



SEEQUENT

INTEGRATED GEOTHERMAL SUBSURFACE

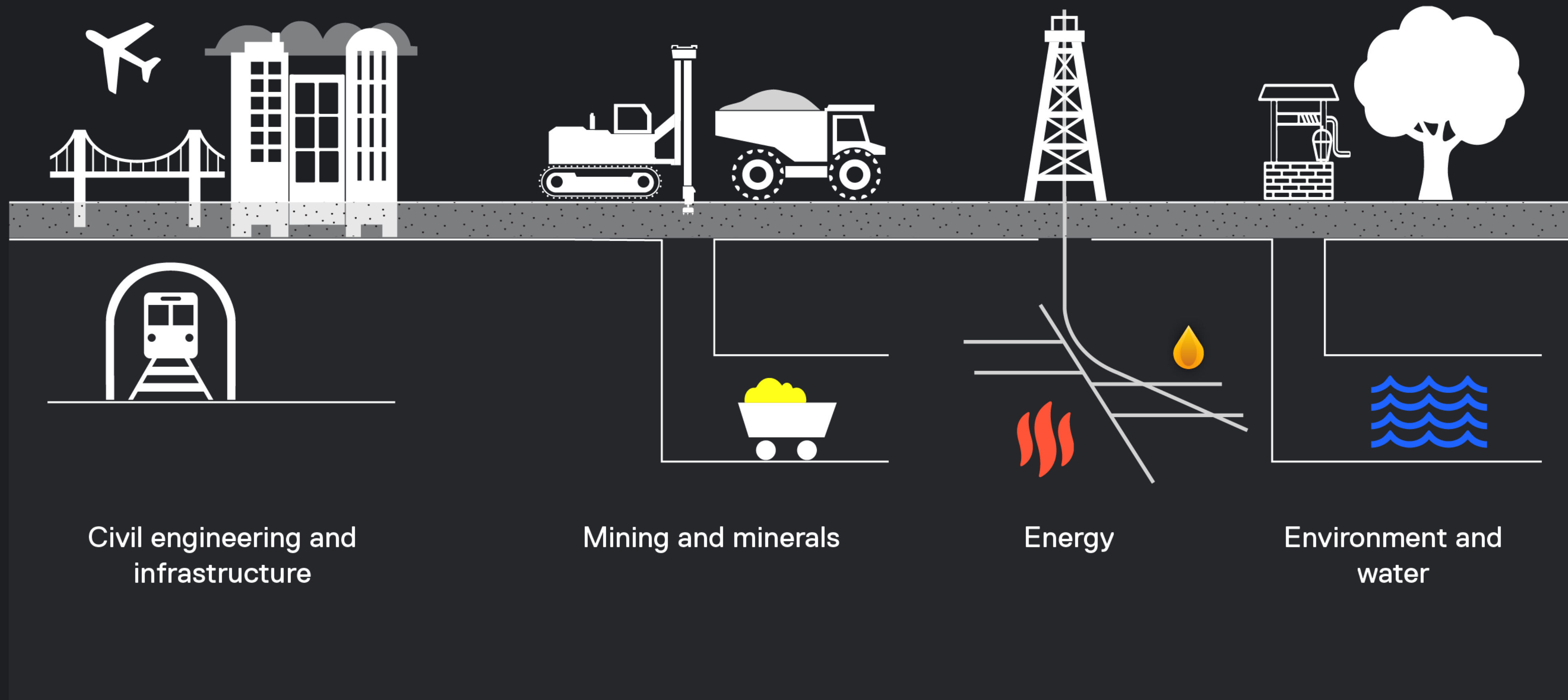
CLARE BAXTER

TECHNICAL SALES ADVISOR – ENERGY EUROPE AND AFRICA

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We help customers tell the underground story



Good Models ensure Better Decisions



Communication

Data interpretation

Resource Management

Well planning

Resource Assessment

Geothermal System Understanding

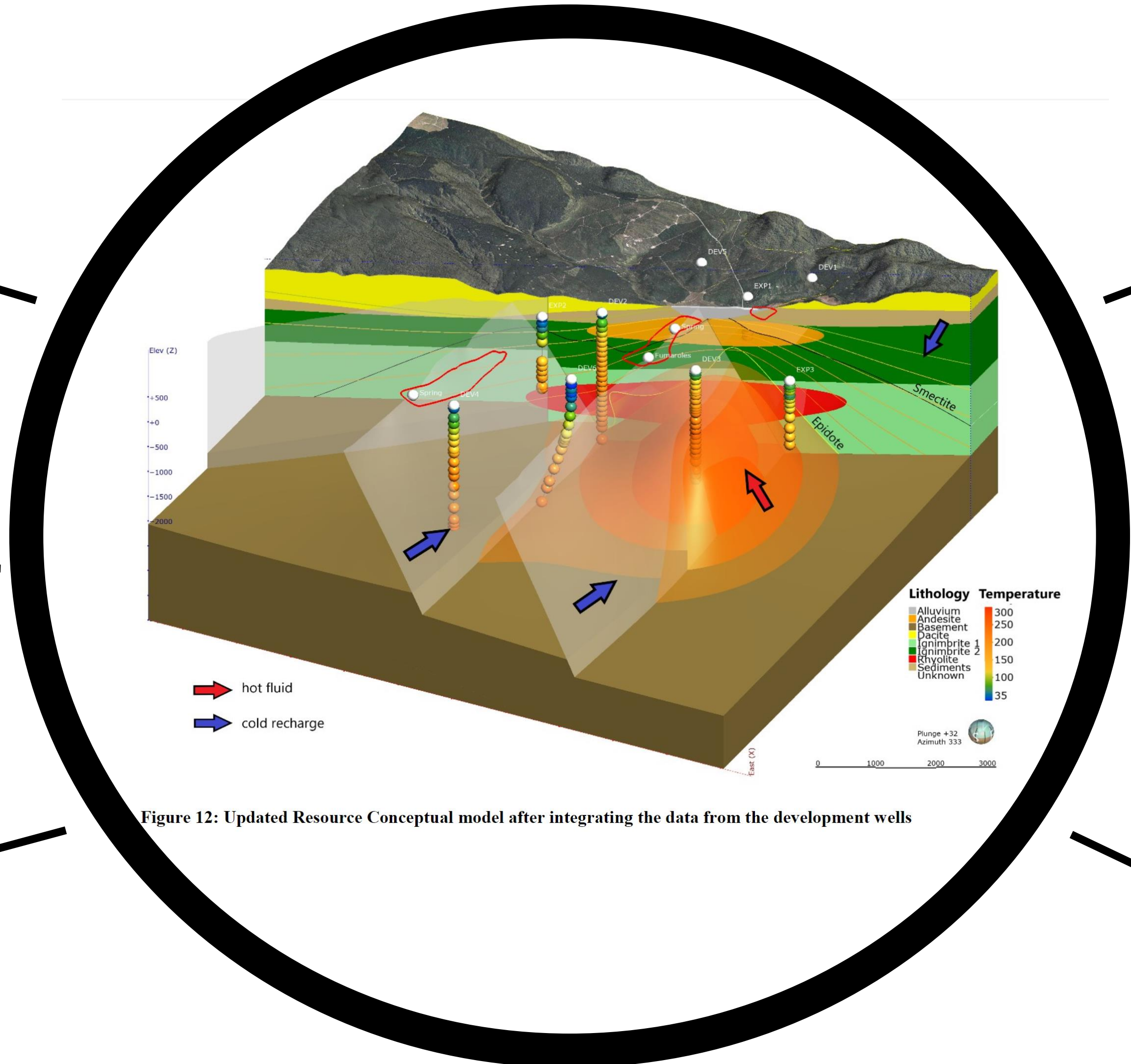
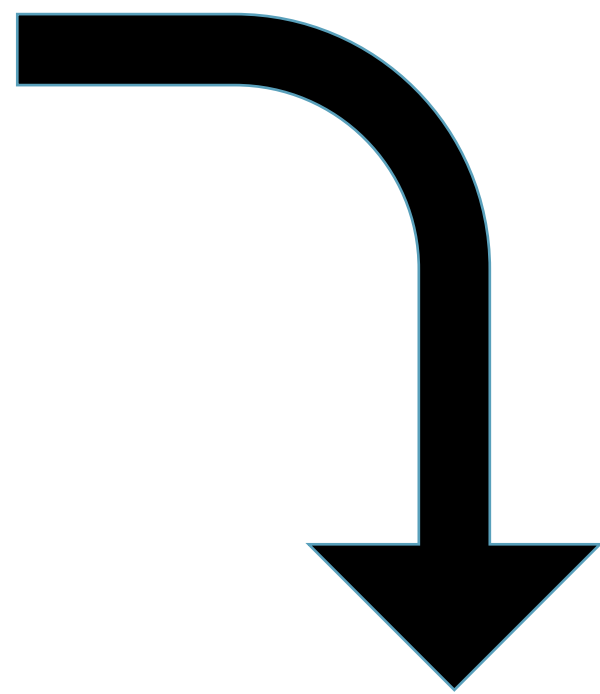


Figure 12: Updated Resource Conceptual model after integrating the data from the development wells



