

Depth Imaging – Above and Beyond Reflections. Why and How of your PSDM project.

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Summary

When I was a student I learned the magical melodic word “migration” and not in relation to butterflies, birds or wildebeests. I have dedicated several years of my post-graduate research work only to understand the brilliance of the Socratic Paradox that **"I know that I know nothing"**

Since then, several decades of PSDM projects and few mistakes later, I still have to admit that I do not know everything about Depth Imaging or PSDM, but I know more and will be happy to share my knowledge as well as the accumulated knowledge of my colleagues in this presentation.

Why do we even do Depth Imaging? Would it be practical to ask of someone to spend so much extra time, resources and money to commission the PSDM work?

We are told that time migration can be used to solve certain imaging problems, but more complex ones need depth migration. Where do we draw the boundary in the decision between time and depth migration?

Where do We Start - Main aspects of Depth Imaging

What are the practical aspects of a PSDM project, where do we start?

How do we gather the data and which data we have to gather anyway?

Do I involve my interpreters at the onset, or do I need a petrophysicist and what about a geologist?

How can I use my well information in PSDM and do I even need it for all my projects? Can I do it without it?

And how about PSDM in a 2D setting?

How to test for migration parameters?

How to setup your migration grid?

And what about raytracing?

Are there any Rules - Practicalities of PSDM Project Execution

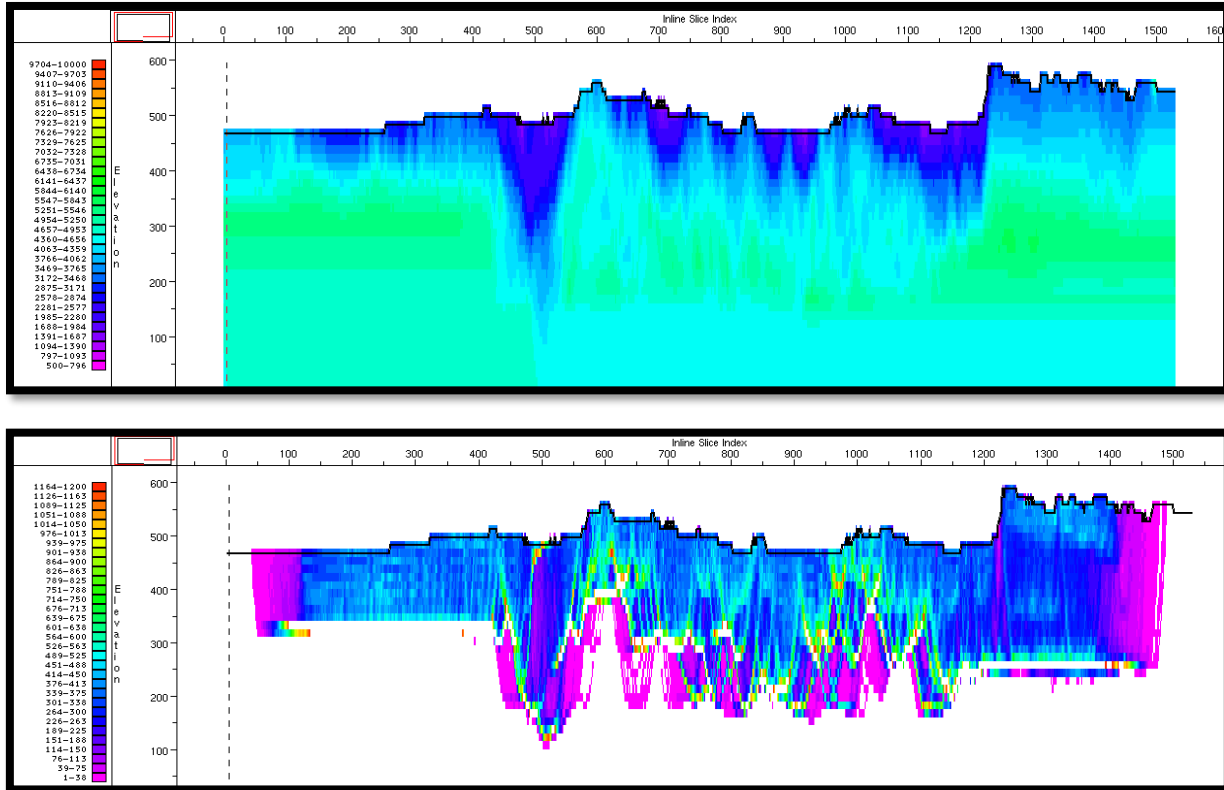
How can I handle anisotropy ambiguity and what about the near-surface?

