

COMPARING ANALOGUE AND DIGITAL 3D MODELS: RECONSTRUCTION OF A TRANSFER ZONE FROM SOUTHERN ALPS

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Comprehension of various geological contexts necessary implies 3D visualisation. But, besides the visualisation, a valid 3D model also represents a validation tool of the consistency of the informations used to realise it. In fact, features and data that are compatible in two dimensions may be unfounded in the third one; thus, the model construction leads to reconsider both the collected data and the related kinematic evolution previously suggested.

Two different kind of tools may be useful to represent geological contexts in 3D:

- 3D digital models (based on 2D data set) showing surfaces and volumes;
- analogue models (sandbox).

In this work we present an integration between both tools, showing a 3D reconstruction of a natural example and the related analogue model. Analogue models, giving an easy and helpful vision of the entire spatial evolution of the structures, are used also to check “sensitivity” and reliability of a 3D digital model against the type and the number of data that have been employed, thus identifying the minimal threshold of data needed to reach a valid outcome.

Analogue sandbox models are geometrically correct and spatially continuous, so that we can use them to check sensitivity and reliability of the digital representation against the type and the number of data that have been employed, thus identifying the minimal threshold of data needed to reach a valid outcome.

Geological context – We used as a natural example a sector of the Southern Alps thrust belt, the Vette Feltrine thrust sheets (D’ALBERTO ET

AL., 1995). In map view, thrust sheets located in the area show undulations reflecting lateral heterogeneities due to:

- pre-existing geological structures;
- facies variation;
- thickness variations of the sedimentary cover.

The Vette Feltrine structures represent a typical non cylindrical case not completely imaged in 2D only. A 3D model gives an exhaustive representation of the whole geometry. The Vette Feltrine geological cross sections published by D’ALBERTO ET AL., (1995) are tightly spaced and balanced, for these reasons they are suitable to an interpolation and a 3D reconstruction.

Analogue model – Sandbox analogue model has been built to reproduce this geological situation. A glass microbeads layer has been introduced in the sand package to simulate a detachment horizon in a non homogeneous stratigraphy. We imposed lateral heterogeneity on the base of the model to force along strike variations in the thrust anticline geometries. As a result we obtained different wavelength thrust sheets connected each other by an oblique transfer zone.

3D digital model – Sandbox analogue model has been tightly sectioned, not considering lateral slices affected by wall side effect. The sections have been digitised to reconstruct the surface of some key horizons and fault planes.

The same process has been followed for the Vette Feltrine cross sections.

Comparison between the analogue model and the real case shows along strike variations of structural parameters, such as:

- thrust sheets wavelength and geometry;
 - thrust sheets horizontal displacement;
 - topographic slope angle;
- Some of these aspects are particularly evident in the 3D reconstruction and visualization; furthermore we can highlight them using structure contour maps.

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