Innovation in depiction of Conceptual Model

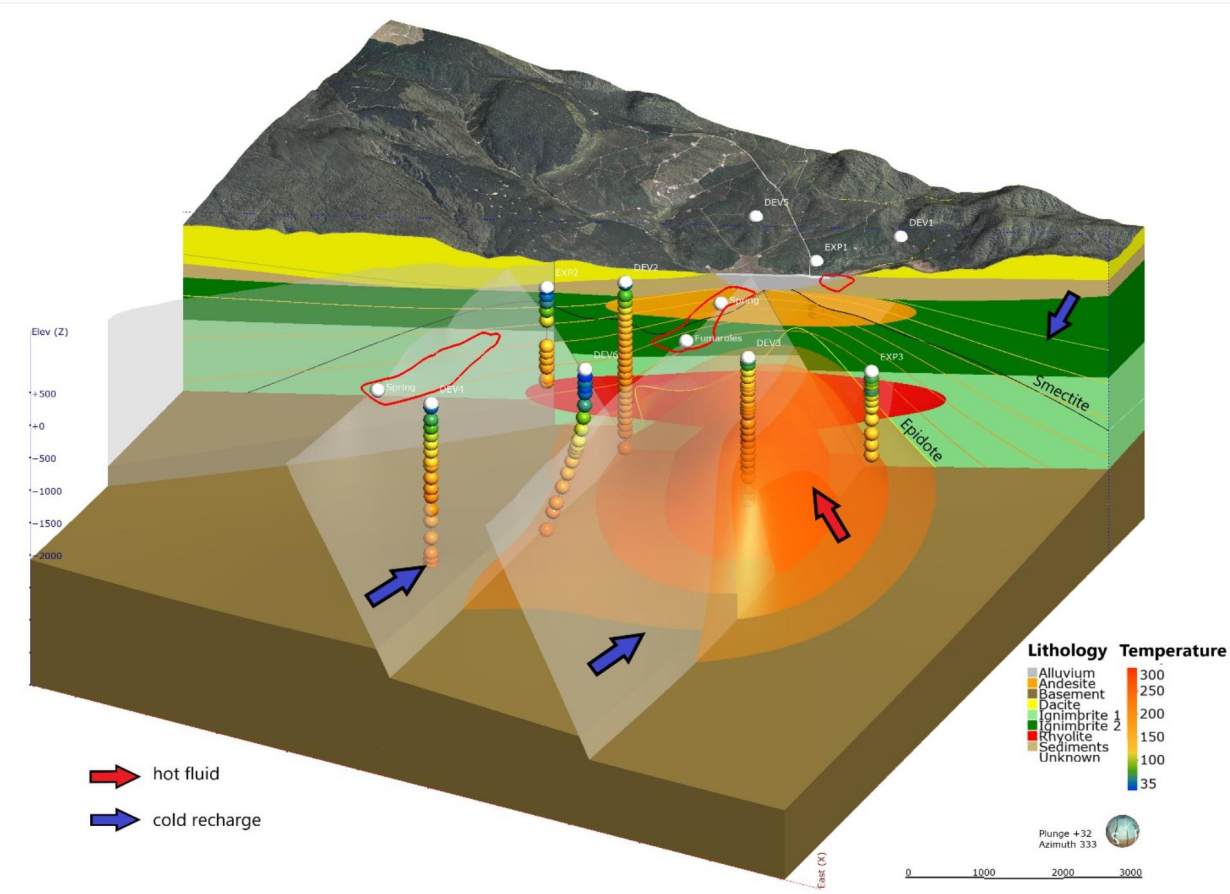
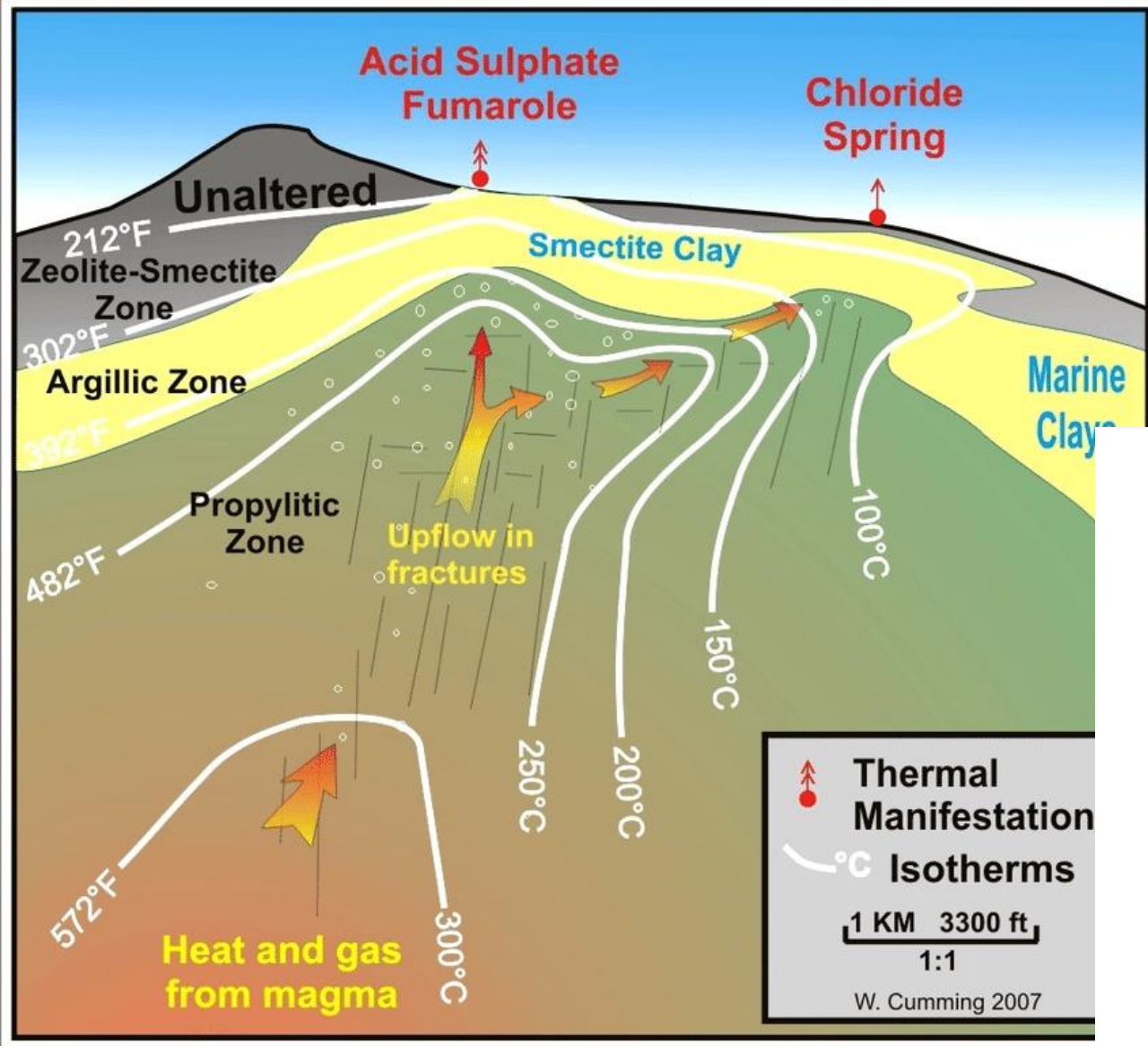
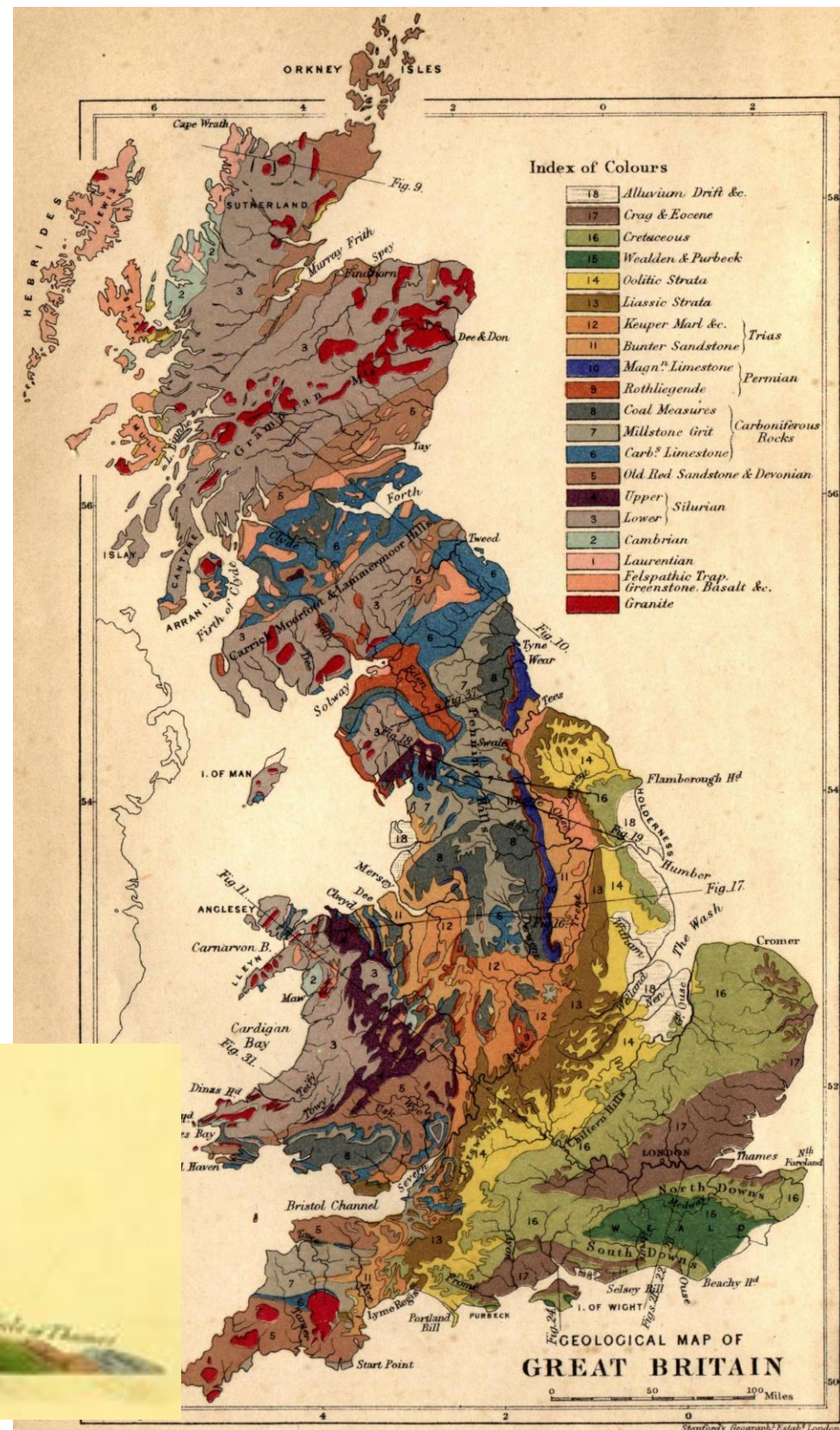


Figure 12: Updated Resource Conceptual model after integrating the data from the development wells



