Dr Phillip Schmidt

ASEG Gold Medal

Brisbane March 2023

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 Brisbane in March that the ASEG Gold Medal has been awarded in 2023 to Dr Phillip Schmidt.

This award specifically recognizes Phil's exceptional and distinguished contributions to the science and practice of geophysics in Australia and internationally, through his leading-edge research and developments in the theory and practical application of rock magnetism/paleomagnetism, and for his significant contributions to the ASEG over many years.

Phil obtained his BSc (Hons) from the University of New England in 1973, and his PhD in Geophysics from the Australian National University in 1976. Following this, he took on a post-doctoral position in Ottawa with the Earth Physics Branch of the Canadian Department of Mines and Energy, focussed on the application of palaeomagnetism to Precambrian tectonic problems. Phil returned to Australia in 1978 to work with Brian Embleton in Ken McCracken's CSIRO Division of Mineral Physics, Sydney, focussing on the application of rock magnetism to mineral exploration and building a magnetic property database.

After joining the CSIRO Phil applied his solid-earth geophysics skills to add an extra dimension in the study of applied magnetics, tackling a broad range of topics from analysing the magnetic petrology of rocks to aid the interpretation of magnetic surveys to using differential vector and tensor magnetometers to define the source of magnetic anomalies. This breadth of research has had a significant impact on the geophysical community and has greatly aided our interpretation of magnetics and the causes of magnetic anomalies.

Phil remained with the CSIRO, reaching the level of Chief Research Scientist before retiring in 2012. Phil has published over 130 refereed publications, 100 conference papers and over 50 CSIRO investigation reports. The research topics covered by Phil are broad, ranging from solid earth projects, such as analysis techniques to improve palaeomagnetic data through to applied geophysical projects. Phil's research can be divided into two major parts, 1) palaeomagnetism/rock magnetism and understanding the Australian Apparent Polar Wander Path and 2) the improvement of the magnetic method to aid geophysical exploration.

Palaeomagnetism: Phil has published leading edge research on palaeomagnetism from when he completed his PhD in 1976, through to the present day. He has mostly focussed on

Australian rocks, from very young units (Cainozoic) to very old rocks (Proterozoic), producing results that are key in defining the Australian Apparent Polar Wander Path (APWP).

Phil's early studies served to inform him how common it is that rocks are partially or completely remagnetised, through weathering or heating/cooling during burial/uplift. Rather than being a negative he concentrated on turning this extra information into a positive. He became focussed on methodologies to obtain reliable rock/palaeomagnetic data. This allowed him to refine the Australian APWP and palaeolatitudes, which have been a primary research topic for him through the years. His work has elucidated how remanent magnetism can be changed and overprinted over time, with key papers on thermal overprinting in Southeast Australia and how it relates to the burial/uplift, which led to high coal ranks and, afterwards, the Blue Mountains west of Sydney for instance. He looked at various geological areas in Southeast Australia that were not completely overprinted to obtain data that looked through the overprinting. In 1990, Phil co-edited a special issue of Tectonophysics and published a key paper on the reliability, limitations and strengths of APWP's.

Phil also researched the palaeomagnetism of Proterozoic rocks focussing on the Adelaide Geosyncline and the Hamersley Basin looking at the Late Proterozoic part of the APWP to better understand the tectonic movement of the Australian plate and also to constrain palaeolatitudes of Late Precambrian glacial deposits. With George Williams (ex-BHP geologist, now emeritus fellow at Adelaide University) Phil showed glaciations from that time were unequivocally equatorial/low-latitude. With his close colleague of 40 years standing, David Clark, Phil studied the rock/palaeomagnetism, including the anisotropy of magnetic susceptibility, of Hamersley Basin banded iron formations. This work was crucial to understanding the magnetic anomalies of banded iron formations and the early Australian APWP. With Mark Lackie, Phil used palaeomagnetism and laser micrometry to measure directions of stress relaxation in drill core to infer stress orientation in Australian coal fields.

