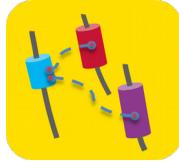


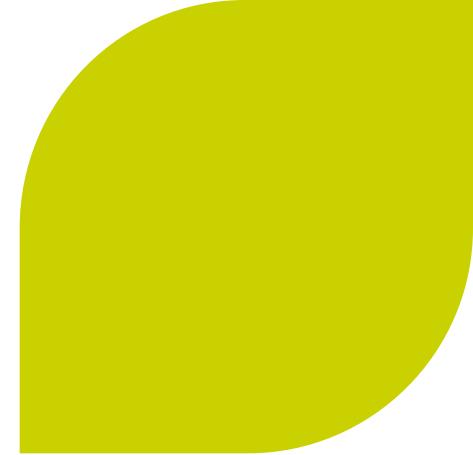


# Albion: Geological modelling software for stratiform deposit



Emmanuel DUGUEY – AREVA Mines  
Oslandia

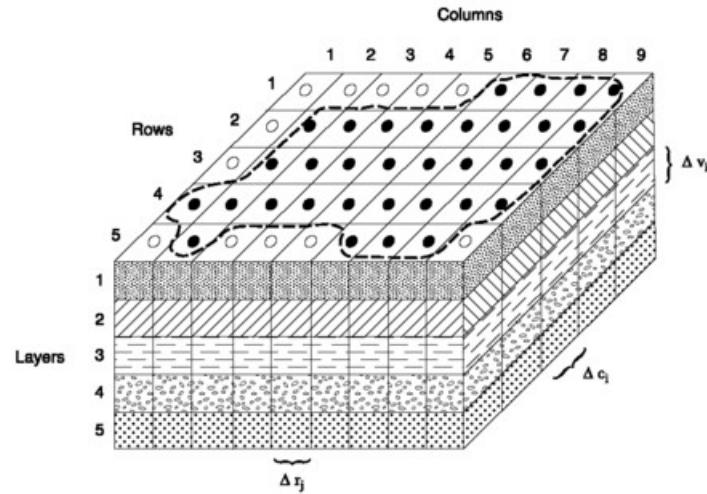
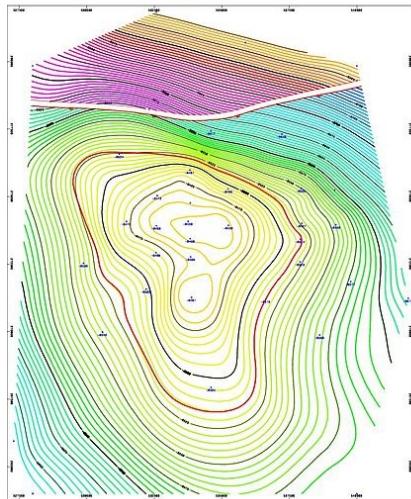
BUSINESS GROUP