Integrated Iterative Innovative Approach

3D Implicit Models

Exploration



Surface Features

- Hot Springs/Fumaroles
- Chemistry
- Topography
- GIS Data

Extrapolated Geology

Geophysics

- Gravity
- Magnetics
- Resistivity

Conceptual Model

Decisions

Well Planning

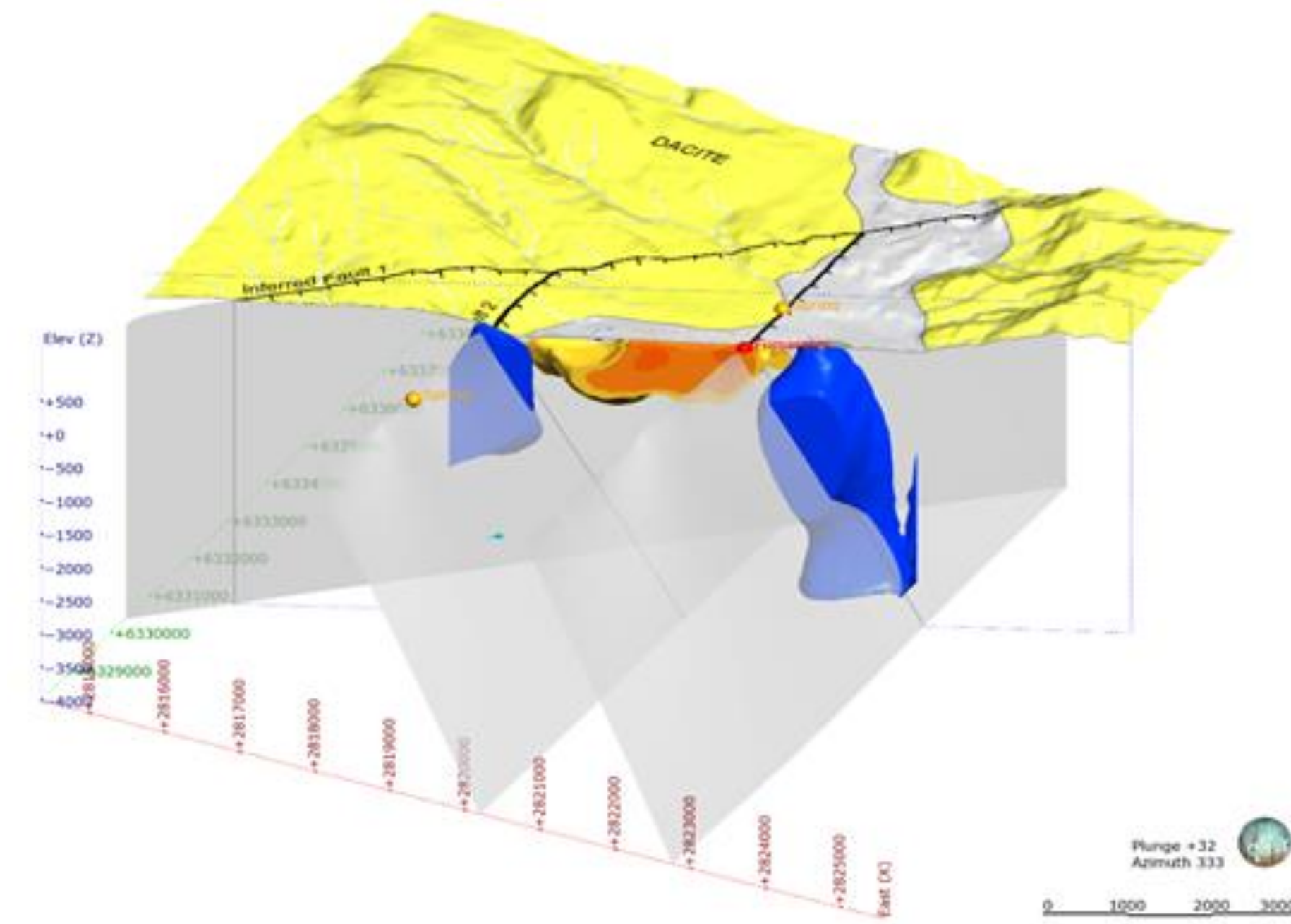
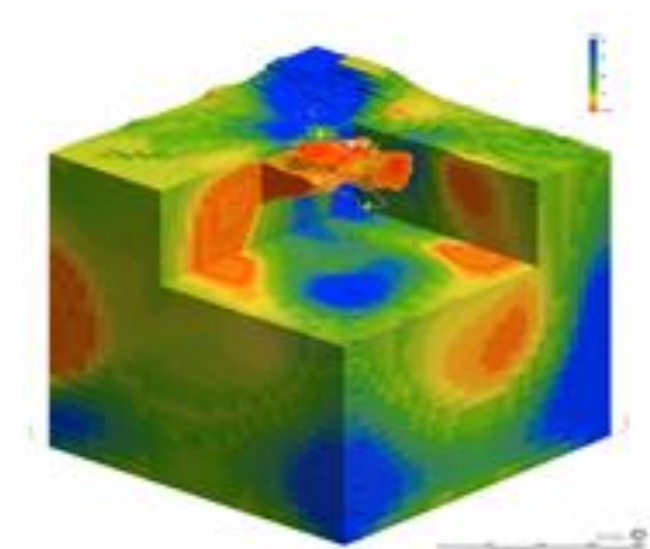
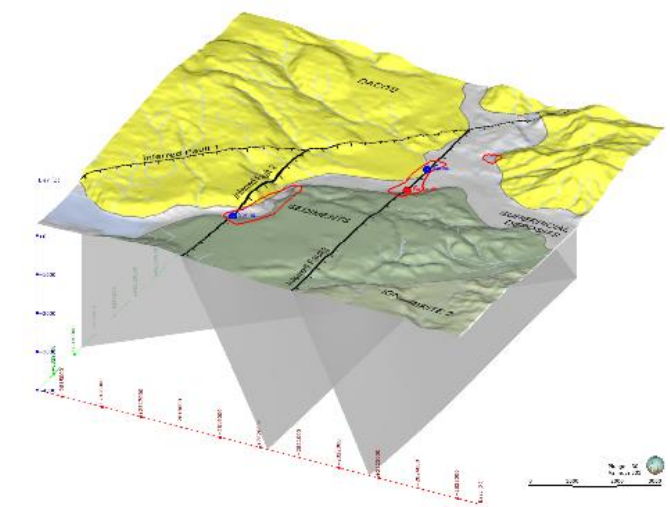
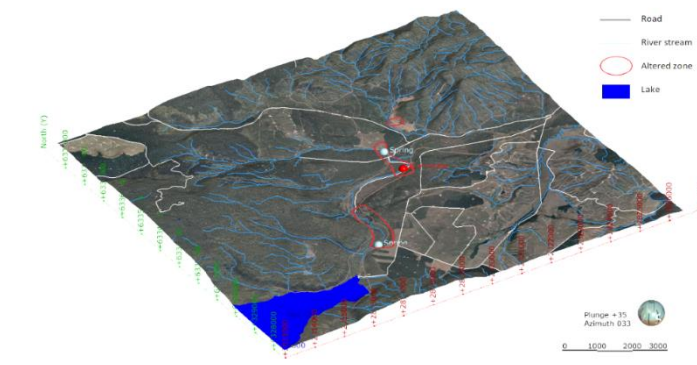
Hypothesis Testing

