Integrated Visualization in the Reservoir Development and Management Workflow*

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Search and Discovery Article #120166 (2014)
Posted November 30, 2014

*Adapted from an extended abstract given as an oral presentation at AAPG Hedberg Research Conference, Interpretation Visualization in the Petroleum Industry, Houston, Texas, June 1-4, 2014, AAPG©2014

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Abstract

A well-articulated need within multidisciplinary asset teams is the requirement to more fully integrate diverse data streams to better understand reservoir conditions and improve the speed and quality of critical decision-making. In many cases, current workflows are not conducive to simultaneous visualization of data from disparate disciplines and processes. Seismic data, horizon/fault interpretation, topographic surfaces, reservoir models, well surveys/logs, top-picks, completions, drilling hazards, microseismic events, fluid production, lease boundaries, geo-referenced imagery, LIDAR data, cultural and infrastructure information, etc., are produced in a wide variety of sources with different formats and standards. True understanding, and hence better decision-making, can only come with the full and complete integration of multidisciplinary data. However, visualization of all relevant data, in the same virtual space and time, can be an extremely difficult proposition.

Discussion

We present a comprehensive visualization solution that provides fast and precise access to a wide variety of surface and subsurface data, both static and dynamic, allowing for the information to be "covisualized" in their true spatiotemporal context (Figure 1). The import and integration of these multidisciplinary data, from many different third-party sources, is an easy and potentially automatic process. By removing the barriers to visually integrate all the data needed in the reservoir development and management process, better, faster, and more accurate decisions can be made.

Summary

The tool we present in this paper extends well beyond basic 3D/4D visualization and data integration. In addition to a fully geo-referenced interactive 4D viewer capable of handling large and diverse datasets, the environment also provides tools for data querying and interrogation, gridding algorithms, time-depth conversion, and statistical analysis of spatially overlapping datasets. Optional features include an easy-to-use, data-centric well planning module enabling geoscientists to create proposed drilling paths/well plans in true geologic context, and advanced workflows for improving seismic history matches through rapid synthetic seismic generation.

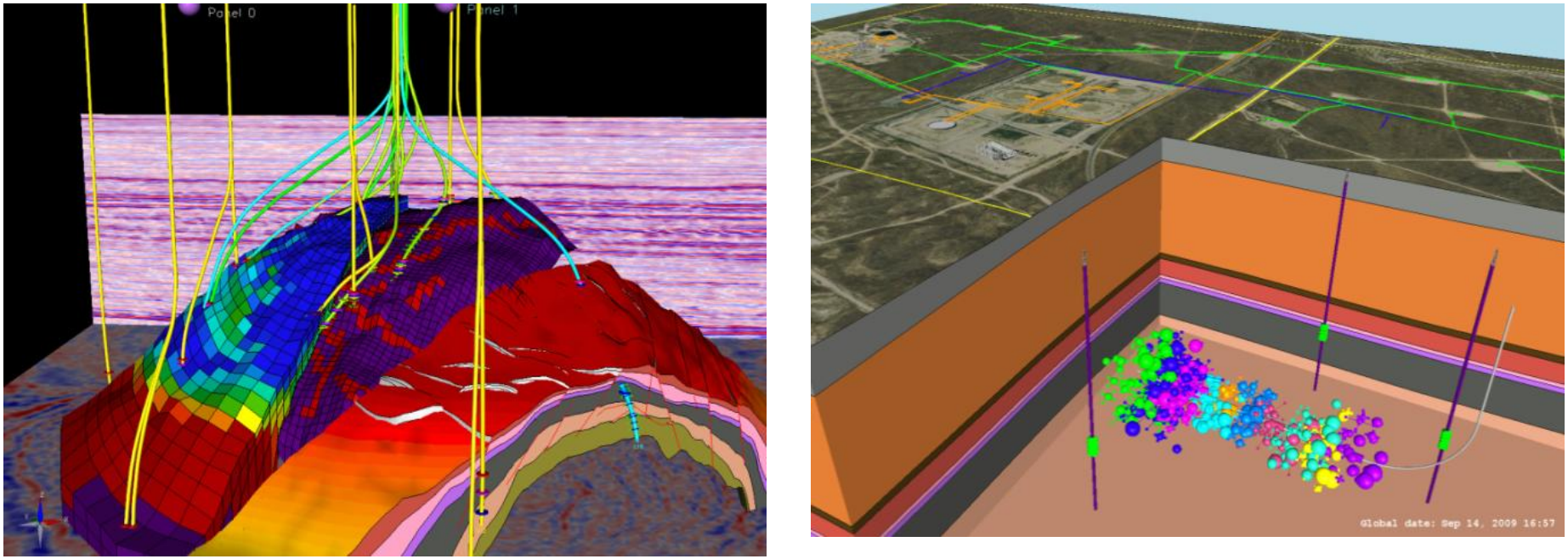

Figure 1. Examples of subsurface (left) and surface (right) data.