**A**  
**AREVA**  
forward-looking energy

# Geological modelling ?

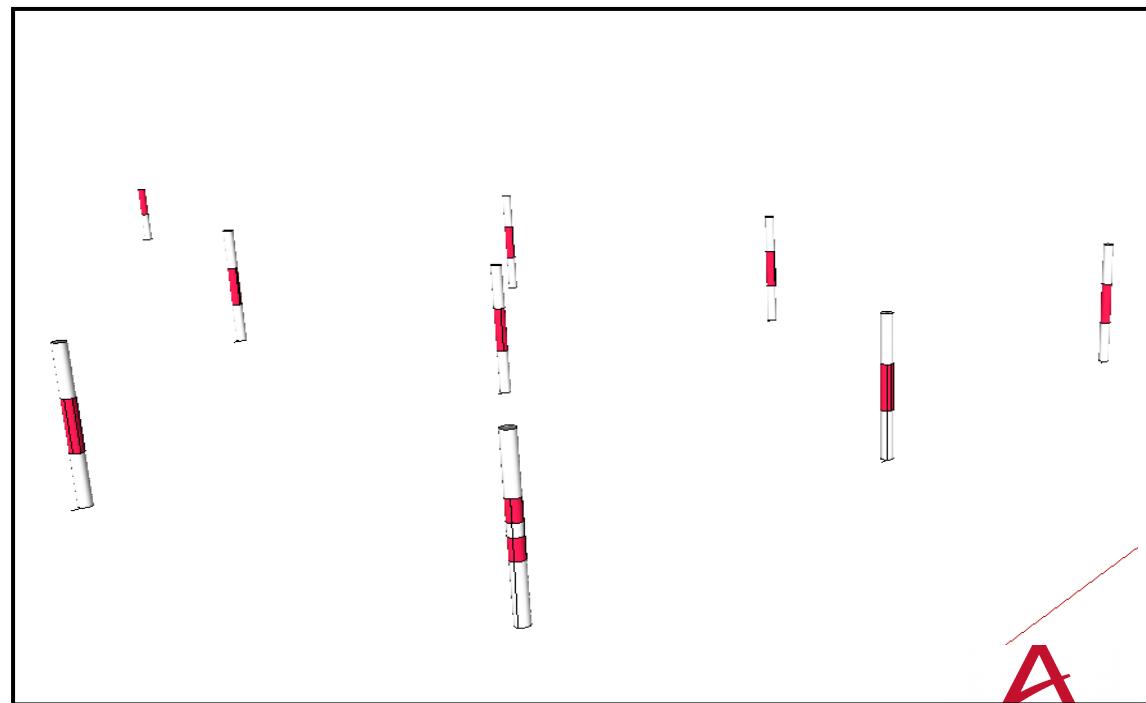
Geological modelling is the  
**applied science**  
of creating **computerized representations**  
of portions of the **Earth's crust**  
based on geophysical and geological **observations** made on and below the Earth surface



