

## 6th International Conference in Airborne Electromagnetics (AEM 2013)

Aaron Davis

CSIRO Earth Science & Resource Engineering, PO Box 1130, Bentley, WA 6102, Australia.  
Email: [aaron.davis@csiro.au](mailto:aaron.davis@csiro.au)

It is with great pleasure that we welcome you to this special issue of *Exploration Geophysics* comprising papers from the 6th International Conference in Airborne Electromagnetics (AEM 2013), held in the beautiful Kruger National Park in Mpumalanga, South Africa. The event, hosted by the South African Geophysical Association (SAGA), was organised by the South African AEM Committee members. Consisting of the chairperson Eddie Kostlin (retired Vice President Geophysics – Anglo American and De Beers), technical chair Louis Polome (General Manager, Spectrem Air – Anglo American), committee members Teo Hage (Manager, Airborne Geophysics – CGG/South Africa) and Malcolm Moreton (Senior Geophysicist (Technical Sales), Geotech), and assisted by the SAGA Conference Committee, the Committee sent invitations to a worldwide audience, inviting them to participate in South Africa. The response was overwhelming, and a large number of requests to present and participate were received from both academia and industry, from which the Technical Committee selected some 72 papers. These were presented over a two-day period in October 2013.

The series of International Conferences in Airborne Electromagnetics has traditionally been organised every 10 years by different host countries, commencing as far back as 1968. In view of rapid technological development and advances in this field of geophysics, the international community participating in the 2008 conference (AEM 2008, Helsinki, Finland) decided that, rather than adhering to the 10-year cycle, the frequency of these meetings should be increased. It was thus agreed that the 6th International Conference would be held in South Africa in 2013.

One unfortunate experience of AEM 2008 was a lack of closure that can be offered by putting together a compilation of papers presented at the conference. To grasp the opportunity that was lost in AEM 2008, I decided to approach the South African AEM Committee with the suggestion that we compile a special issue of papers to be published in *Exploration Geophysics*, the journal of the Australian Society of Exploration Geophysicists (ASEG). Consequently, a special Selection Committee was formed, consisting of Dr Mark Lackie (Senior Lecturer in Geophysics, Department of Earth and Planetary Sciences, Macquarie University, and Editor-in-Chief of *Exploration Geophysics*), Dr Aaron Davis (Senior Research Geophysicist, CSIRO/WA, and Associate Editor, *Exploration Geophysics*), Dr David Annetts (Senior Research Scientist, CSIRO/WA) and Louis Polome (General Manager, Spectrem Air – Anglo American), who identified authors whose contributions at AEM 2013 were suited to be published.

We believe that the papers published in this issue reflect the outcome and results of the first-class research and innovation which has contributed significantly to our better understanding of AEM geophysical prospecting, resulting in the design of better and more sensitive instrumentation and yielding methods to better process and interpret AEM data. I hope that it will be a reference

volume for students of AEM for many years to come, much as the special edition of AEM 1998 (held in Sydney) was to me. Perhaps it is also in order here to mention that the 7th International Conference in Airborne Electromagnetics (AEM 2018) will be held in Denmark under the leadership of Professor Esben Auken (University of Aarhus, Denmark). I hope that we can start a tradition of using *Exploration Geophysics* as the medium for the dissemination of papers and abstracts from that conference, much as was done for AEM 2013 and AEM 1998.

In this special issue, you will read 15 papers by many authors showcasing the latest ideas and advancements in the discipline of AEM geophysics. You will see the contribution from Magdel Combrinck, author of the Best Paper for AEM 2013, as well as the work of James Macnae, winner of the Second Best Paper. It is fitting that both authors also happen to be South African, but the awards were selected by peer-review ballots in the audience. Dr Combrinck was awarded best paper for presenting an innovative method for displaying the results of data modelling for AEM system comparisons and survey designs (Combrinck, 2015), and Professor Macnae describes how the use of spectral processing can be used to model the AEM signature of 3D bodies (Macnae, 2015).

Other contributions exhibit case histories of the use of AEM systems in geophysical exploration. Daniel Sattel shows how ZTEM was used to develop an electrical conductivity model of the Humble anomaly in the presence of high magnetic susceptibility (Sattel and Witherly, 2015); Geoff Peters describes the use of TEMPEST for regional exploration in Namibia (Peters et al., 2015); and Jean Legault shows the results of using ZTEM and VTEM over the Nuqrah Cu-Pb-Zn-Au massive sulphide deposit in the Western Arabian Shield (Legault et al., 2015).

Tianyou Chen explains how the exploration depth of AEM systems can be enhanced by changing the waveform of the primary transmitter in any AEM platform with a paper on the Multipulse innovation (Chen et al., 2015), while Greg Hodges shows how a geophysicist can compare the resolution of AEM systems by using a wire-loop model to produce a metric he calls the geobandwidth (Hodges and Chen, 2015). Andreas Pfaffhuber presents advances made with the MAiSIE sea-ice explorer produced by the Norwegian Geotechnical Institute (Pfaffhuber and Hendricks, 2015) and Alan Ley-Cooper looks at the consequences of applying different modelling techniques to target detection and definition (Ley-Cooper et al., 2015).