Phil has published on methods to improve the "cleaning" and "analysis" of palaeomagnetic data and was part of an international group that looked at low temperature demagnetisation of magnetite bearing rocks to preferentially eliminate remanence "noise" carried by multi-domains allowing a more realistic thermal remanence acquisition history to be unravelled from the remaining single domain grains. Low temperature demagnetisation is now a routine demagnetisation technique used in palaeomagnetic analysis.

Application of magnetic techniques to aid in geophysical exploration: since he started at the CSIRO, Phil was involved in the measurement and analysis of rock magnetic properties, in support of the needs of the exploration industry. He produced or co-authored numerous Investigation Reports covering a wide range of potentially economic styles of mineralisation. These reports allowed measured physical properties to be used in company's analysis of their aeromagnetic data. As the CSIRO magnetics group, led by Phil, routinely measured the remanence and magnetic anisotropy of rocks, these properties became understood by industry and became more commonly requested by companies. Phil worked on analysing differential vector magnetometer surveys as well as the construction of DVMs in collaboration with John Stanley's group at the Geophysical Research Institute in Armidale. With Dave Clark and Keith Leslie, Phil also extended Euler Deconvolution to take advantage of magnetic gradient tensors in source characterisation.

Phil was a great believer in disseminating knowledge to industry and students, not only by reports but also by workshops and lab demonstrations to explain and value add to reports. A good example of this is the Applied Magnetics workshop held in 1990. Over the years he co-supervised seven PhD students from Macquarie University, including Peter Hunt (dec.) of ABC Science Show fame, Chris Fergusson (current co-ed. *AJES*) and Mark Lackie (ex-MU, Managing Editor of *Exploration Geophysics* and ASEG NSW Branch President of many years).

After finishing up at the CSIRO, Phil worked on developing the Q-Meter, a portable instrument that could be used in the field at drill sites to determine the Koenigsberger Ratio (Q) in a timely manner so that appropriate decisions could be made at the drill site as to the source of the magnetic anomaly that is being drilled. Phil was awarded the ASEG Grahame Sands Award in 2015 for this innovative development of significant practical benefit to exploration geophysics. Q-Meters have since been exported around the world, including North and South America, and Africa.

In addition to his distinguished professional work, Phil has also been a very active and supportive member of the ASEG since joining the Society in 1971. Over the last 50 years, he has contributed to the running of the society and has served in many important roles for the Society. He served on the Federal Executive from 2005 to 2016, was Chair of the ASEG Publications Committee from 2005 to 2013 and Federal President in 2015-16. Whilst Publications Chair, he was instrumental in making *Exploration Geophysics* an academically recognised journal, and helping to establish on-line access to both *Exploration Geophysics* and *Preview*, allowing more geophysicists to access the Society's publications on a regular basis.

Phil has been an active member of the NSW Branch and its Treasurer before joining the Federal Executive, and has also been involved in many ASEG conferences, as a presenter, session Chair, and on Conference Organising Committees. In 2010, he took on the role of Chair of the Technical Program Committee for the 21st ASEG conference in Sydney. In 2012 Phil received the ASEG Service Medal for his distinguished and valuable contributions to the ASEG as Publications Chair and his work on the Federal Executive.

In summary, since Prof Ron Green (UNE) advised Phil to join ASEG in 1971 (and to attend the 1972 RSES Summer School, ANU, where Phil first met Dr Brian Embleton and became his PhD student), Phil has had an outstanding record in research and practical applications, in the education of students and working explorationists, and in service to Australian earth sciences, particularly to the ASEG. He has gained an international reputation for his contributions to both pure and applied geophysics and made many important contributions to theory and practice of exploration, particularly in the Australian context.

With his career-long achievements resulting in many significant contributions to the science and practice of geophysics, and his service to the profession through the ASEG, it is only appropriate that the profession now recognises Phil Schmidt as a most worthy recipient of the prestigious ASEG Gold Medal.