# Albion : input data

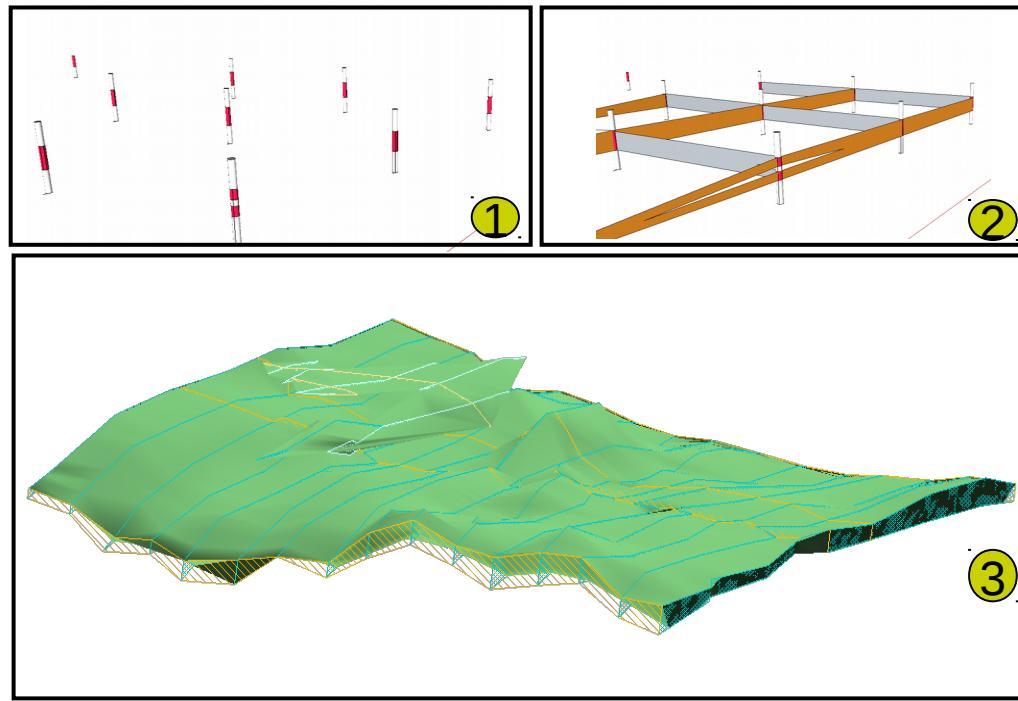
## ► Field survey : core drilling

- > 3K per site
- > 10K geological objects



# Geological modelling process

- ▶ Geological objects correlation ( 2 directions )
- ▶ Surface reconstruction

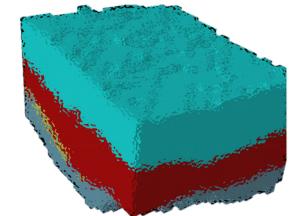
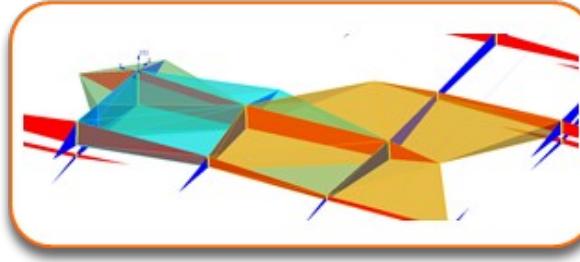
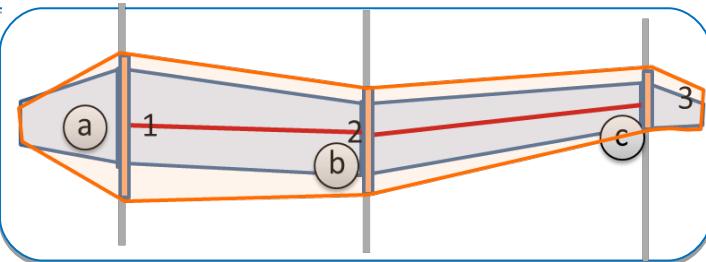


Cross section

# Albion : new approach

## ► Why create a new 3D software?

- ◆ Geological models with traditional 3D modelers  
=> time consuming !
- ◆ 3D modelers old & expensive  
=> not initially for volumetric construction
- ◆ Geological 3D modelers  
=> no advanced spatial tools recently developed in GIS software
- ◆ Generalize acces to 3D modelling





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GPL-3.0

Branch: [master](#)[New pull request](#)[Create new file](#)[Upload files](#)[Find file](#)[Clone or download](#) **garaud** Remove an unused imported module

Latest commit a6581d2 on 14 Apr

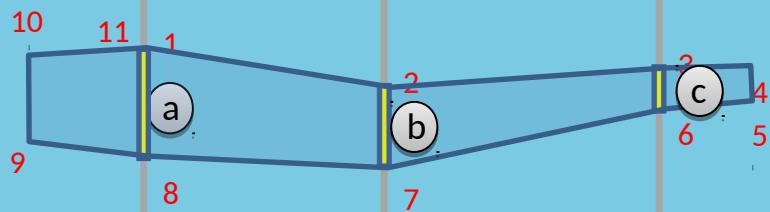
buttons	Fix polygon export	3 months ago
res	Cleanup qgis_section code	4 months ago
scripts	Add build script and precommit hook	3 months ago
tests	Fix failing test	3 months ago
viewer_3d	Remove several unused imported modules	3 months ago
.gitignore	Big refactoring of the whole codebase	5 months ago
LICENSE	Initial commit	6 months ago

