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***A review of some recent advances in seismic technology impacting the future of near surface geophysics*, Theodore Stieglitz and William Doll, Collier Geophysics**

Recent advancements in seismic technology (originating from within the petroleum industry) are acting as disruptive agents with a positive impact. Historically, advanced seismic methods have been an expensive proposition in order to be considered as a viable geophysical method for near surface investigations. In terms of imaging, the efficacy of seismic data operators are physically constrained by the spatial resolution of the data acquisition geometry. Should the spatial resolution of the data acquisition be too coarse (because of budget), the imaging operators will alias the responding wavefield. The resultant image will be a poor representation of the true subsurface (garbage in: garbage out). Consequently, the inherent real and intangible costs related to planning, operations, imaging and interpretation have typically restricted this geophysical method to much larger projects with better resources.

Fortunately, in recent years, novel innovations in nodal recording and light energy source technology have generated significant improvements in operational efficiency and cost which has enabled consideration of much higher quality data programs. Improvements in acquisition technology have had a "knock-down" positive benefit in producing high fidelity high-resolution broadband data well suited for advanced imaging methods. Similarly, improvements in high performance computing have opened the door to advanced (and compute intensive) 3D imaging methods such as full waveform inversion used for resolving subsurface impedance.

As geophysicists we are never satisfied with the data we have and always pine for more and ever greater refinement. Advancing forward into the world of ideals, the temptation of offsetting lower operational costs will entice us to explore a future of ever-increasing ultra high-density data. The ability to produce an ever more refined subsurface image will naturally extend clarity to the interpretation of our subsurface model. Looking beyond, to faster computers and implementation of automated or semi-automated ML- and AI-supported processing schemes, we can anticipate higher resolution solutions which incorporate a full suite of the current independent processing approaches (refraction, reflection, surface wave analysis) to yield reliable models for more complex applications at lower cost.

We will show several examples both from industry and our own work that will demonstrate the value of these technological improvements.