Integrating Structural Validity Checks At All Stages of the Mainstream Interpretation Process*

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Abstract

Producing a viable structural interpretation from seismic and well data is a significant challenge. There are many complex relationships that experienced structural-seismic interpreters automatically reconcile (such as the relative timing and growth of the structures and stratigraphy, and the displacement variations both along and between structures). The challenge for software developers is how to replicate the mental processes and the steps that an experienced structural-seismic interpreter applies and design tools that are automatically available for the general interpreter dealing with structure. The next generation of software tools builds upon those mental processes by analysing the data in ways that are difficult to achieve in the normal interpretation workflow. As a result, the interpretation process is streamlined ensuring quality is achieved by a far broader group of interpreters.

Introduction

For many general seismic interpreters and geomodellers, the physical laws that govern structural geology concepts are not at the forefront of their minds while interpreting and modeling. Tools that are easily accessed and intuitive are required to enhance awareness of structural geology concepts through quality checks (Figure 1).

Discussion

Over the last three years, we have built a broad array of tests that allow for many different inter-relationships of the interpretation to occur. Those tests generally fall into the following categories:

- Geometric consistency
- Offset consistency
- Seismic consistency
- Kinematic consistency

- Stratigraphic consistency
- Mechanical consistency

The aim is to provide access to the tools at the point at which the interpreter needs them, with the various analyses available throughout the interpretation and modeling workflow. Typically, many data object types with different co-relationships are used, such as fault interpretation sticks, fault surfaces, geomodelled faults in grids etc. At each stage of the workflow, structural analysis tools need to be available for the interpreter or modeller to ensure structural consistency and viability.

Summary

Many of the very detailed analyses of complex structures will remain with experienced structural geologists but the concepts and approaches used to analyse those architectures should be available for the wider group of geoscientists that perform the bulk of structural interpretation in the industry today. The immediate access to structural tools that allow quality assessment is useful but it only provides part of the solution. Detailed guidance and support is also required to enhance awareness and knowledge about how and when the interpreter should apply the various different tools. We deal with this challenge in an associated contribution.

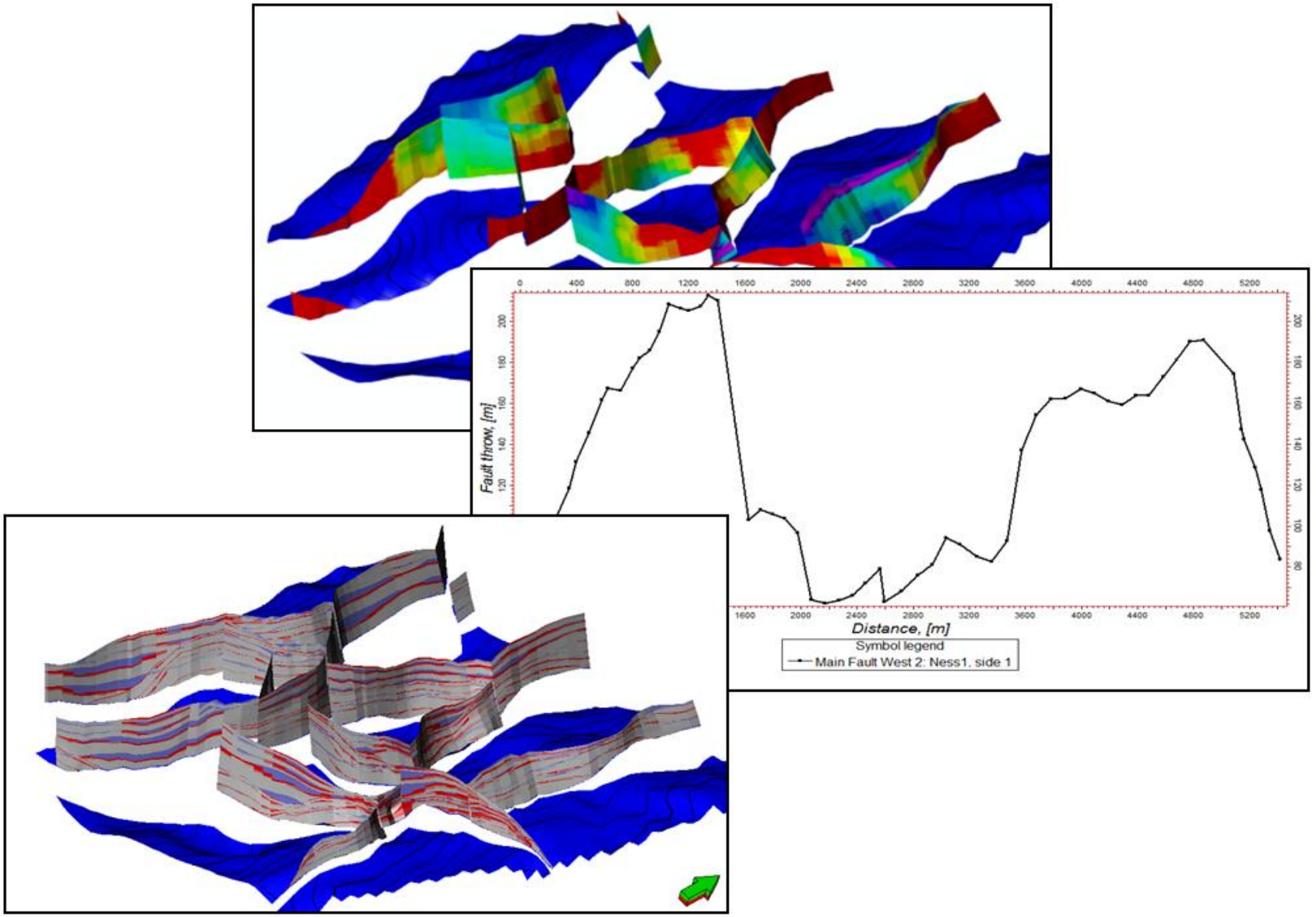

Figure 1. Example of tools that are easily accessed and intuitive to enhance awareness of structural geology concepts through quality checks.