# New approach to build cross sections and volumes

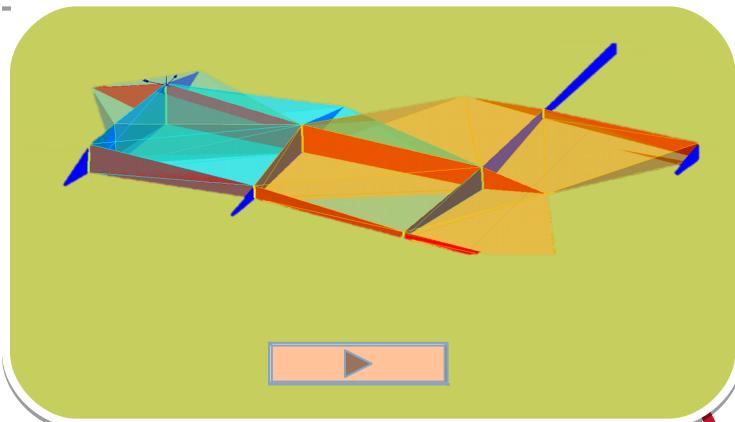
Traditional method

## Cross section

Albion method

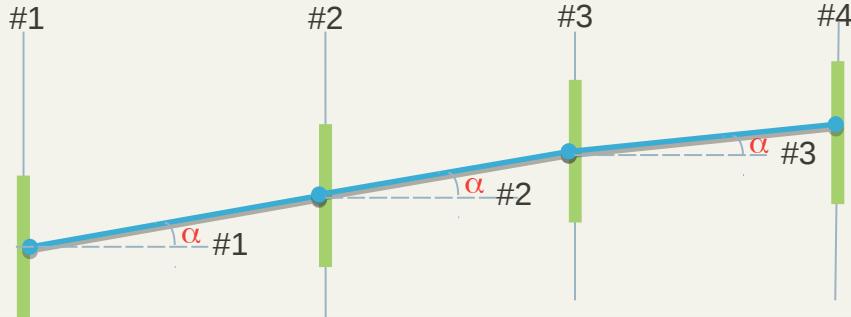


## 3D volumes

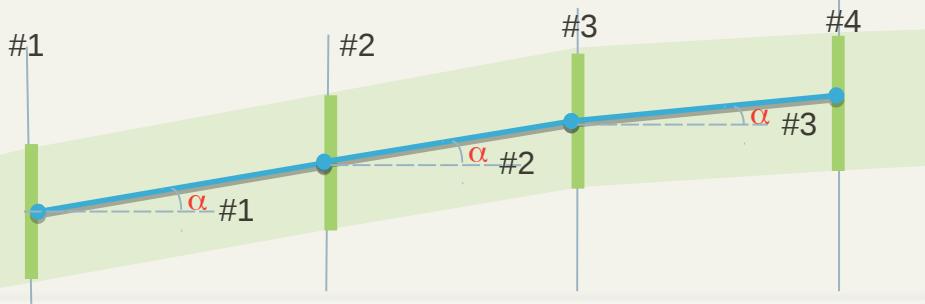


New method

# the cross sections are created quickly by using graph and herited graph (for example mineralization hosted by geological layer stratiform deposit)

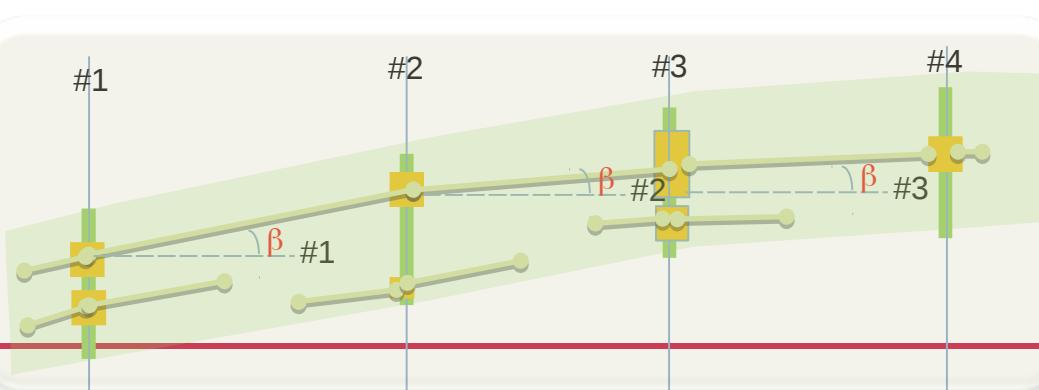


Automatically create graph according to the distance between boreholes and dip angle  $\alpha$



