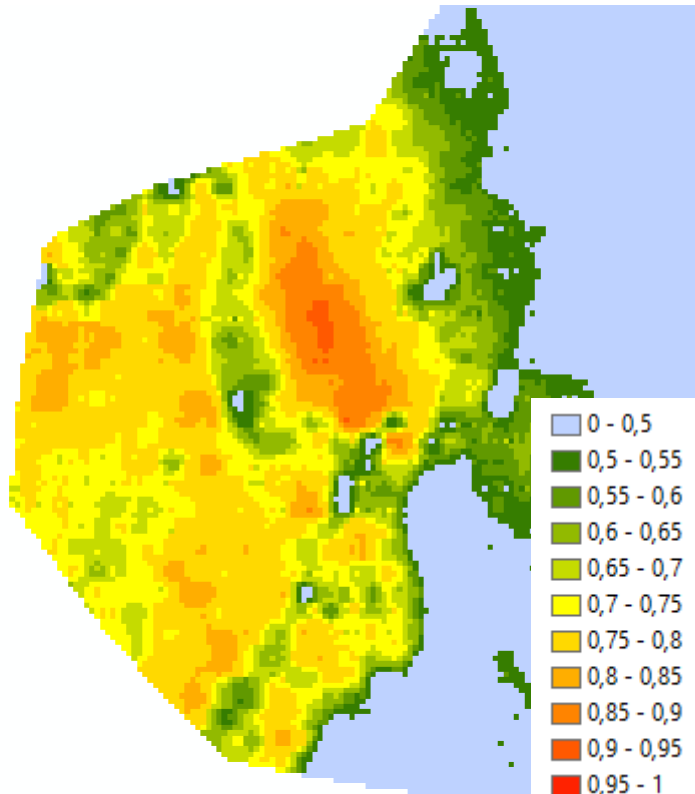
advangeo® Prediction Software

beak CONSULTANTS

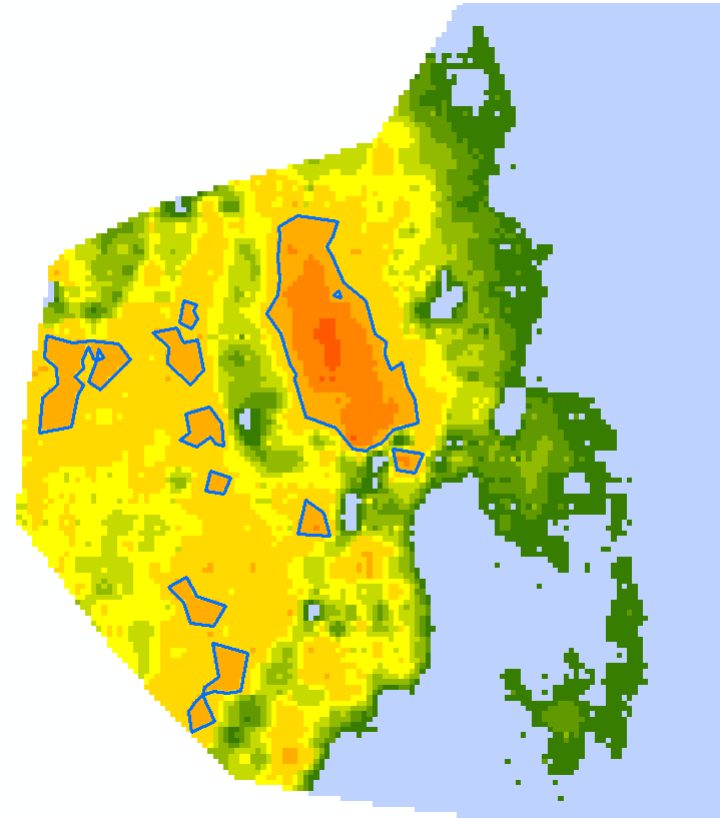
Supported by: RawMaterials Connecting matters

# advangeo® MapWizard – Tract Delineation

- Tract Delineation derived from advangeo® prediction model by setting:
  - Threshold for the binarization
  - Minimum area size of the permissive tracts



Prediction map calculated with ANN in advangeo® 2D Prediction



Permissive tracts - blue outlined

Supported by:



# advangeo® MapWizard – Undiscovered Deposits

- Estimation of number of undiscovered deposits

advangeo® MapWizard - [Undiscovered Deposits]

File Module Help

Input Results

Deposit Density Negative Binomial

Select Tract permtract

Model General

Median Tonnage (Mt)