Validate Data

Enticing Investors

Required Surveys

Community Engagement

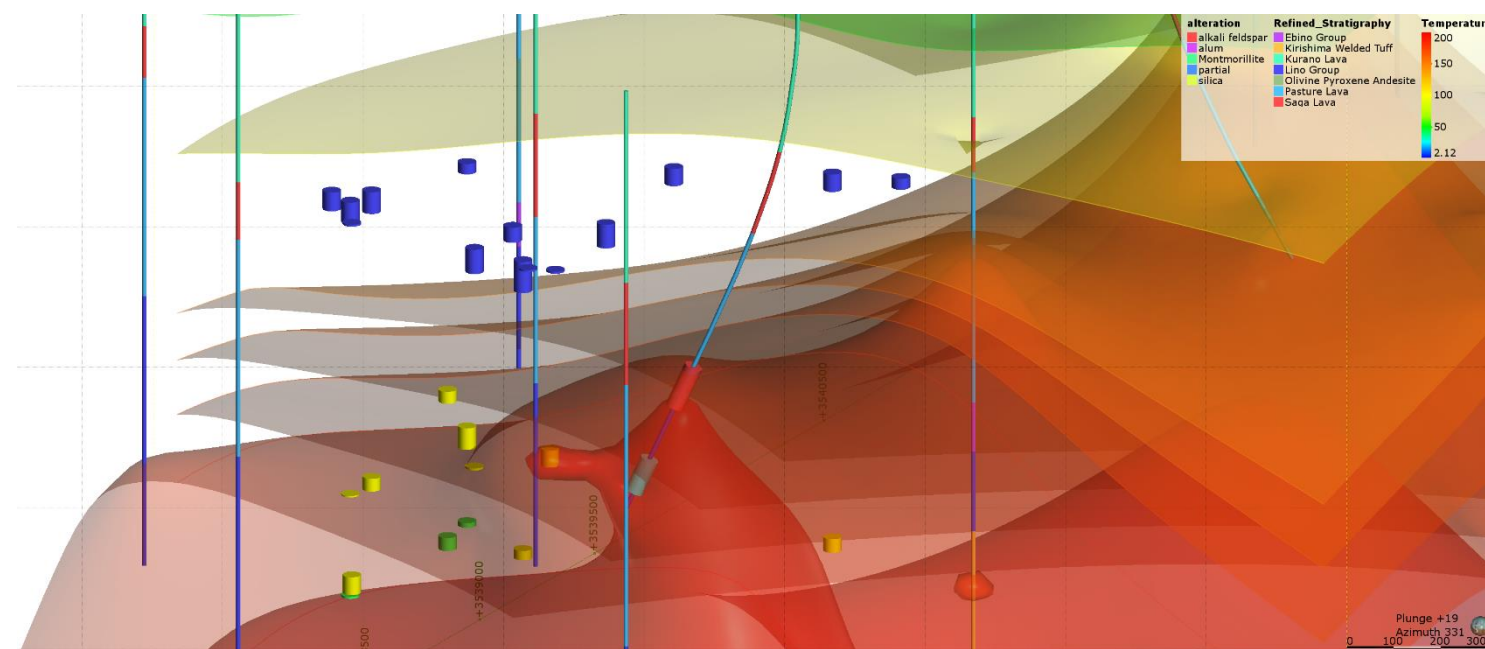


Leapfrog in action - Exploration Utilizing existing Datasets



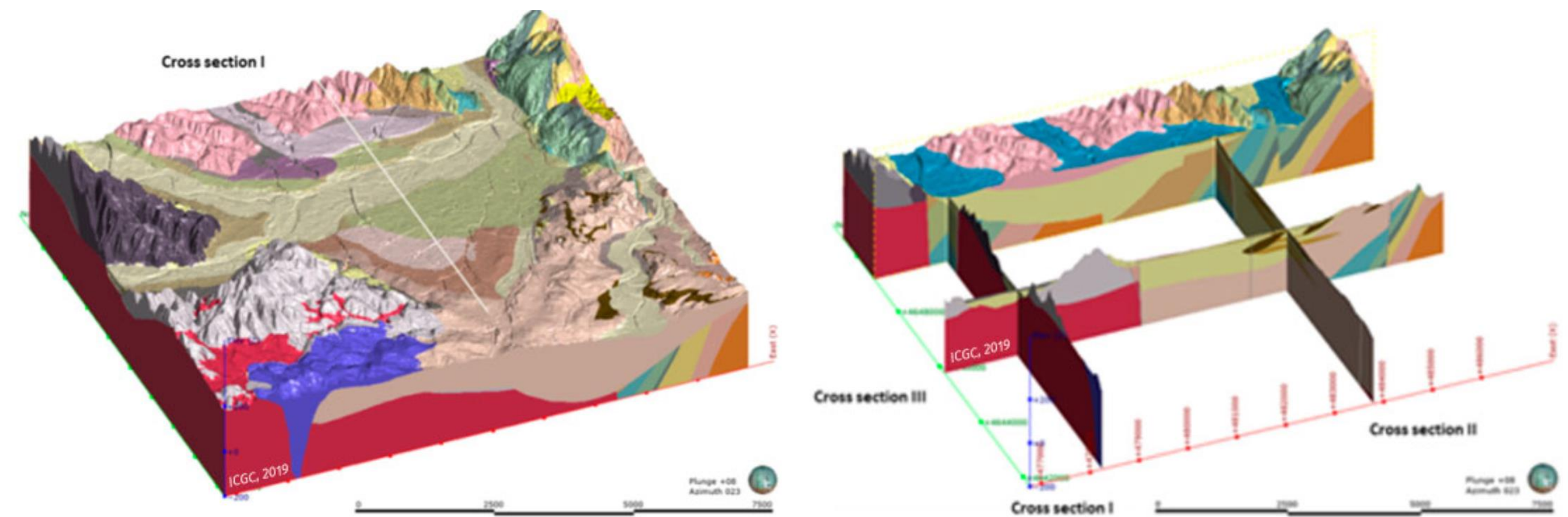
Ebino, Japan

- Integration of existing datasets for the area using NEDO data
- Spatial context of the resource
- Well Planning
- Data QA/QC
 - Temperature
 - Geophysics
 - Faults
 - Geology



Girona, Spain

- Regional scale integrated geological model to input into Feflow
- Understand urban heat presence and influence on shallow geothermal fluid.

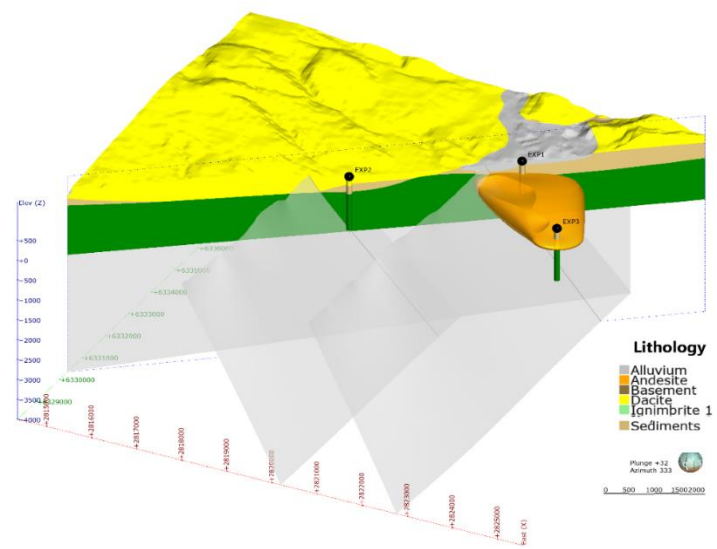


Model geològic en 3D (Fase I); bloc complet modelat i diverses seccions

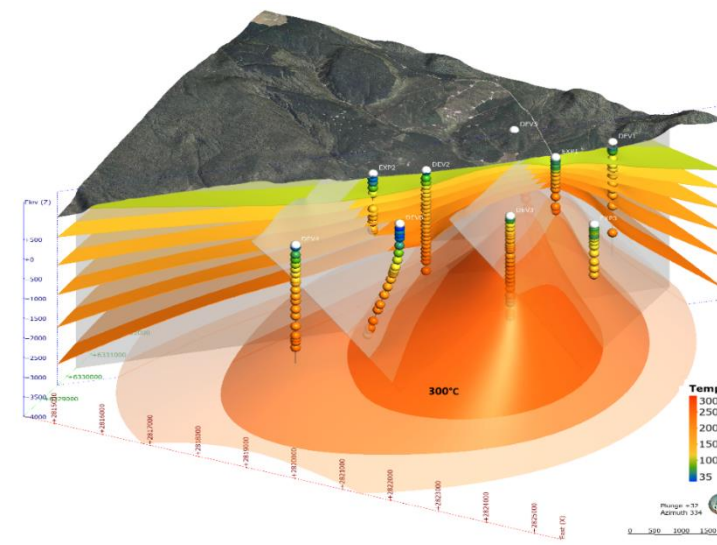
<https://www.icgc.cat/Innovacio/Projectes-R-D-i/MUSE-GeoERA>



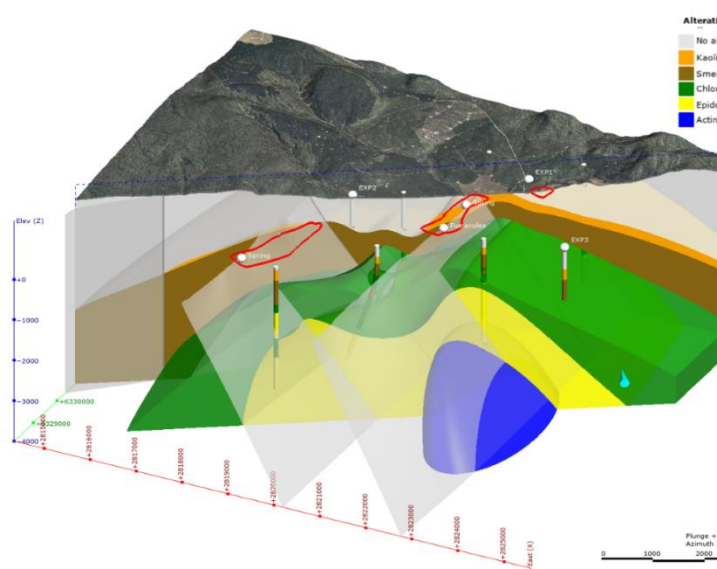
Feasibility – Geothermal System Delineation



