



Malcolm Cattach
ASEG Gold Medal
Brisbane September 2021

CITATION:

The ASEG Gold Medal is awarded from time to time for exceptional and 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 Awards Ceremony held in September in conjunction with the AEGC that the ASEG Gold Medal has been awarded in 2021 to Dr Malcolm Cattach.

This award specifically recognizes Mal's exceptional contributions to geophysics in Australia and internationally, through his pioneering work spanning 40 years in the development of new and innovative geophysical exploration technologies that have become internationally established.

After graduating with a science degree from University of New England in 1978, Mal worked as a geophysical field hand for two years with Newmont Mining. He returned to UNE in 1981 to complete a Master's Preliminary year in the Department of Geophysics. He then enrolled in a Master's study sponsored by Newmont Holdings, analysing the comparison between the performances of commercially available IP receivers.

Upon completion of this MSc, Mal had the choice of obtaining employment with Newmont, which had been his original ambition, or join John Stanley at the self-funding Geophysical Research Institute (GRI). John had developed a Cs vapour magnetometer with automatic data positioning and digital recording and pioneered the application of high-definition magnetic mapping to mineral exploration, archaeological mapping and then the detection of UXO. In 1984 the GRI had a contract to develop the TM-3 magnetometer for the Australian Defence Department. Mal chose to support the GRI.

Having gained an appreciation of the benefits of acquiring high-definition magnetic data, and with his Master's experience in electrical methods, Mal proposed the concept of using the fast-sampling Cs magnetometer to simultaneously acquire spatially varying magnetic and time varying electromagnetic responses.

Under John's supervision at the GRI, and with funding support from Normandy Poseidon, Mal subsequently undertook a PhD researching all the basic physics underlying the Sub Audio Magnetics (SAM) method by which the four parameters of TMI, TFMMR, TFEM and TFMMIP could theoretically be simultaneously acquired. Within the PhD program, Mal confirmed the simultaneous acquisition of the TMI and TFMMR parameters through practical application with case studies. Mal and John then co-supervised the PhD of David Boggs, who proved that the remaining two parameters could also be simultaneously obtained.

When the GRI transitioned from an Institute to a private Company G-Tek, Mal took on the role of Director of Research and was on the Board. In 2005, after John's retirement, Mal led the regrouping of the former GRI research staff in the formation of Gap Geophysics in Brisbane, and very successfully managed a commercially viable geophysical company providing an invaluable service to the exploration and environmental mapping industries, while continuing to advance an active research and development program.

In the 16 years since forming Gap, Mal has been responsible for bringing to maturity all the technologies that in the GRI days were but a dream.

Over the past 40 years, Mal has been a pioneer, often the pioneer, of a sequence of geophysical exploration technologies that have become internationally established as World Leading. In 1984 he introduced microprocessor technology to the newly developed digital Cs magnetometer, facilitating the automatic acquisition of positioned magnetic data that became a precursor to his development of image processing software. This achievement was recognised at the time with the Grahame Sands award of 1988.

His PhD research completed in 1993 produced the Sub Audio Magnetics technology, a task that required both the upgrading of the Cs magnetometer technology, the development of theoretical requirements to enable the separation of the SAM parameters, and case study proof of the combined performance of hardware and software. This work was recognised by a second Grahame Sands award in 1995.

Experience applying SAM using the best available commercial geophysical transmitters enabled Mal to propose a specification for a new, very high-power transmitter to specifically meet SAM requirements. With assistance from a specialist electronic engineer, a range of high-performance transmitters were built. This development earned Mal an unprecedented third Grahame Sands Award in 2012.

A further development of SAM, named SAMSON, enhanced performance in the acquisition of TFEM data. Their paper describing this innovative application of geophysical technology won Mal and his co-authors, the Laric Hawkins Award for best paper at the ASEG Conference in 2007. SAM and SAMSON have now received international acceptance in the geophysical exploration and mapping industries, and are used on all continents. SAM is not just a ground-based technique but has also been successfully applied from a helicopter platform, a development that earned Mal a second Laric Hawkins Award in 2018.

With three Grahame Sands awards for innovation in applied geophysics, two Laric Hawkins awards, and Best Paper awards at ASEG Conferences, Mal has in fact received more ASEG awards for excellence in exploration geophysics than any other awardee in the Society's 50-year history.

Mal's contribution to the development of high resolution, and high-definition multi-parameter geophysical mapping was also recognised in Europe as a joint recipient (with John Stanley) of the Comenius University (Bratislava) Medal.

In addition to contributing to many innovative technology developments, Mal has successfully established, managed and operated Brisbane based Gap Geophysics, a commercially viable geophysical contracting and consulting company, providing an invaluable service to the exploration and environmental mapping industries, while continuing to advance an active research and development program.

Mal has also been an active member and supporter of the ASEG since 1984 and has subsequently participated in almost every ASEG Conference as a trade exhibitor and presenter. Throughout his career, Mal has demonstrated an extraordinary loyalty to the Society and to Australian geoscience by choosing to present and publish his science and technology developments at ASEG Conferences and in the ASEG's journal *Exploration Geophysics* and in *Preview*. He has also shared his scientific skills as supervisor of post-graduate students and mentor to his staff. He is greatly admired for his achievements by his peers and colleagues.

Malcolm Cattach's scientific and technical inventions and his pioneering contributions to exploration geoscience over four decades, demonstrate his exceptional and distinguished contributions to the science and practice of geophysics, and it is appropriate that the profession now recognises these achievements with the award of the ASEG Gold Medal.