

Guest Editor's Column



It is my distinct honour and privilege to have been invited to write an editorial column for this issue of GEOHORIZONS, being released at the 2020 SPG Conference at Kochi.

As I have been associated with SPG since its inception in 1992, even though I have been living in Canada for the last 20 years now, for me it is more like coming back home at every opportunity or invitation and participating in SPG activities. Every time it is my absolute pleasure meeting my ex-SPG and ONGC colleagues and reminiscing the old times we spent together and contributing in whatever way possible. I distinctly remember in August 1992, when a group of us first met at a colleagues' place in ONGC Colony, Dehradun to discuss the formation of SPG.

This issue of GEOHORIZONS compiles six papers from various presentations that were made at the SPG, EAGE and SEG-coordinated technical workshop on '*Challenges in imaging: Sub-basalt Exploration in Asia and Pacific*' held at Dehradun in February 2019.

The Deccan flood basalts in west-central India occupy large onshore and offshore areas. Interestingly, in this region the Mesozoic sedimentary column is trapped between the Precambrian basement and the overlying Late Cretaceous Deccan basalts, and available evidence, including borehole data, suggests their hydrocarbon prospectivity. However, imaging of the sedimentary column with the reflection seismic method presents challenges due to the high impedance contrasts of the strata above and below, resulting in a host of problems ranging from energy penetration, absorption, multiple activity, and focusing issues. The above-mentioned workshop was organized to solicit presentations and discussion which could apprise the participants about the present understanding of the issues and how they may be addressed going forward.

In the first paper entitled, *Sub-basalt imaging in Padra Field, South Cambay Basin, India through subsurface angle domain processing*, **Ghosh et al.**, discuss the challenges in sub-basalt imaging and suggest a workflow for enhancement of the sub-basalt seismic signal. Using full-azimuth angle domain processing of surface seismic data, the workflow entails building an effective velocity model built using well log data, employing local angle domain imaging and direction-dependent diffraction-weighted filters. The results demonstrate improved imaging of the intra-Deccan trap reflector, as well as sharper spatial discontinuities.

Satpathy et al., in their paper entitled, *Effective demultiple and depth migration enhances basalt and sub-basalt features: a case study from Kutch offshore, India*, discuss cascaded demultiplex processes carried out in different domains, followed by Kirchhoff time and beam depth migration procedures. The results exhibit improved definition of reflection events below the basalt as well as their discontinuity patterns.

As the title of her paper reads, *A review of multi-physics approaches for imaging sub-basalt sediment*, **Lucy MacGregor** suggests the integration of seismic with complementary information from gravity, CSEM and MT data. The latter two are non-seismic methods with the CSEM providing the resistivity structure of the subsurface, and the MT data yielding lower frequency characteristics penetrating to greater depths. While the seismic data can provide reasonably good imaging of sections running up to the top of basalt, its integration with non-seismic methods (CSEM and MT), including gravity data, yields more complete seismic images. Such integrated data are amenable to more accurate interpretation leading ultimately to better prospectivity of the area under investigation.

Brice and Bayly in their paper entitled, *Seismic imaging below the basalt: lessons learned and ideas for the future*, enunciate the challenges in sub-basalt imaging and how they limit success in such areas. The authors then go on to suggest improvement in the quality of the seismic data by acquiring wide-azimuth 3D seismic with super long offsets,

use of converted and diving waves and 3D SRME for multiple attenuation, preserving the amplitudes while processing and performing prestack depth migration employing FWI. Such seismic data can be gainfully integrated with data obtained from non-seismic methods such as gravity, CSEM and MT, for getting better results.

In their paper entitled, *Sub-basalt imaging enhancement by broadband processing and prestack depth migration (PSDM)*, **Katherla et al.**, show the application of broadband processing employed to seismic data from Kutch offshore area of India. Their workflow entails noise attenuation, minimizing ghost notches, building an accurate interval velocity model using well log data and carrying out PSDM. This application resulted in significant improvement in the sub-basalt imaging.

Finally, **Banerjee and Subba Rao** in their paper entitled, *Depth estimation of subsurface discontinuity by applying spectral analysis of gravity data in sub-basalt region of Kutch-Saurashtra*, demonstrate the application of spectral analysis on gravity anomaly data from the Saurashtra and surrounding areas. Their analysis estimates the depth of the basement at 5 km, which could be useful information for operators in the area.

I wish to thank all the authors for their contributions towards this issue, and I hope you enjoy reading them as much as I enjoyed putting them together.

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