Geology

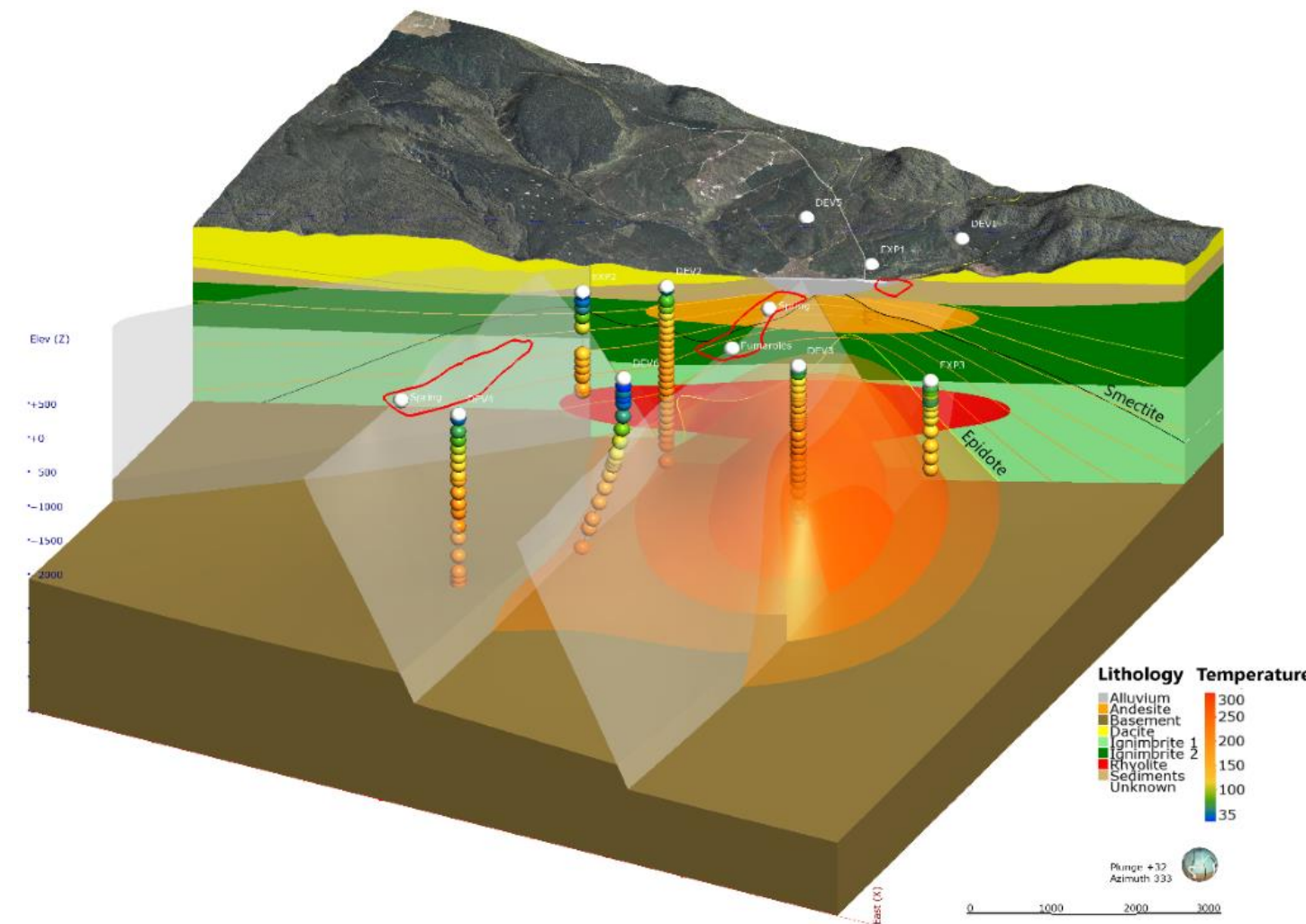


Temperature

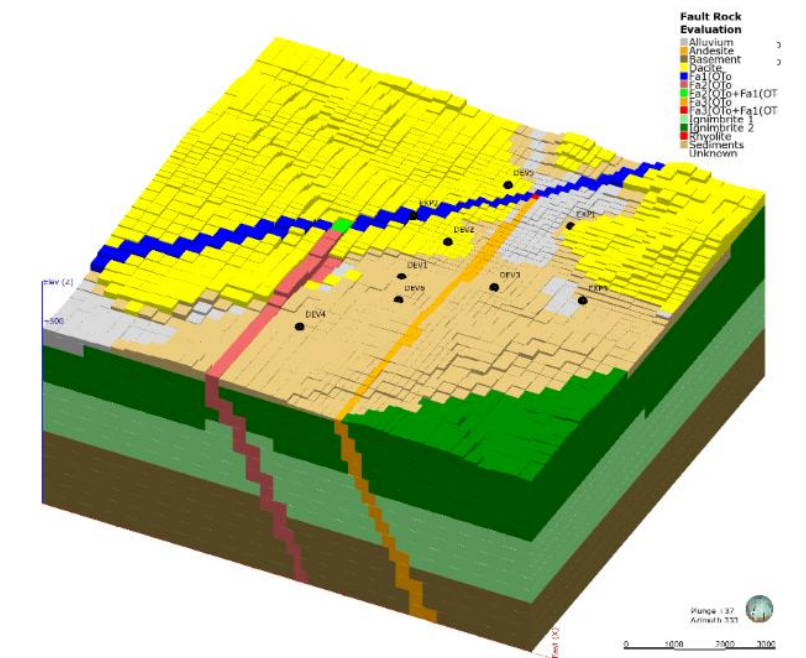


Alteration

Conceptual Model



TOUGH2 Model



Decisions

Resource Capacity

Plant Requirement

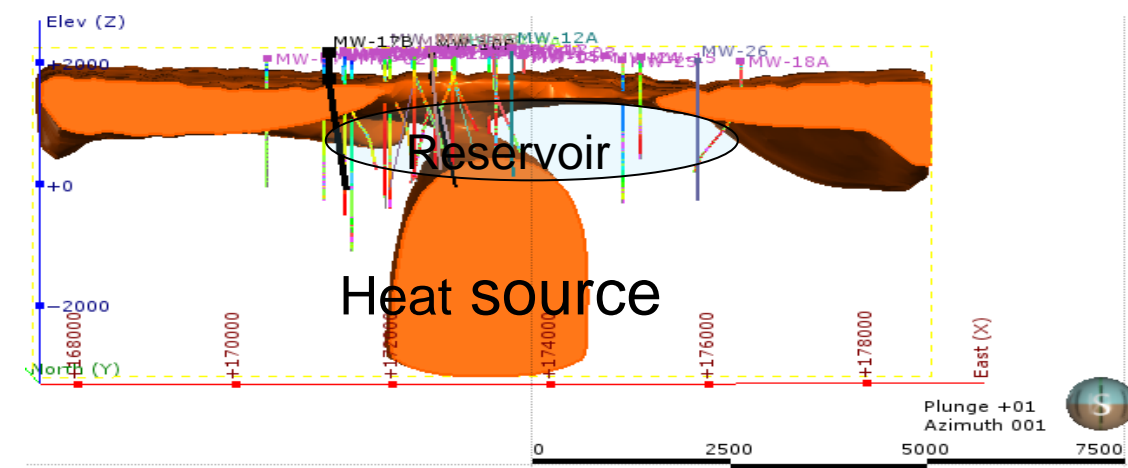
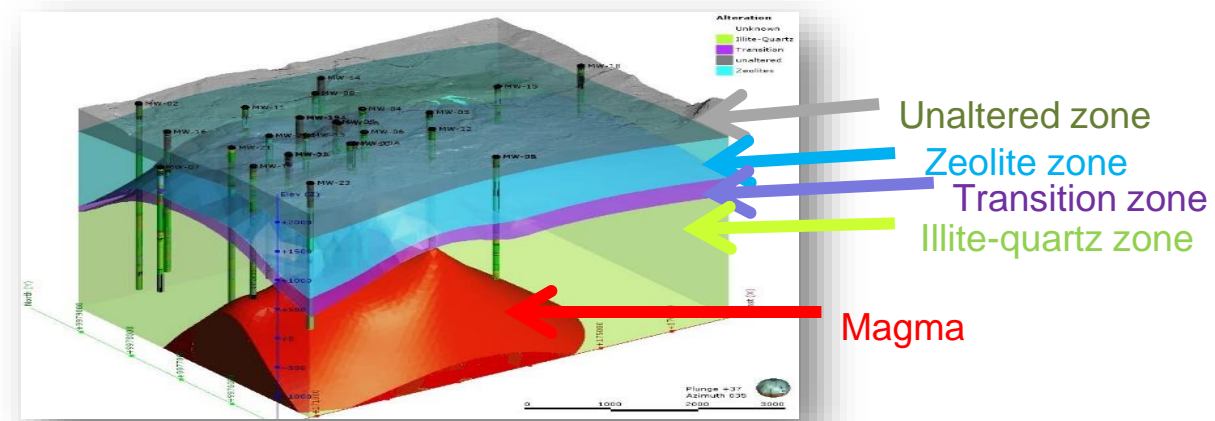
Surface Infrastructure

