

Seismic Interpretation Exercises – Some Thoughts

Dear Euan

It is often said that the geologist who has seen the most rocks is the best geologist and I think this applies to seismic interpreters as well. We are all products of our own experiences and our views are shaped by our backgrounds. The same could be said for your exercises. The concept of seismic interpretation implied in the questions (and the space provided for answers) is very much influenced by simple seismic surface correlation and structural interpretation. (Is this the background Midland Valley influence?) Basic correlation is only part of what is done (or ought to be done) in a seismic *interpretation*. As you build your analysis of a data set your structural model must go hand in hand with your understanding of the stratigraphic and lithological relationships. To attempt an interpretation concentrating on only one aspect of the geology is to restrict the data available to you.

People often talk negatively of being model driven. Unlike some others I think this is not a bad thing provided you are not model blinkered. It is impossible to do a good job of seismic interpretation without the assistance of models. The secret is to make observations first, then choose a model to assist your interpretation. The trap into which many of us fall is to make only the observations which fit our pre-conceived ideas.

One of my favourite quotations which I use at the beginning of my course is from Douglas Adams - *So Long and Thanks for All the Fish*

a scientist must ...be absolutely like a child. If he sees a thing, he must say that he sees it, whether it was what he thought he was going to see or not."

"See first, think later, then test.

But always see first, otherwise you will only see what you are expecting.

Most scientists forget that."

I suppose my own stratigraphic and environmental interpretation of the Freyja line is very much influenced by the recognition (assumption) that the main extensional fault in the left is detaching on a surface immediately above which there is a lot of disturbance. This is classic salt-tectonic relationship and much of the lithological and environmental interpretation of the overlying section is based on a combination of observations on reflectivity, geological models and memories of relationships from previous salt basins in which I have worked.

It is always tempting when looking at an unidentified line to speculate on its location. This line looks very much like one from the East Texas Basin, USA. The salt would be the Mid Jurassic Louann salts overlain by Smackover limestone's and Upper Jurassic Bossier clastics capped by Cotton Valley clastics. The thick section above would be Cretaceous clastics. If the line is not from that part of the world then dating aside, the East Texas basin would be a nice well-explored analogue.



I am afraid I find the Vor Exercise frustrating and forgive me if I do not complete it. Once again it seems to be confusing the processes of correlation and prediction. I can say something is the same age as something else or even that it is made of the same rocks, but unless I know what age or what kind of rocks they are to begin with it is not prediction from seismic – at least in the sense I teach and practise.

Regarding models and principles etc. there is obviously a structural issue about fault shapes and perhaps more importantly section balancing and mass conservation etc. but it is a single 2D line and these are 3D matters. Moreover the five solutions supplied are once again structurally dominated (the Midland Valley influence once again). Would it not be better to include a non-structural option or options? I could (at a pinch) create the same shapes with a thick dissected carbonate platform on the “foot-wall” and no significant time equivalent section in the basin to the right “hanging-wall” side. The shallow faulting could be differential compaction. Most of us are now fairly familiar with the Inner Moray Firth geology and know the Oxfordian to Trias interval highlighted is not carbonate, but that is additional information. I seem to recall that in the early days TOTAL drilled a well near this location on a flower structure thinking it was a reef!

Finally your last comment that “the majority of the respondents chose the same interpretation as being the most plausible option” is a little confusing. At the risk of being pedantic surely this is always the case or do I misunderstand the phrase most plausible. Who else can decide the most plausible apart from the majority? If you mean the most accurate or perhaps nearest the truth then that supposes we know the right answer.

If the final question was intended to be along the lines of “in your experience is the majority view usually the closest to the truth” then I am pleased to say not always. I often call this the lemming philosophy which goes along the lines of *well everybody else is doing it so it cannot be such a bad idea*. Small oil companies make their fortune bucking this trend.

I hope these comments are useful. I wish you luck with your project and if you want to discuss anything further please feel free to get in touch.

Regards

George