David Clark
ASEG Gold Medal
Perth September 2019

CITATION:

The ASEG Gold Medal is awarded from time to time for exceptional and highly distinguished contributions to the science and practice of geophysics by a Member, resulting in wide recognition within the geoscientific community. The ASEG President announced at the ASEG Awards Ceremony held at the AEGC in Perth that the ASEG Gold Medal has been awarded in 2019 to David Clark.

This award specifically recognizes David's exceptional and distinguished contributions to the profession, both in Australia and internationally, through his leading research, publications and presentations in magnetic petrophysics and its application to magnetic field survey design and magnetic interpretation, over a 40-year period.

After graduating from Sydney University in 1974 with a B.Sc. (First Class Honours) majoring in Physics, David took a 'gap two years' in London and worked as a scientific staff consultant at the GK Bureau in London, before returning to Australia to work as a Research Assistant in the Department of Geology and Geophysics at the University of Sydney for two years.

In 1978, David joined Ken McCracken's CSIRO Division of Mineral Physics as an Experimental Scientist. It was whilst at Mineral Physics that, through Professor Don Emerson at Sydney University, he became involved in a research project on basic magnetic models incorporating both anisotropy and remanence. Here he achieved much, especially his own development of equations for modelling ellipsoids, on which he was the first to publish in the public domain. He was awarded an M.Sc. in Geophysics from Sydney University in 1984 for his thesis topic "Magnetic properties of pyrrhotite -applications to geology and geophysics".

From 1979 to 1992, Dave was the lead researcher for four consecutive 3-year internationally supported AMIRA projects on the Applications of Rock Magnetism to Mineral Exploration, projects that served to demystify many magnetic modelling enigmas. For example, the anomalies associated with several mineralised Au-Cu bearing quartz-magnetites in the Eastern Mt Isa Inlier in Queensland give rise to large magnetic anomalies, which significantly perturb the ambient geomagnetic field. Dave showed that the effects of self-demagnetisation from these strongly magnetic bodies originally led to serious errors, particularly in interpreted dip, accounting for the initial mis-targetting of drill holes. Correct dips were calculated after allowing for the self-demagnetisation. This example and others from this period served to demonstrate to exploration geophysicists the importance of anisotropy of susceptibility, self-demagnetisation and remanence.

In conjunction with this work, Dave took up the role in 1986 of Senior Research Scientist at CSIRO's Exploration Division, where he specialised in magnetic

petrophysics and its application to magnetic field survey design and geological interpretation of magnetic surveys.

During the 1990s and early 2000s, Dave played a leading role on further AMIRA projects that integrated petrology and petrophysics through his unique understanding of magnetics, petrology and alteration systems. These projects typified this period of Dave's career and led to a major review of magnetic effects of hydrothermal alteration in porphyry copper and iron-oxide copper-gold systems.

Later David worked with CSIRO on tensor gradiometry in multidisciplinary teams collaborating with DSTO, the US Strategic Environmental Research and Development Program, the Canadian National Research Council and Defence R&D Canada, developing SQUID-based tensor gradiometer systems for submarine detection from airborne platforms. This led to many new mathematical relationships that Dave was able to exploit and bring back into geophysics, including the investigation of multiple-order magnetic gradient tensors for localization of a magnetic dipole and interpretation of magnetic gradient tensor data using eigenvector analysis and the novel concept of the normalised source strength and a review of methods for determining remanent and total magnetisations of magnetic sources.

In CSIRO Minerals Down Under Flagship projects Dave was intimately involved in two main developments involved: (i) developing tools for downhole magnetic measurements and (ii) a surface magnetometer/gradiometer system for remote determination of properties and locations of magnetic sources to aid geological interpretation and drill targeting.

Based on much of this new insight, in 2014 David was awarded a Ph.D. in Geophysics from Macquarie University Department of Earth and Planetary Sciences, for his thesis "Integrated Magnetics: Contributions to Improved Processing and Interpretation of Magnetic Gradient Tensor Data, New Methods for Source Location and Estimation of Magnetisation, and Predictive Magnetic Exploration Models".

Through all this time, Dave has remained with the CSIRO in its various guises, both on staff and from 2003 as a consultant to the CSIRO Division of Industrial Physics at Lindfield, Sydney. After a few years and a name change to the Division of Materials Science and Engineering, Dave was put back on staff where he remains to this day, although currently he works mostly from home in Kentucky in the US.

Dave has a proven record and renowned reputation internationally in communicating his work to the research community. In his career with CSIRO he has published over 60 peer-reviewed articles, as well as over 60 conference abstracts, four book chapters, and numerous CSIRO reports. As evidence of his standing in the international geophysical community, Dave has been invited to give several keynote addresses/plenary lectures, invited seminars, and to convene sessions at overseas universities and major international conferences.

Additionally, Dave has always made himself freely and willingly available to share his insights and mentor, advise and help students, post-graduates and colleagues in

their work on magnetics. He has also been a pro-active supporter of the ASEG, having been a member since 1977, and a regular presenter and contributor at ASEG conferences and meetings,

David Clark has diligently and effectively devoted his great abilities to magnetics, transforming what was a more-or-less qualitative exploration tool into a sophisticated geophysical technique for the benefit of all geoscientists. For his achievements he is greatly admired both in here and internationally by his peers and colleagues.

This combination of skills and multidisciplinary experience, combined with his proven track record in attracting industry support, his publication record and established international reputation, is perfectly aligned with the goals of the ASEG. It is only appropriate that the profession now recognises David Clark's career-long achievements and contributions to the science and practice of geophysics with the award of the ASEG Gold Medal.

David Clark receiving the Gold Medal from ASEG President Ted Tyne