Well Development Plan



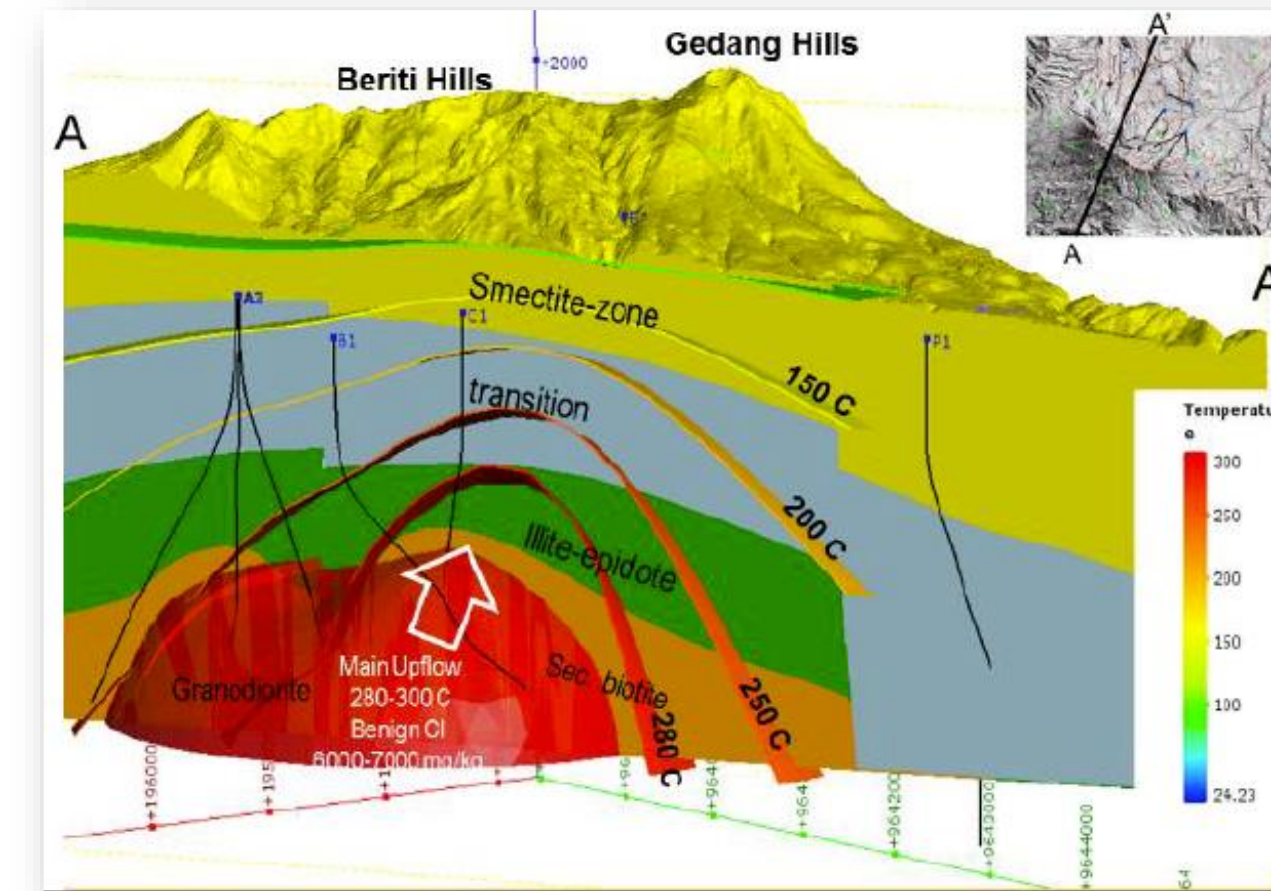
Understanding the Potential

Resource Delineation - Kenya



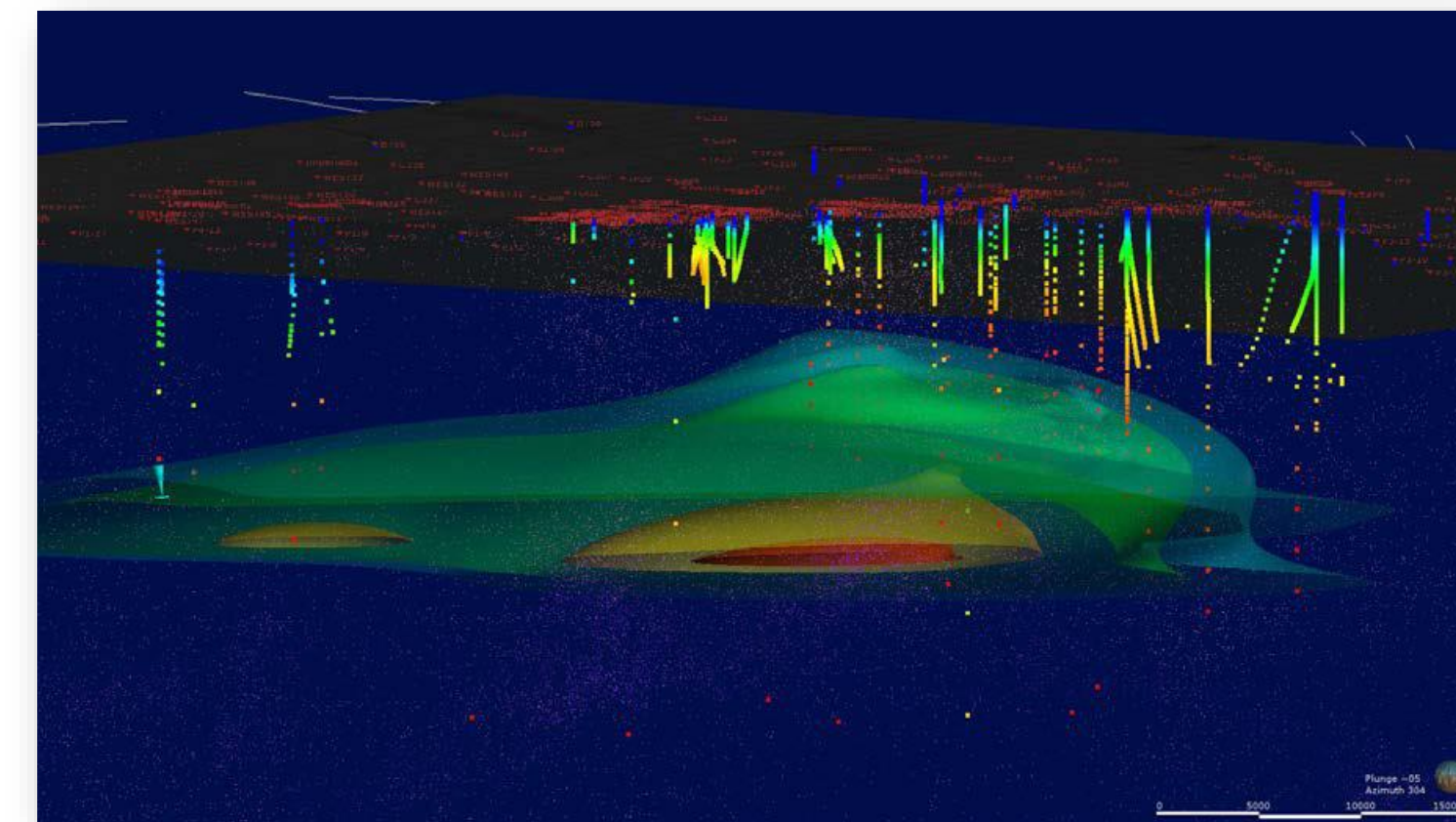
Mibei et.al, 2017

Baseline Modelling - Indonesia



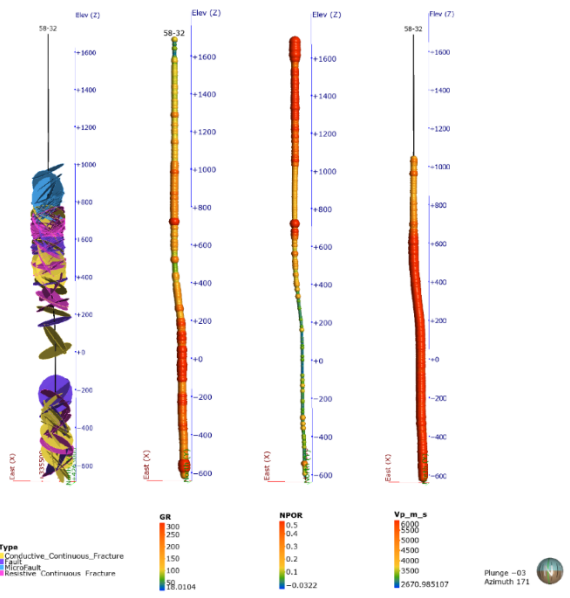
Nusantara et.al, 2017

Super Critical Potential - USA

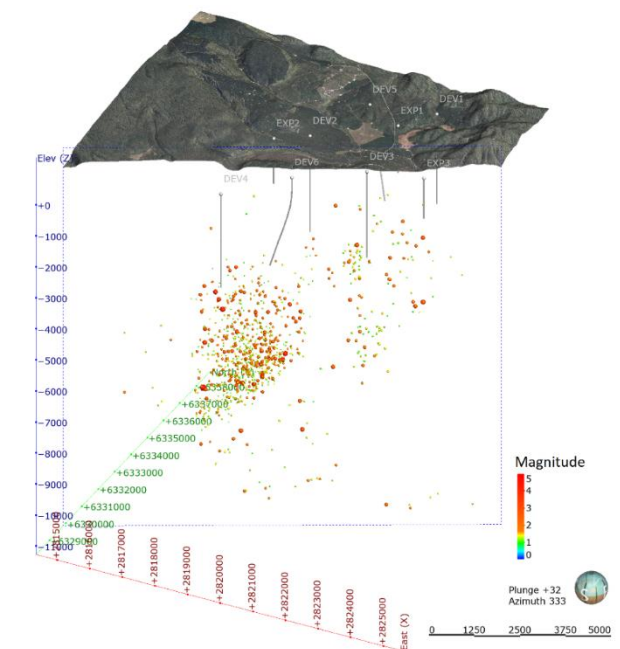


Stimac et.al, 2017

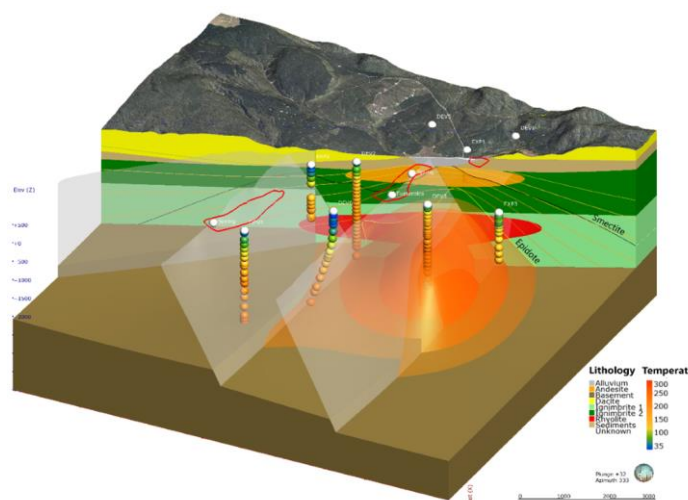
Development and Management



Well
Production
Data

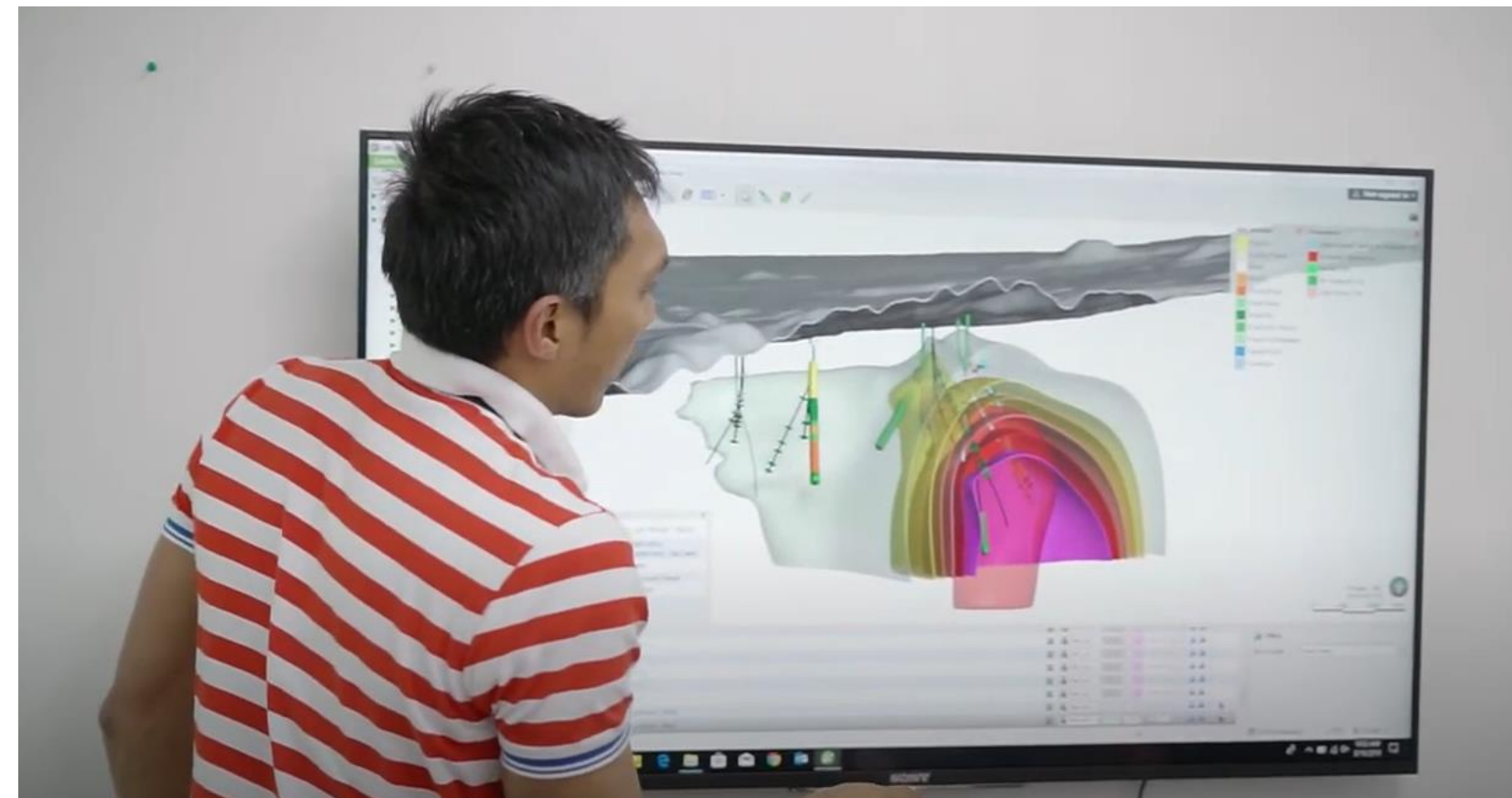


Micro
seismic



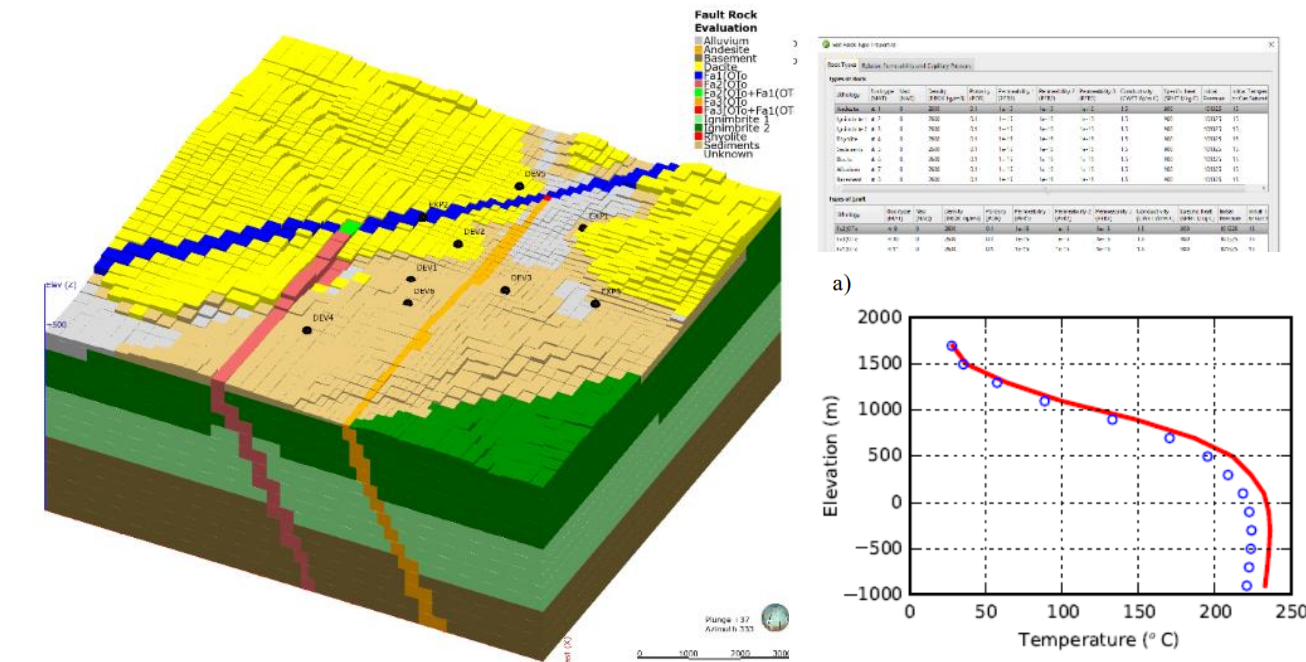
Dynamic
Updating

Conceptual Model



Click for video

TOUGH2 Model



Decisions

Reinjection