Tract Area (km<sup>2</sup>)

Number of Known Deposits

advangeo® MapWizard - [Undiscovered Deposits]

File Module

Input Results

Deposit Density Negative Binomial

Estimates for undiscovered deposits

Select Tract permtract

Name

Weight

N90

N50

N10

Add Expert

Name,Weight,N90,N50,N10

advangeo® MapWizard - [Undiscovered Deposits]

File Module

Input Results

Deposit Density Summary Deposit Density Plot Summary Plot

Tract name: TractFinnAu2

Number of undiscovered deposits	Confidence
48	10%
17	50%
4	90%

Model: General

Median deposit tonnage (Mt): 100000

Tract are (km<sup>2</sup>): 5600000

Number of deposits: 10

advangeo® MapWizard - [Undiscovered Deposits]

File Module

Input Results

Deposit Density Summary Deposit Density Plot Summary Plot

Summary of the pmf for the number of undiscovered deposits within the permissive tracts.

Type: NegBinomial

Mean: 39.0531

Variance: 2159.08

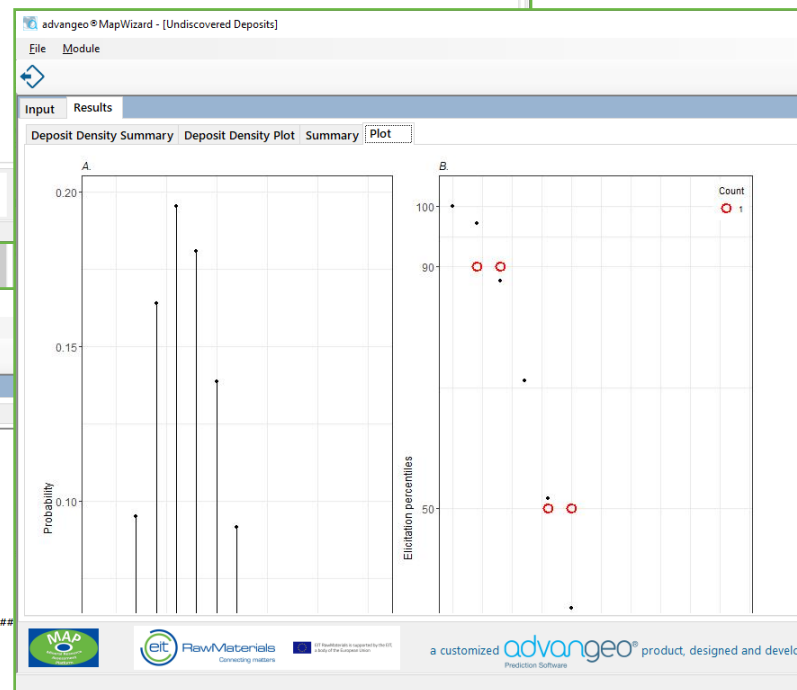
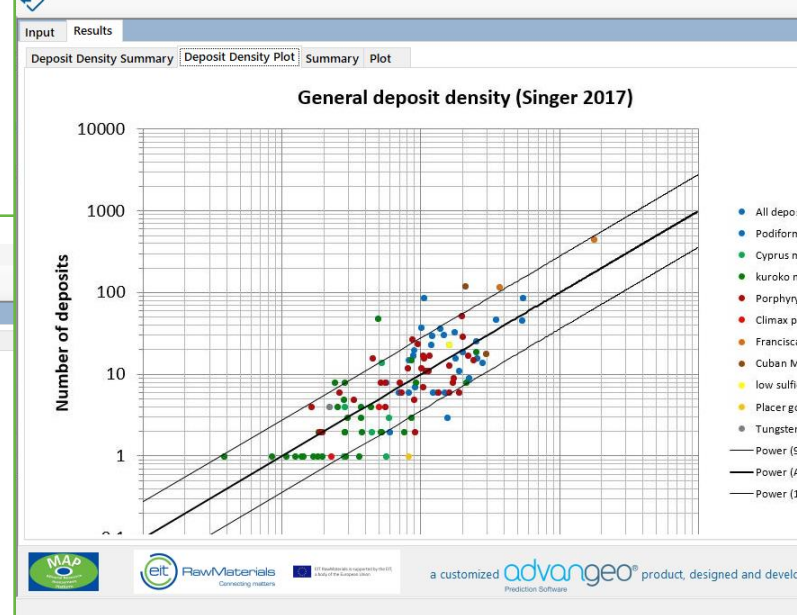
Standard deviation: 46.4659

