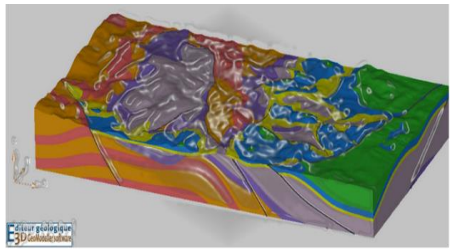
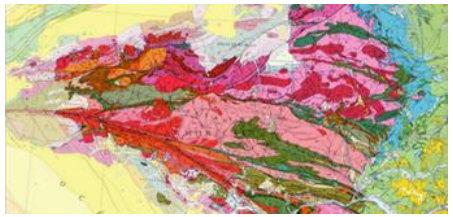
POKIMON, une ontologie pour représenter la connaissance de géomodélisation

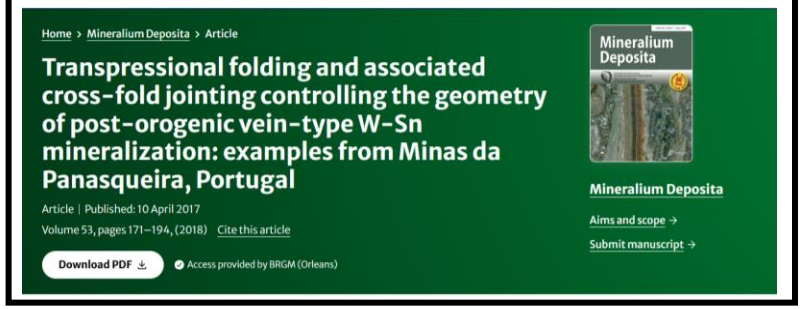
Modèle 3D



Carte 2D



Ressources textuelles



représentation 1

Données d1

Données d2

Objet t

Objet x Objet c

Processus calcul PC1

Processus interprétation In-1

Objet x Objet z

Objet k

représentation 2

Données d2

Données d50

Processus interprétation In-1

Processus calcul pc4

Loi géologique sur la **classe x**

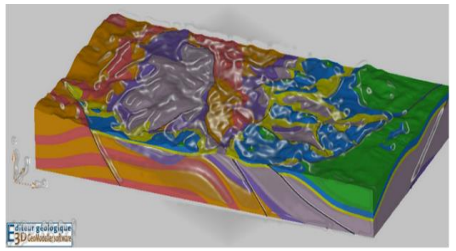
Autres lois

représentation 3

Processus de raisonnement R30

POKIMON, une ontologie pour représenter la connaissance de géomodélisation

Modèle 3D



Mode

représentation 1

Contenu sémantique

Objet t

Objet x Objet c

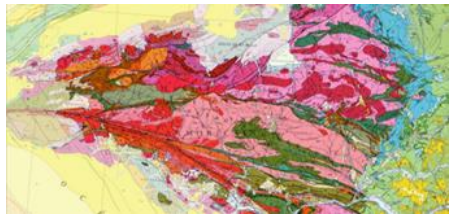
Données d1

Données d2

Processus calcul PC1

Processus interprétation In-1

Carte 2D



Contenu sémantique

Objet x Objet z

Objet k

Mode

représentation 2

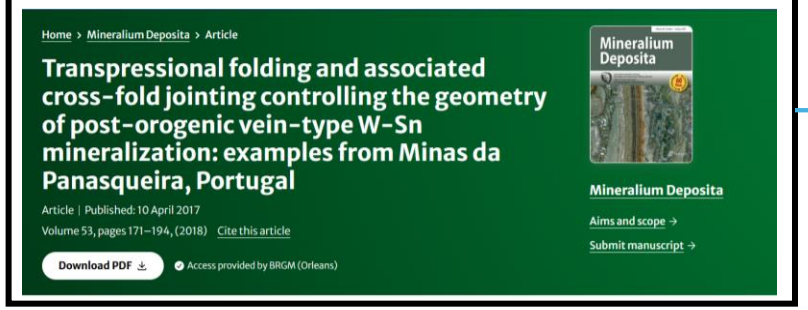
Données d2

Données d50

Processus interprétation In-1

Processus calcul pc4

Ressources textuelles



Contenu sémantique

Loi géologique sur la **classe x**

Autres lois

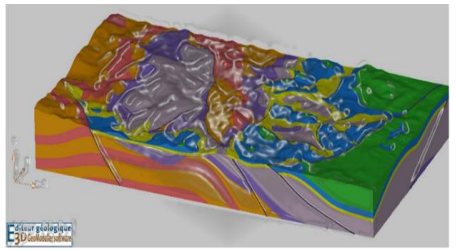
Mode

représentation 3

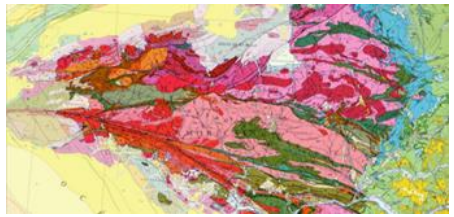
Processus de raisonnement R30

POKIMON, une ontologie pour représenter la connaissance de géomodélisation

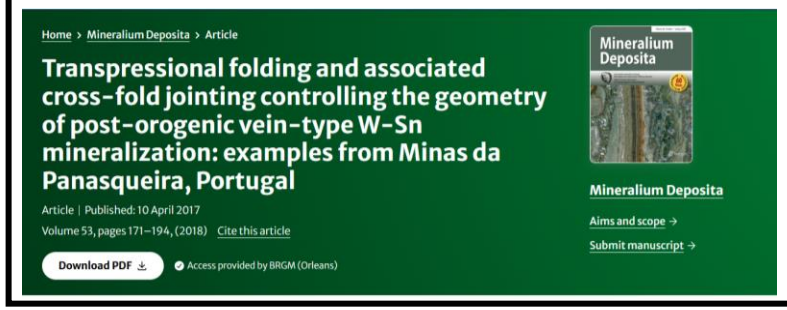
Modèle 3D



Carte 2D



Ressources textuelles



Mode

représentation 1

Contenu sémantique

Objet t

Objet x

Objet c

Contenu sémantique

Objet x

Objet z

Objet k

Mode

représentation 2

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Données d1

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Données d50

Processus calcul PC1

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Processus interprétation In-1

Processus calcul pc4

Processus de raisonnement R30

POKIMON, une ontologie pour représenter la connaissance de géomodélisation

POKIMON: An ontology for geological interpretation in 3D geomodelling

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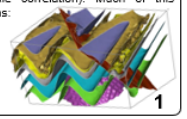
Abstract

We present an ontological model that formalizes expert's knowledge used to build 3D structural geological models. This formalization is driven by our intention of proposing a capturing the implicit knowledge aspects to assist automatic model construction. The proposed ontological model includes aspects about geological features, their representations, and modeling processes

Scientific Challenges