Geological formation [A]

The polygon [A] along the section is built automatically according to the graph



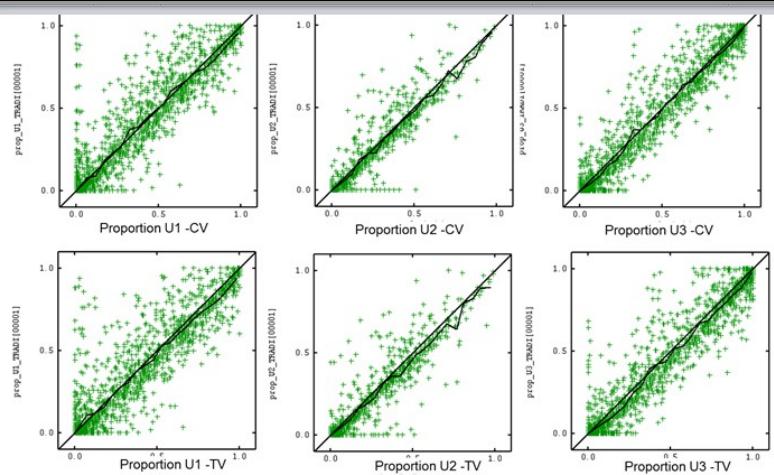
Mineralization hosted by [A]

The graph of the mineralization is built automatically, according to the herited graph and a specific angle  $\beta$

# Traditional vs Albion : Good correlation

	prop_U1_CV	prop_U1_TV	prop_U1_TR	prop_U2_CV	prop_U2_TV	prop_U2_TR	prop_U3_CV	prop_U3_TV	prop_U3_TR
prop_U1_CV	1,00	0,99	0,96						
prop_U1_TV	0,99	1,00	0,96						
prop_U1_TR	0,96	0,96	1,00						
prop_U2_CV				1,00	0,99	0,97			
prop_U2_TV				0,99	1,00	0,96			
prop_U2_TR				0,97	0,96	1,00			
prop_U3_CV							1,00	1,00	0,99
prop_U3_TV							1,00	1,00	0,99
prop_U3_TR							0,99	0,99	1,00

Correlation matrix of 6 different volumes build with Albion and geological modeler