Mode: 0

Smallest number of deposits in the pmf: 0

Largest number of deposits in the pmf: 347

Information entropy: 4.63607



# advangeo® MapWizard – Monte Carlo Simulation

- set of simulations of undiscovered deposits
- probabilistic estimation of the amount of undiscovered mineral resources

advangeo® MapWizard - [Monte Carlo Simulation]

File Module

Input Results

Select tract:

Path to grade pdf:

Path to tonnage pdf:

Path to number of deposits pmf:

Select output folder (optional):

Run

Summary Total Marginals Simulated Deposits

Summary of the pdf for the total ore and resource tonnages in all undiscovered deposits within the permissive tract.

	Q_0.05	Q_0.1	Q_0.25	Q_0.5	Q_0.75	Q_0.9	Q_0.95	Mean	P(0)
Ore	2.82e+06	4.05e+07	2.00e+08	5.61e+08	1.13e+09	1.58e+09	4.24e+09	4.24e+09	0.00
Au	7.08e+00	5.71e+01	2.21e+02	5.42e+02	9.96e+02	1.37e+03	3.88e+03	3.88e+03	0.00

Explanation  
 "Q\_0.05" is the 0.05 quantile, "Q\_0.1" is the 0.1 quantile, and so on.  
 "Mean" is the arithmetic mean. "P(0)" is probability of zero tonnage.  
 "P(>Mean)" is probability that the tonnage exceeds the arithmetic mean.

Comparison between statistics estimated from the multivariate pdf and statistics from analytic formulas.

Mean vectors

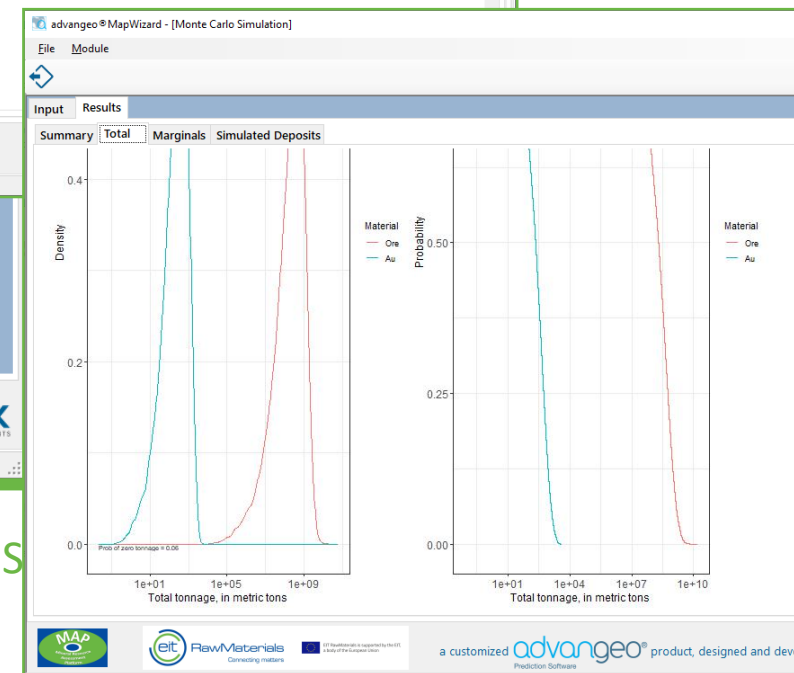
	Pdf	Formula
Ore	4.24e+08	4.24e+08
Au	3.88e+02	3.88e+02

Standard deviation vectors

	Pdf	Formula
Ore	6.29e+08	6.31e+08
Au	4.73e+02	4.79e+02

Composite correlation matrix

Logos: MAP, eit RawMaterials, a customized advangeo® product, designed and developed by beak CONSULTANTS



# advangeo<sup>®</sup> MapWizard – Report Tool

advangeo<sup>®</sup> MapWizard - [Reporting]

File Module Help

Tract Report Assessment Report

Tracts to include Tin

Author list Brosig, Barth

Country Germany

Assesment Date 04/2020

Assesment Depth

Assessment Team Leader Brosig

Assessment Team Member List

Deposit type Sn

Descriptive model

advangeo<sup>®</sup> MapWizard - [Reporting]

File Module Help

Tract Report Assessment Report

Deposit type Sn

Descriptive model

Grade-Tonnage model ☐ Add this to report?