3D modeling tools incorporate only a limited portion of geological knowledge as they are primarily mathematical frameworks that visualize some geometric properties of geological objects (figure,1) but are not designed to handle implicit expertise (e.g., interpretation, simplification, abstraction, multiscale correlation). Much of this knowledge remains tacit, leading to several limitations:

- No direct access to expert knowledge
- Models represent digital abstractions not true geological features
- No trace for expert interpretation and subjectivity
- Poor reproducibility and difficulty in exchanging embedded knowledge



1

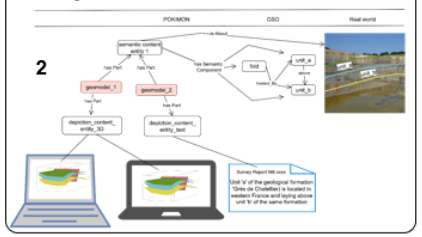
Ontological requirements

Ontologies are gaining in geosciences significant interest [1]. In 3D modeling their scope is limited to the final digital artefact, lacking coverage of employed processes, algorithms, and much of conceptual properties of geological features. also, most do not reuse existing domain geoscience ontologies.
Main competency questions then are:

- How to define ontologically models and relate them to geological entities?
- How can the processes employed to build 3d models be represented within the ontology?
- How to built on existing domain ontologies ?

POKIMON

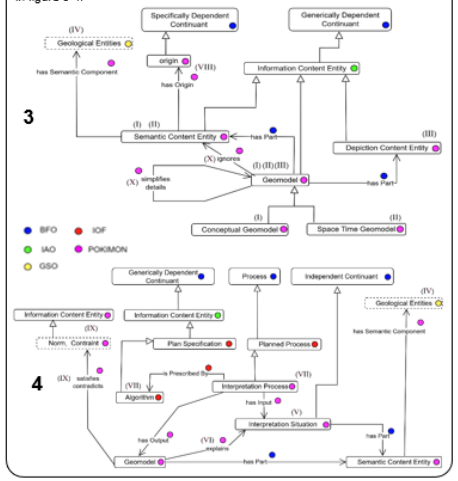
The theoretical framework of POKIMON is based on the information artefact ontology framework [2]. This latter is adapted to fit with the study requirements to model 3D structural models and their representation as shown in figure 2.



2

Extension and extraction

POKIMON extracts entities from the following ontologies: the Basic Formal Ontology (BFO) [3], the Information Artefact Ontology (IAO) [2], the Industry Foundry Ontology (IOF) [4], and the GeoScience Ontology (GSO) [5] as shown in figure 3-4.



3

4

Exploiting POKIMON

POKIMON is logically consistent with Hermit and Pellet reasoners and can be queried using SPARQL. Figure 5 shows an extraction of an example about a conceptual 3D geomodels and its realization into two space-time geomodels depicted differently while sharing the semantic components.

5

Acknowledgements

The authors wish to extend their gratitude to Professor Michael Gruninger from the University of Toronto for the fruitful discussions and for the hosting in his lab during the completion of this work. Additionally, they thank the Natural Resources of Canada for the invitation and collaboration.
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Merci de Votre.Attention

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