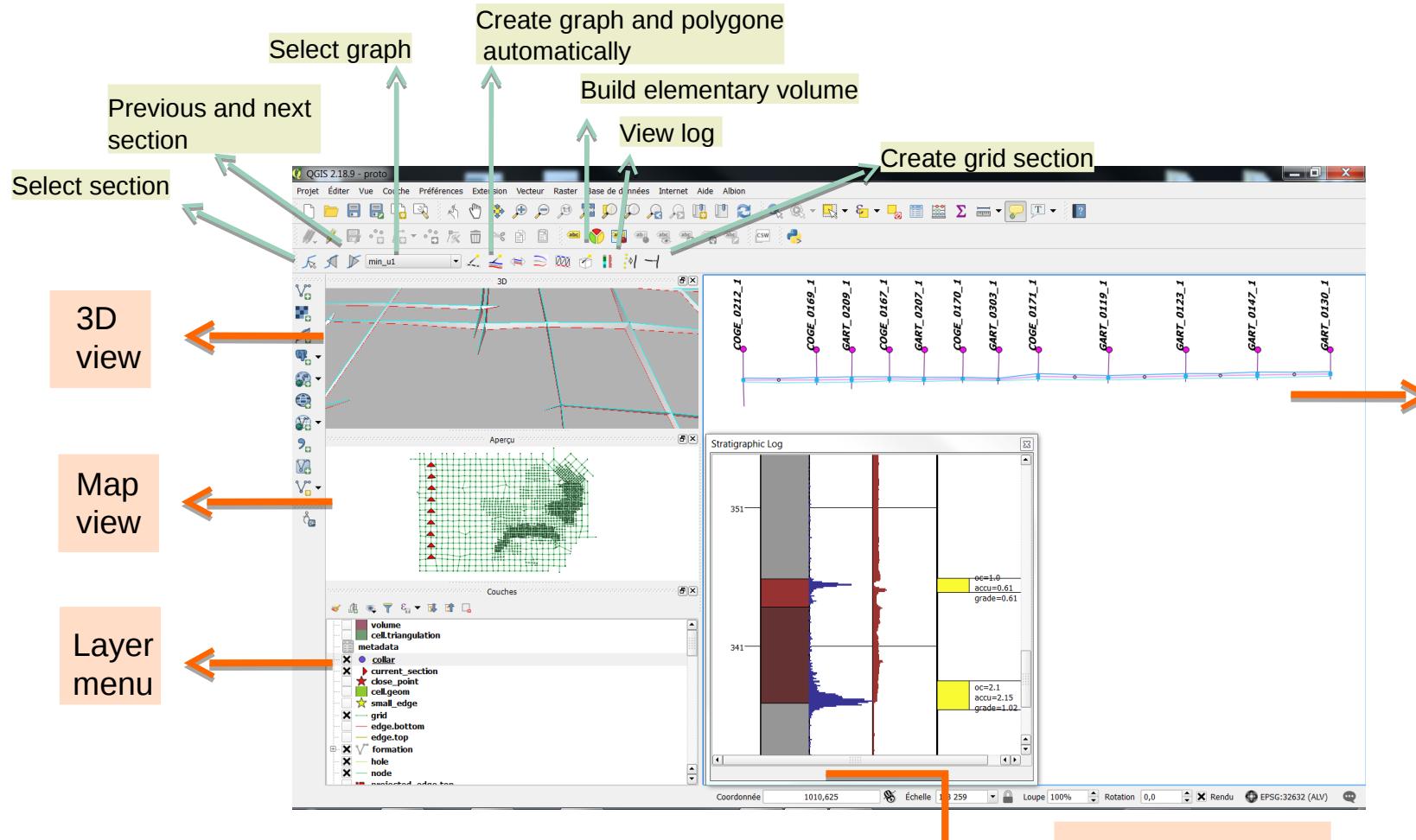


The differences observed between the volume created by modeler and Albion are due to human mistakes !