Undiscovered deposits pmf

Image file containg location of tract

Known deposits within tract

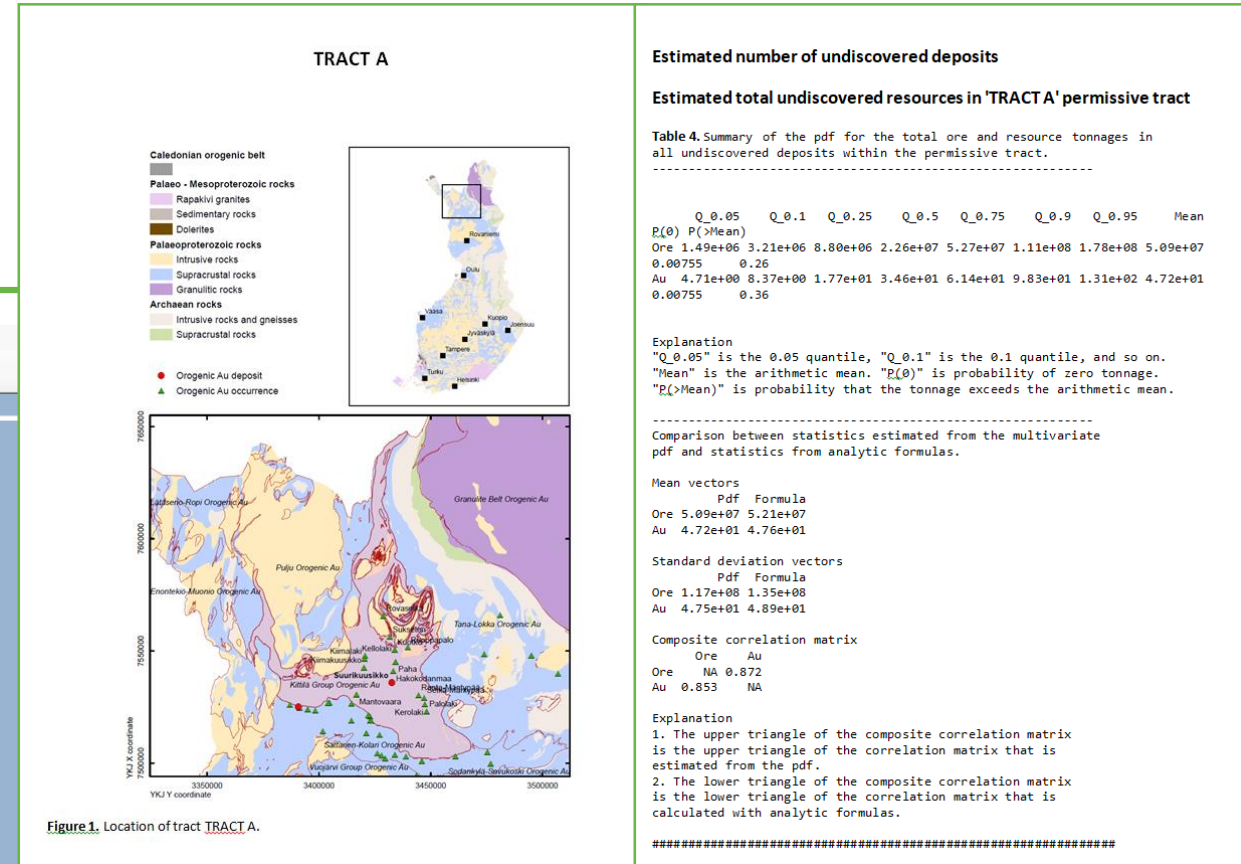
Known occurences within tract

Exploration history of the tract

Principal sources of information

References

Run



# advangeo® MapWizard – Results

- First release finished, available commercially from BEAK Consultants GmbH
- Contact us for enquiries and more information about advangeo® Prediction and the MapWizard integration via email:
  - [advangeo@beak.de](mailto:advangeo@beak.de)
  - [peggy.hielscher@beak.de](mailto:peggy.hielscher@beak.de)
  - [andreas.knobloch@beak.de](mailto:andreas.knobloch@beak.de)
- Thanks to all our project partners for their cooperation and EIT RawMaterials for their funding and support



# RawMaterials

Connecting matters



This activity has received funding from the European Institute of Innovation and Technology (EIT), a body of the European Union, under the Horizon 2020, the EU Framework Programme for Research and Innovation