And what are these diffractions and why are they so important?

And of course – the never-ending saga of velocity update. Where do I start with my initial model?

Which update methods do I choose? Do I need tomography? How can I use my horizons and well tops?

What are the rules anyway and are there even rules at all?

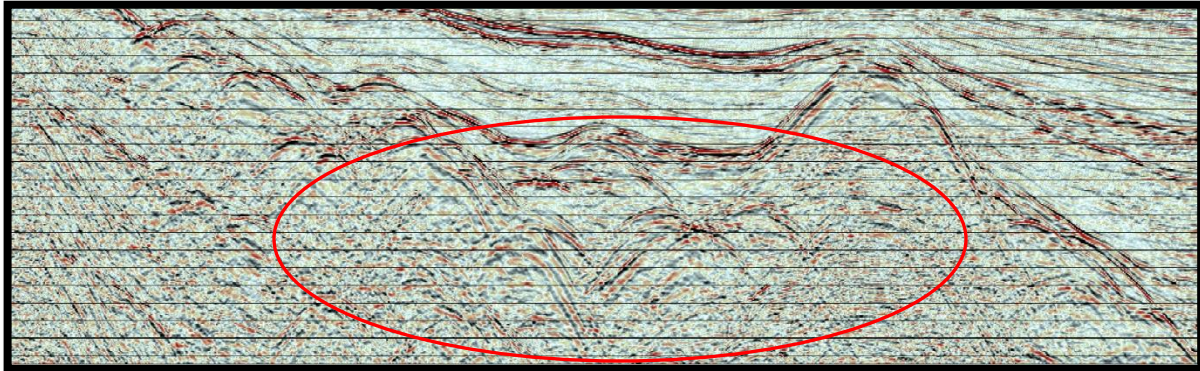


Top: Constructing a near-surface model for complex structural PSDM. A tomographic near-surface solution in the presence of a low velocity shallow anomaly.

Bottom: Utilizing the ray hit count as a QC tool for the near-surface model for PSDM.

Show others what you have seen - Quality Control and Results Presentation

- What are the best quality control strategies for my depth migrated volume?
- How to manage those ever growing and multiplying output volumes?
- What is important in post-processing
- How to prepare my results for future inversion work (QI)?
- Should I depth convert my final PSDM volume?
- Results presentation and visualization aspects.



Well preserved diffractions in time pre-processing are necessary for successful imaging

Achieving the Unachievable - Time and Budget

Project Management Aspects. How can I estimate my budget and resources and moreover, how can I achieve my targets? How many processors and imagers do I need for a given project and how much machine time will be required. How can I make my resource allocation correctly? And if something does not go as planned what mitigation methods can I put in place...will they be enough or will they even work.

Where to draw the line

And the last and the most important question is – where do I draw the line and pronounce my project and efforts complete and satisfactory? Will it ever be satisfactory? And what about interpreters and clients, how to keep them content and happy? What will happen next to my data, my results, to months of my work?

Most importantly – how to feel confident and good about the thorough and intelligent work I have done while there are so many controversial opinions about the results and the method itself.

In this paper we will try to tackle perhaps not all, but the majority of these questions and will try to enlighten you and provide you with practical tools and approaches that are the results of our combined experience of several decades of onshore and offshore depth imaging work.

PSDM will still be an enigma, as complex and ever evolving as it ever has been and likely will be for some time to come ... but hopefully it will be a bit easier to handle and a bit lighter to approach.

Acknowledgements

Evolutionary tribal wisdom, mistakes, disappointments and victories of all my colleagues.

References: Will be provided with the final presentation