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3D GeoModelling: a collaborative platform for multidisciplinary interpretation

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A better understanding of the structuration and evolution of the underground is crucial for many applications. Various disciplines are implemented to reach this goal. Among the most common ones are geology, geophysics, or geochemistry. Data are generally acquired in the field, such as geological observation, gravimetric survey, or fluid sampling. These data are interpreted to characterize the geometry, and the properties of the explored zone. They provide separate but complementary information to understand the area. However, combining geological, geophysical and geochemical interpretations is not an easy task [1].

In such a context, GeoModelling is often used to provide an integrative platform for interpretation [2] [3] [4]. Usually, the final model is completed through successive stages bringing new information at each step. This interdisciplinary workflow leads to a coherent conceptual model integrating as much as possible the outcomes of the disciplines deployed [5] [6]. Nevertheless, every step of this sequential workflow improves the previous one but without retroactive consequence on it. Moreover, a given step is ignorant of the next one. As a matter of consequence, the later a discipline appears in the workflow, the more important is its influence on the final model.

Producing a 3D model by associating complementary disciplines is an interesting perspective but giving these disciplines the opportunity to interact is even more powerful. Indeed, geological, geophysical, and geochemical interpretations have not to be disconnected. The interpretation coming from one discipline has to be enhanced by the others. To do so, the methodology needs to be object oriented instead of workflow oriented. In this collaborative approach, the central object is a 3D GeoModel that grows from the common interpretation implemented jointly by the specialists of various disciplines. In other words, they can compare, connect, discuss, adapt, and integrate their own approaches in a mutual environment via such a GeoModelling platform. At the end, the 3D GeoModel is not a conglomerate of distinct interpretations but a consensus agreed by the contributors [7].

The methodology described above will be illustrated with examples to demonstrate how 3D GeoModelling helps to integrate multi-sources information and to allow a collaborative interpretation. In addition, the model can be enhanced - depending on new data or new interpretation - to provide an up-to-date knowledge of the investigated region. Such a 3D model can also be used to mesh the modelled geometry of the zone and to compute dynamic simulations.

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