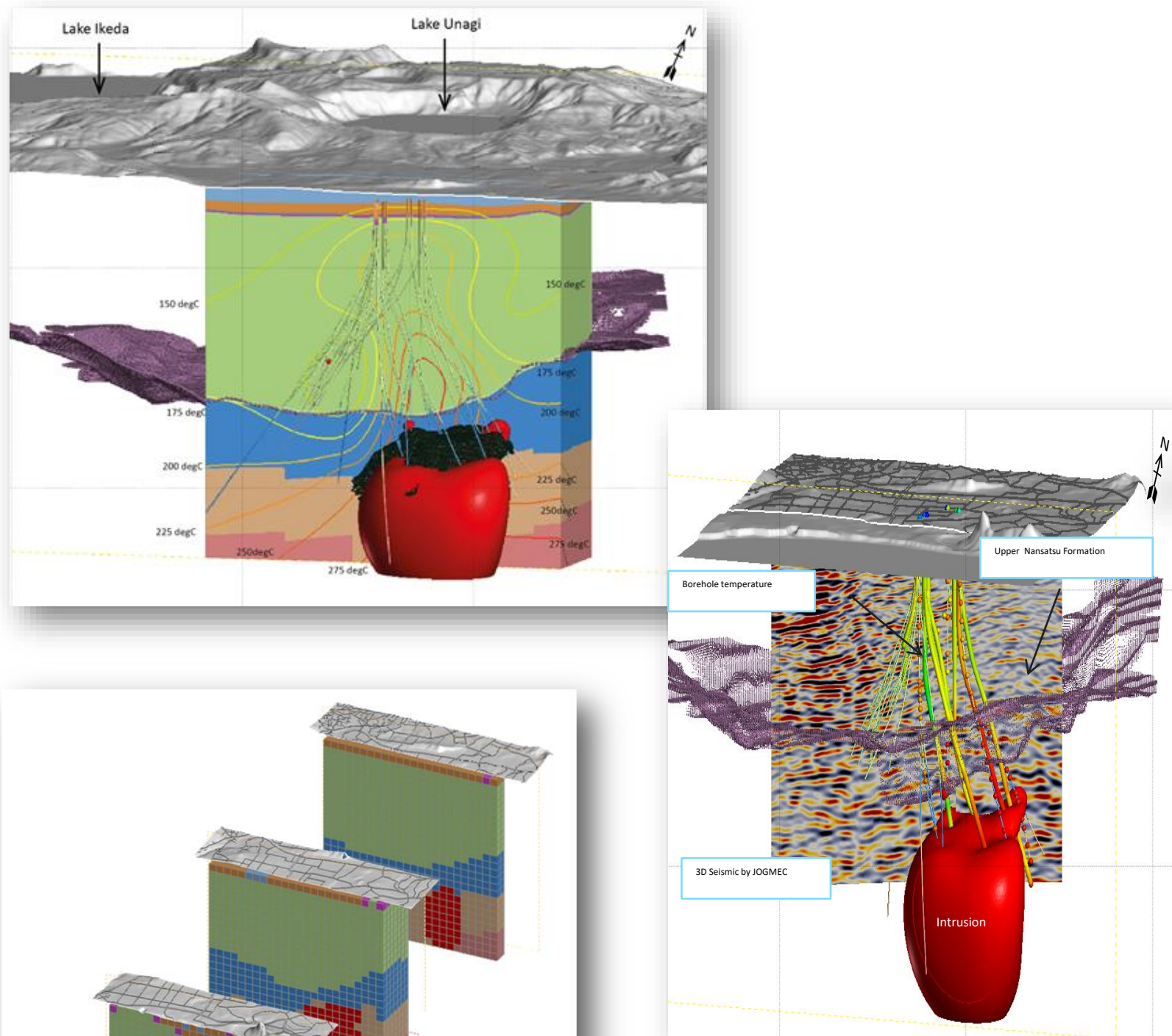
Maintenance

Community Engagement

Leapfrog in Action – Field Optimization



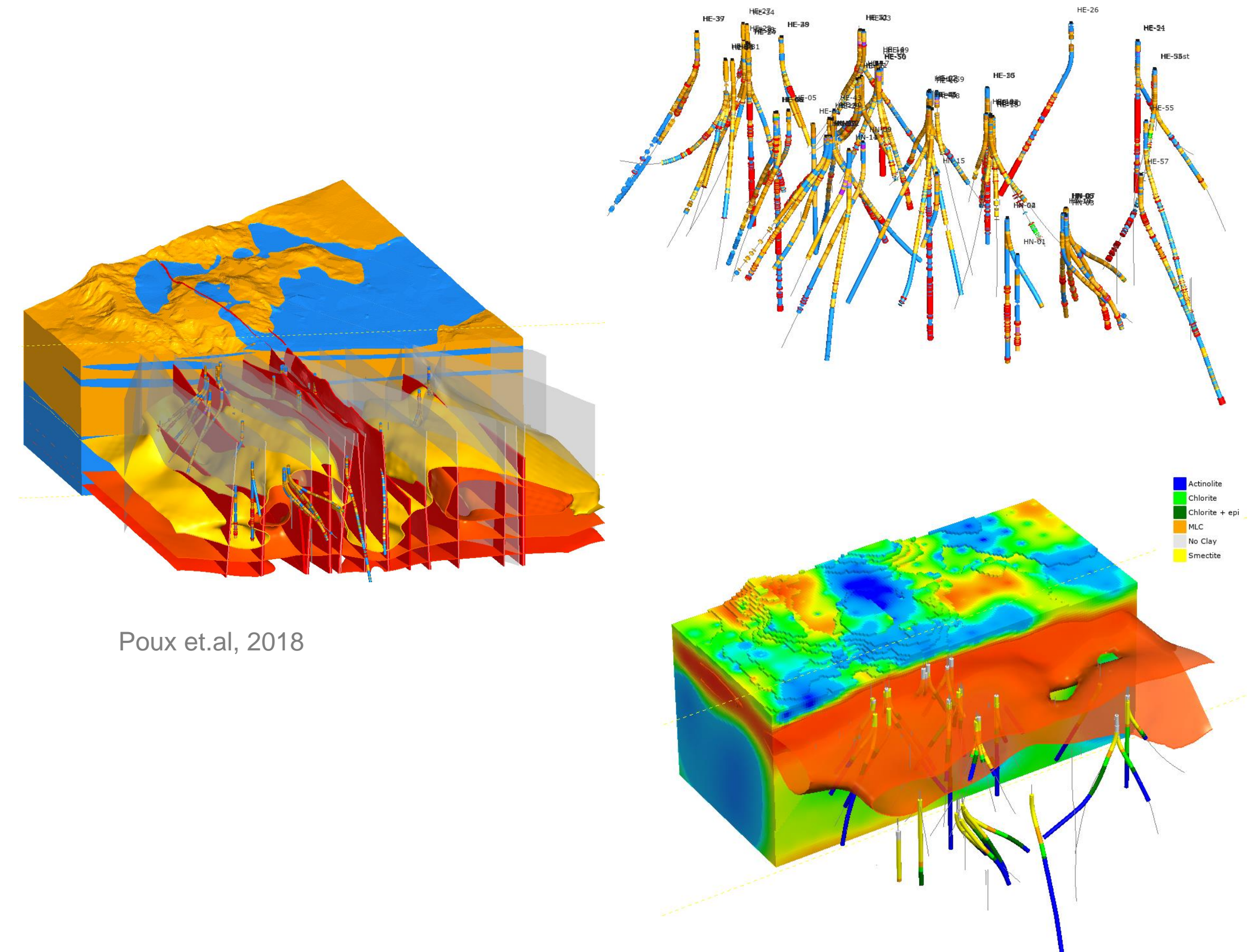
Field Optimization – Yamagawa Japan



Wulaningsih et.al, 2017

3D numerical reservoir simulation block using Leapfrog Geothermal

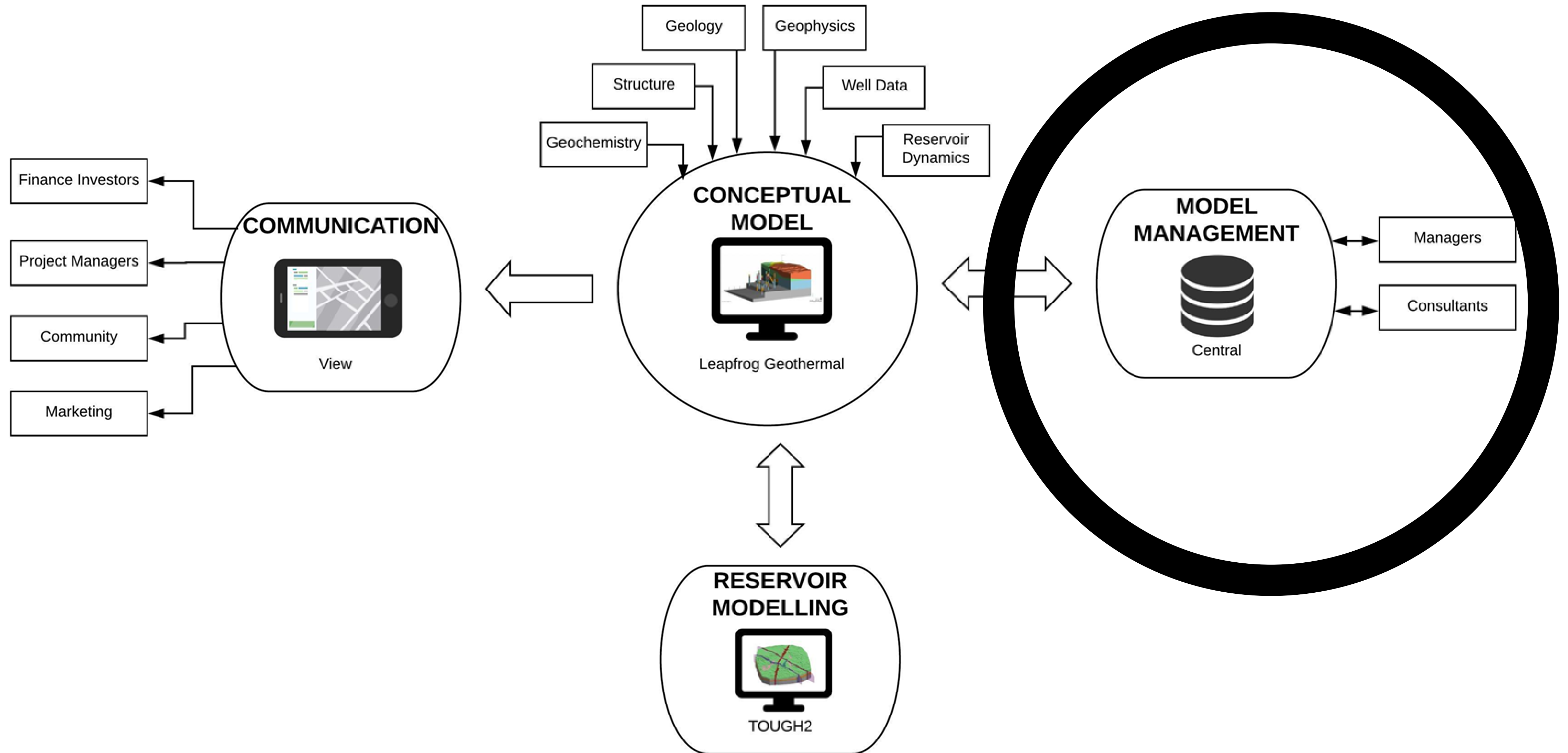
Dataset Integration – Hellisheidi, Iceland



Poux et.al, 2018



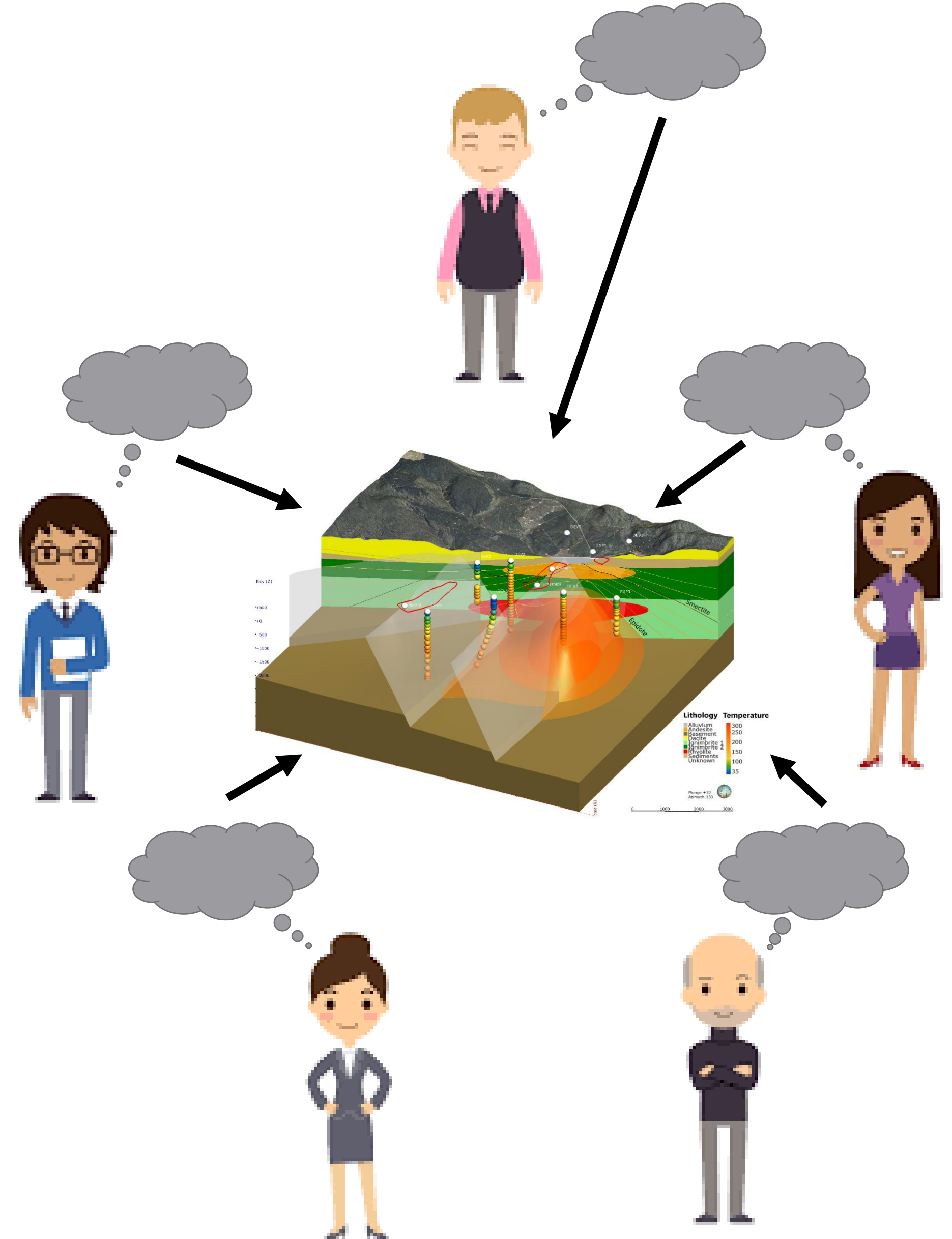
Geothermal Integrated Workflow



Cloud workflow for Collaboration



Project history									
Graph	ID	Local	Locked	Project	Size	App Name	App Version	Project	Status
	83		🔒	1.5GB	Leapfrog Geo	4.3.1	Master Model	11/10/2018	J.Elliott
	82		🔒	2.0GB	Leapfrog Geo	4.3.1	Master Model	4/10/2018	N.Saav
	76		🔒	1.5GB	Leapfrog Geo	4.3.1	Master Model	2/10/2018	N.Saav
	75		🔒	1.5GB	Leapfrog Geo	4.3.1	Master Model	2/10/2018	N.Saav
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	73		🔒	2.0GB	Leapfrog Geo	4.3.1	B-Zone	28/09/2018	J.Elliott
	72		🔒	2.0GB	Leapfrog Geo	4.3.1	B-Zone	28/09/2018	N.Saav
	71		🔒	1.6GB	Leapfrog Geo	4.3.1	Master Model	28/09/2018	N.Saav
	70		🔒	1.5GB	Leapfrog Geo	4.3.1	A-Zone	28/09/2018	J.Elliott
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	52		🔒	1.3GB	Leapfrog Geo	4.3.1	Experimental	17/09/2018	J.Elliott
	51		🔒	1.3GB	Leapfrog Geo	4.3.1	Database	14/09/2018	N.Saav





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THANK YOU

