geoconvention
Calgary • Canada • June 17-19 2024

Understanding fluid migration in the Western Canada Sedimentary Basin: theory, observation, modelling & applications

Andy Mort
Geological Survey of Canada, Natural Resources Canada

Summary

More than a century of observations in the Western Canada Sedimentary Basin provides a bedrock for excellent understanding of fluid dynamics in the basin. Modern technologies have potential to simultaneously leverage far more data than was previously possible, combined with powerful visualization tools. This presentation considers how knowledge and technology can build on historical knowledge for application to future subsurface resource management.

Theory / Method / Workflow

Among the many paradoxes presented by the drive to understand geological processes is the increased entropy resulting from the close examination of rocks. What was a stratigraphic unity in the past, can be subdivided into discreet units with better internal coherence following meticulous inspection, however this often makes it paradoxically more difficult to maintain a coherent narrative which binds together the geological record. The current megaproject to produce a 3rd generation atlas of the WCSB is aptly metaphorical of this paradigm. The number of chapters required to accommodate the depth and breadth of geological understanding in the WCSB has ballooned as understanding has increased.

Dynamic forward basin models require that the 3D volume modelled is continuous and that discreet sedimentological packages have a defined relationship with juxtaposed strata. This produces an inherent requirement that the model incorporates elements which contradict geological understanding.

This presentation examines the usefulness of models in evaluating fluid migration when considering the balance between lumping discreet geological packages and properties versus the advantage of universal coherence in describing evolutionary geology

Results, Observations, Conclusions

geoconvention
Calgary • Canada • June 17-19 2024

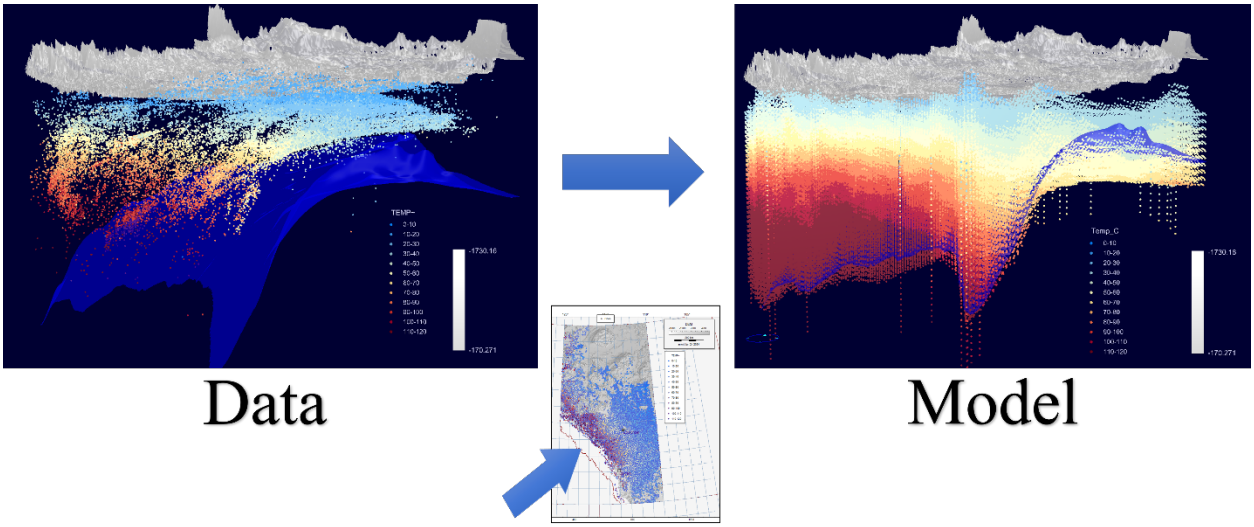

Figure 1. 3D visualization of discrete reservoir temperature datapoints (Left) for >65000 oil and gas reservoirs in Alberta. Note the anisotropy of the data which are concentrated in zones of historical economic importance e.g. Mannville Group clastics. Evaluation of deep basal clastics for geothermal, CCUS and other future resource purposes requires modelling of temperature data where measurements are sparse, highlighting the need for models, data and understanding.

Novel/Additive Information

Acknowledgements

References

Reference Style (use Arial 9pt normal)