Introduction to this special section: General submissions

Steve Brown[1] and Chester W. Weiss[2,3]

https://doi.org/10.1190/tle43070420.1

Readers familiar with *The Leading Edge* will notice that the current issue strays from the norm. Since the late 1990s, with but a handful of exceptions, each issue of *TLE* has featured a special section of technical papers grouped around a specific theme, technology, or geographic region. These special section topics are determined after thoughtful — often lengthy — discussion by an editorial board composed of experts from industry, academia, national laboratories, and elsewhere within the field of applied geophysics. The topics are scheduled each year in a published editorial calendar, giving authors ample time to collect research and publish their results. For the reader, it is hoped that these special sections will provide a deeper dive into a topic than what would be possible in a single article on the subject.

But what of the reader who has little interest in a particular issue's special section topic? If there is a downside to the special section model, this is it. *TLE* strives to appeal to a general readership of geophysicists and to portray the full breadth and depth of the science. To that end, there is an effort to include in each issue what we refer to as "technical standalone articles" — articles unrelated to the special section theme — to provide a measure of variety. However, due to the economic constraints associated with journal printing, an issue of *TLE* can only be so big, and oftentimes, the special section ends up consuming the bulk of an issue's content — hence, the editorial board's decision to dedicate this issue of *The Leading Edge* to "general submissions."

The intent was twofold. For authors, it was hoped that such an issue would provide an opportunity for rapid publication of research that did not fit squarely into one of *TLE*'s predesignated monthly special sections. For readers, the objective was to showcase the broad diversity of ongoing geophysical research and application — to provide a little bit of something for everyone.

Whether or not this goal was achieved is arguable. Response from authors was positive, but the number of submissions received was lower than expected. And while the individual papers in this issue are of high quality and varied theme, the collection perhaps falls short of capturing the breadth of geophysical application that the editors may have envisioned. (Admittedly, editors are a difficult-to-satisfy lot, occasionally prone to unrealistic expectations.) What we have, though, with these five articles is an excellent start to build upon as we expect the "general submissions" tag to appear regularly in future editorial calendars.

Buist and Bedle kick off our special section-less issue with a case study exploring the use of ground-penetrating radar (GPR) and the integration of image attribute enhancement and machine learning techniques to aid in the identification of unmarked and multiple-occupant burial sites at Green Hill Cemetery in Frankfort, Kentucky. Their findings indicate that a hybrid approach combining human expertise and machine learning can improve efficiency in GPR-based cemetery mapping. The work has potential application in infrastructure monitoring and archaeology, among other areas.

Birnie et al. revisit the adage, "One man's noise is another man's signal," and apply this idea to the filtering of low signal-to-noise ratio (or is it noise-to-signal ratio?) seismic data collected during seismic-while-drilling operations. Traditionally, these data present a superposition of drill rig and earth signal, overlapping in frequency content and similar in amplitude. The authors show how a UNet neural network trained with a signal mask to predict rig noise — rather than a noise mask to predict earth signal — can generate interpretable, high-frequency residuals of earth structure. The proposed algorithm may have application elsewhere (e.g., microseismic monitoring for subsurface fluid storage) where isolation of the earth signal from a cacophony of interference is endemic.

Willacy and Dooley address the problem of creating realistic digital earth models for seismic imaging and analysis. Their approach is to base the digital model on a set of images recovered from physical-scale "sandbox" models subjected to stresses analogous to those that drive the evolution of basin architecture. Specifically, thin slices of the physical model, postdeformation, are photographed with RGB channels of the resulting images mapped into impedance perturbations over a background depth profile. The set of 2D image slices is interpolated and upscaled to determine the final 3D digital earth model. An example inspired by the allochthonous salt diapirs in the Gulf of Mexico is presented, with migrated seismic sections illuminating the full complexity of the physically derived analogue model.

With groundwater resources increasingly pressured by human activities and extreme climate conditions, the field camp work of students at Azerbaijan State Oil and Industry University (ASIOU) is timely and commendable. Jodry et al. document work performed during a summer field camp organized by the SEG student chapter at ASIOU. The students utilized electrical resistivity, seismic refraction, and GPR to investigate an unconfined alluvial aquifer in the Astara region of Azerbaijan, revealing a four-layer subsurface structure, including a permeable unconfined aquifer and a potential confined aquifer at depth. Their findings enhance understanding of the local hydrogeological conditions and suggest the need for extended surveys linked to borehole data for regional insights.

In the issue's final article, Toelle and Stellas present a case study that highlights the integration of multiple data sets in developing a gas storage field in Pennsylvania's fractured Oriskany

[1]SEG, *The Leading Edge*, managing editor, Tulsa, Oklahoma, USA. E-mail: sbrown@seg.org.
[2]Sandia National Laboratories, Geophysics Department, Albuquerque, New Mexico, USA. E-mail: cjweiss@sandia.gov.
[3]University of New Mexico, Earth and Planetary Sciences Department, Albuquerque, New Mexico, USA.

reservoir. The interpretation of 3D isofrequency seismic volumes, through spectral decomposition, identified subtle structural features controlling the natural fracture system, which were later confirmed by horizontal gas storage wells. The study's findings were validated through image logs and flow tests, facilitating the successful conversion of the field from gas production to gas storage.

While focused special sections will continue to have a prominent place in *TLE* (see the editorial calendar printed toward the front of each issue and available at https://library.seg.org/journal/leedff), the editors wish to impress upon potential authors that *all* novel, impactful applied geophysics research is welcome in *TLE* — whether the topic is specifically listed in the editorial calendar or not. General submissions issues like this one will be planned more frequently in the future (in fact, the next one is but six issues away in January), and standalone technical papers are always needed. *TLE* will continue to provide rigorous but rapid peer review (time to first decision is 47 days at the time of this writing) and an economical outlet for knowledge exchange (traditional publication with transfer of copyright carries no author fees or page charges).

We look forward to your future submissions. TLE