The bulk of the papers contained in this issue are focused on the advances made in modelling AEM systems for detection. Julien Guillemoteau shows how to apply rapid topographic correction of AEM data by modelling a magnetic dipole of any orientation over a half-space (Guillemoteau et al., 2015); Marc Vallée applies AEM to discrete conductor inversion (Vallée, 2015); and Peter Fullagar shows how we can rapidly approximate inversions of time-domain AEM systems for routine survey work (Fullagar et al., 2015). Daniel Sattel's second paper shows how we can

improve the modelling of superparamagnetic effects in AEM data, which is becoming more of a problem in modern AEM systems (Sattel and Mutton, 2015). Adam Smiarowski explains that the inline component of the secondary EM signal is of utmost importance in inverting for thin layers when examining data from fixed-wing AEM systems (Smiarowski, 2015), and Peter Leggatt shows how a geophysicist can use probability theory to extend the range of conductivity detected by an AEM system for conductor detection (Leggatt, 2015). Each of these papers showcase the advancements made in the years between 2008 and 2013, make for good reading, and will hopefully provide a good forum for study and discussion.

The Editors of this special issue, SAGA and the AEM 2013 committee would like to thank all authors who have willingly contributed their papers to this special volume. We hope that you enjoy reading these papers as much as we did.

## References

- Chen, T., Hodges, G., and Miles, P., 2015, MULTIPULSE – high resolution and high power in one TDEM system: *Exploration Geophysics*, **46**, 49–57. doi:10.1071/EG14027
- Combrinck, M., 2015, Developing an efficient modelling and data presentation strategy for ATDEM system comparison and survey design: *Exploration Geophysics*, **46**, 3–11. doi:10.1071/EG14026
- Fullagar, P. K., Pears, G. A., Reid, J. E., and Schaa, R., 2015, Rapid approximate inversion of airborne TEM: *Exploration Geophysics*, **46**, 112–117. doi:10.1071/EG14046
- Guillemoteau, J., Sailhac, P., and Behaegel, M., 2015, Modelling an arbitrarily oriented magnetic dipole over a homogeneous half-space for a rapid topographic correction of airborne EM data: *Exploration Geophysics*, **46**, 85–96. doi:10.1071/EG13093
- Hodges, G., and Chen, T., 2015, Geobandwidth: comparing time domain electromagnetic waveforms with a wire loop model: *Exploration Geophysics*, **46**, 58–63. doi:10.1071/EG14032
- Legault, J. M., Izarra, C., Prikhodko, A., Zhao, S., and Saadawi, E. M., 2015, Helicopter EM (ZTEM–VTEM) survey results over the Nuqrah copper–lead–zinc–gold SEDEX massive sulphide deposit in the Western Arabian Shield, Kingdom of Saudi Arabia: *Exploration Geophysics*, **46**, 36–48. doi:10.1071/EG14028
- Leggatt, P. B., 2015, Extending the range of time constants recorded by the SPECTREM AEM system: *Exploration Geophysics*, **46**, 136–139. doi:10.1071/EG14029
- Ley-Cooper, A. Y., Viezzoli, A., Guillemoteau, J., Vignoli, G., Macnae, J., Cox, L., and Munday, T., 2015, Airborne electromagnetic modelling options and their consequences in target definition: *Exploration Geophysics*, **46**, 74–84. doi:10.1071/EG14045
- Macnae, J., 2015, 3D-spectral CDIs: a fast alternative to 3D inversion?: *Exploration Geophysics*, **46**, 12–18. doi:10.1071/EG14036
- Peters, G., Street, G., Kahimise, I., and Hutchins, D., 2015, Regional TEMPEST survey in north-east Namibia: *Exploration Geophysics*, **46**, 27–35. doi:10.1071/EG14022
- Pfaffhuber, A. A., and Hendricks, S., 2015, Not extinct yet: innovations in frequency domain HEM triggered by sea ice studies: *Exploration Geophysics*, **46**, 64–73. doi:10.1071/EG14034
- Sattel, D., and Mutton, P., 2015, Modelling the superparamagnetic response of AEM data: *Exploration Geophysics*, **46**, 118–129. doi:10.1071/EG14005
- Sattel, D., and Witherly, K., 2015, The analysis of ZTEM data across the Humble magnetic anomaly, Alaska: *Exploration Geophysics*, **46**, 19–26. doi:10.1071/EG14006
- Smiarowski, A., 2015, Using the in-line component for fixed-wing EM 1D inversion: *Exploration Geophysics*, **46**, 130–135. doi:10.1071/EG14024
- Vallée, M. A., 2015, New developments in AEM discrete conductor modelling and inversion: *Exploration Geophysics*, **46**, 97–111. doi:10.1071/EG14025