# All tools integrated

Albion GUI

## Friendly menus for accurate cross-sections & volumes



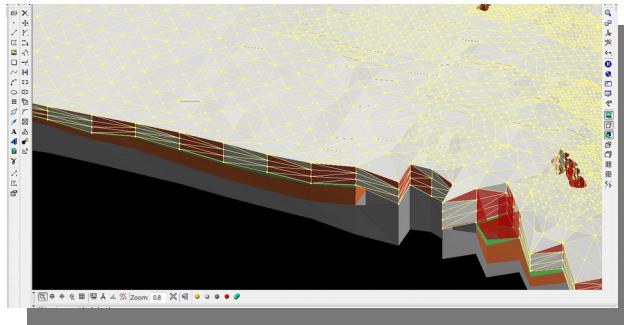
Stratigraphic log

# Export cross sections and volumes to other 3D softwares

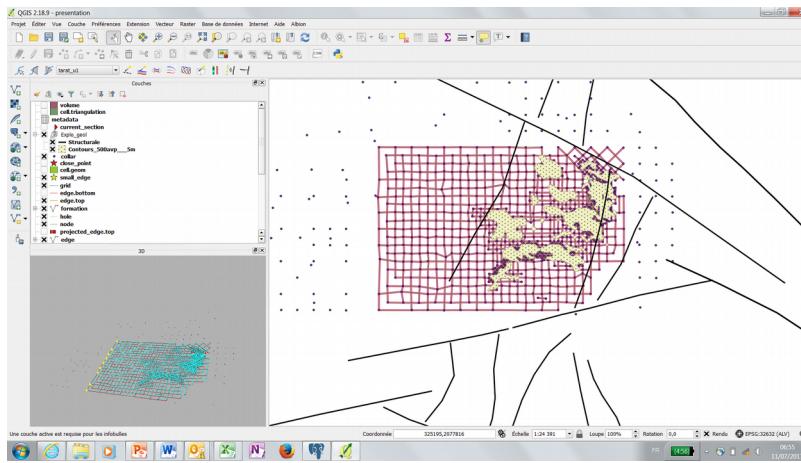
Isatis  
(Resource Reserve  
estimation soft)



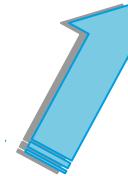
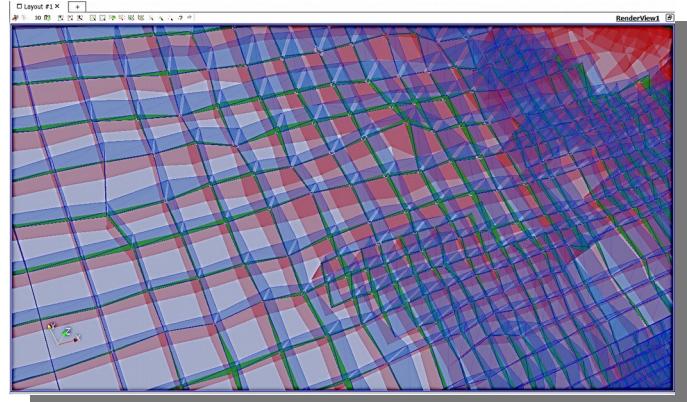
3D modeler



Albion - QGIS



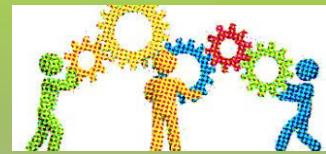
Paraview (open source soft)



# Albion project : history

<b>October</b>	Version 1.0 Albion developed by Oslandia
<b>May-June</b>	Albion software conception: Tender process -> Oslandia
<b>April</b>	Comparaison Volume build with traditionel methodology and Albion approach in a restricted sector of Artois : good correlation
<b>February</b>	The mineralized volume of Artois deposit is build with Albion in few weeks instead of several months with traditional methodology
<b>January 2016</b>	Presentation of the prototype Albion in AREVA company
<b>October</b>	Mineralized envelope of Tamou Extension Sud Est (Niger) performed With the prototype Albion
<b>September</b>	Mineralized envelope of Nord Tamou (Niger) build with the prototype Albion
<b>August</b>	Bibliography to check if the ideas were not already used in other 3D software
<b>July 2015</b>	Birth of ideas: 1)Graph theory to digitize quickly the cross sections 2)Elementary volume to autamate the 3D volume

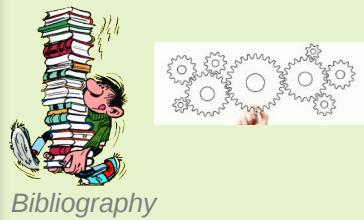
Software development



Communication & Convince time



Prototype stage



Bibliography

Idea



# Albion : next steps

## ► 2017 / 2018

**Software improvement / specific sites : Mongolia, Kazakhstan, Niger**  
**Volume construction**

## ► Communication & mutualization

**Get new users ( you ! )**

**Get new use cases ( yours ! )**

**New contributors & funders ( you again ? )**

# End / Questions

- ▶ Innovative ideas & Opensource are a good match !
- ▶ Thanks to Areva for funding this work
- ▶ Kudos to Vincent Mora, lead developer
  
- ▶ Contacts :
  - Emmanuel.duguey@areva.com
  - infos+albion@oslandia.com
  - <https://github.com/Oslandia/albion>
  
- ▶ Thank you and ask any question !