10.1071/PVv2015n178p43

Seismic Window

Michael Micenko
Associate Editor for Petroleum
micenko@bigpond.com

Contours, maps and visualisation

Early in my career I learnt to hand contour maps. It was a skill that is still useful today. Contouring was a therapeutic pastime and was commonly done on a Friday afternoon after a long lunch at one of Adelaide's many watering holes (and often repeated on Monday mornings). Unfortunately, long lunches and hand contouring disappeared at about the same time – is there a link?

Contouring can be fun. My first job out of university was with Geoex in Adelaide. One project involved flying a large aeromagnetic survey out of Broken Hill. It covered a huge area and the data to be contoured was posted on large sheets that were spread over a good sized table. Around the table were a number of keen new graduates, including me. We spent several days contouring these sheets under the supervision of John Haigh. The challenge was to contour an animal or fish into the map sheet without anyone noticing. I'm not sure they all got through but it would be interesting to hear from anyone that has an aeromagnetic map with fishy contours.

I am led down this path by an email I received from Scott Tideman of Petrosys* following one of my articles last year. Scott says that 'an increasing number of senior managers are regularly seeing poorly-produced subsurface maps' so he set about working with clients to improve mapping standards. Test your skill with the example challenge at http://www.petrosys.com.au/improving-mapping-standards/.

Alternatively you can have a go at the simple example in Figure 1 (answers later).

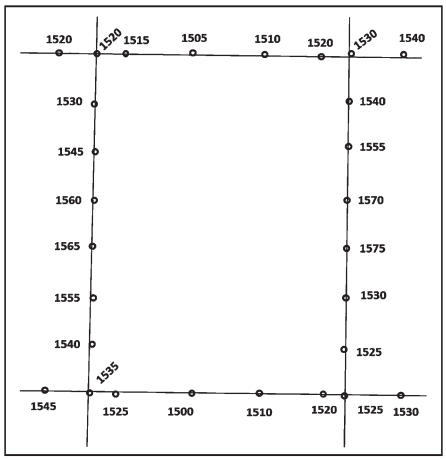

Figure 1. *Contouring exercise – hand draw some contours on this figure.*

I agree with Scott. I see a lot of maps and some are shockingly bad even today when almost all are computer generated. But it's not just about making maps. Maps are a tool to help evaluate an area's prospectivity but, as the VP of one large independent quoted by Scott says 'The prevalence of 3D seismic has left many geoscientists unable to conceptualise and portray geological structures in areas without 3D. An unskilled geoscientist simply makes grids and contours that portray the available data, and will regularly fail to recognise prospectivity'.

Perhaps the physical exercise of hand contouring our maps in the past allowed us time to think of the various options, formulate ideas and test them 'on the fly'. Certainly, all our work was checked by the team leader and chief geophysicist before being sent off for drafting. Unfortunately, these QC steps are often missing with the lean organisations of today.

But are contours relevant in today's exploration office? Maps are being replaced by 3D models from which colourful displays are extracted to give a better representation of the subsurface. The viewing angle of these displays can be varied to give the best possible representation of the structure or attribute. For example, the colour rendering of Figure 2 shows the possible distribution of sandy facies and the rendered surface gives the structural setting. In this case the structural surface is interpreted to be a deltaic prograde with fan sands (pink, orange) deposited in front of it after being transported down one of the incised feeder channels that can be seen snaking across the top sets (blue). It would be difficult to convey this information so easily on a contour map.

The latest technology can also be annoying. Often geos like to display surfaces from varying angles to keep us guessing the viewing direction. This is usually combined with a short display time so that the next picture is presented before the viewers can get their bearings. By convention north is at the top but Nintendo geos ignore this to confuse us (or provide the best angle). As my geography teacher once told me 'Every map needs four things otherwise it is just a picture: a title, a scale, a north indicator and a legend'. I must admit that most maps I make these days would not meet her approval. (At about the same time my English teacher also taught me a sentence has to have a verb – but that was last century.)

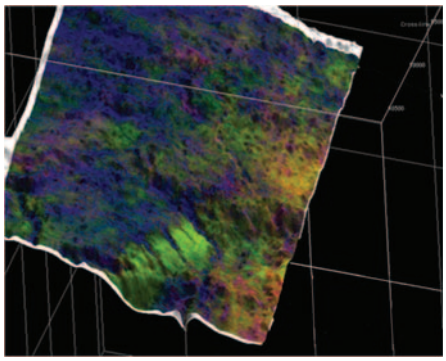

Figure 2. *3D rendering of a prograde surface and colour rendering highlighting possible sandy facies. (North indicator deliberately removed).*

Back to the exercise – if you contoured a syncline or low in the example of Figure 1 then your answer is correct. This example is from my time teaching at Curtin University and 80–90% of students contoured a low. Perhaps a more correct answer, definitely a more optimistic one, is a contour map showing an anticline.

Exploration is for optimists and 'Creating a quality map is about a lot more than just pushing buttons; having the right skills and tools is vital to the success of our business' says the Chief Geophysicist of a large exploration company.

*Disclosure: I have been using Petrosys mapping software for over 30 years – it's a great Australian product.