Association of Applied Geochemists

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QIUMING CHENG, AAG 2020 GOLD MEDAL

The Association of Applied Geochemists (AAG) is pleased to announce that the 2020 Gold Medal for outstanding contributions to exploration geochemistry is awarded to Professor Qiuming Cheng of Sun Yat-sen University in Zhuhai City and of the China University of Geosciences in Beijing (China).

Professor Cheng completed his PhD in Earth sciences at the University of Ottawa (Canada) in 1994, following undergraduate and MSc degrees at the Changchun University of Earth Sciences (China). After a decade-long professorship at York University in Toronto (Canada), in 2004 he became a founding Director of the State Key Laboratory of Geological Processes and Mineral Resources at the China University of Geosciences in Wuhan and Beijing. Presently, he is a full professor at the School of Earth Science and Engineering at Sun Yat-sen University and at the Faculty of Earth Science and Resources at the China University of Geosciences.

Professor Cheng is one of the top international scientists in quantitative geology and applied geochemistry. He has made fundamental contributions that have significantly advanced the theory of non-linear processes in the geosciences and in methods for modelling geochemical anomalies for mineral resources and environmental assessments. Professor Cheng's research contributions to exploration geochemistry have been exceptional in his development of mathematical theory and in the application of unique methods for recognizing mineralized environments across a range of geochemical landscapes, sample media, and analytical methods. He has an exceptionally strong mathematical background and his research has resulted in a new paradigm for evaluating geochemical data through the use of non-linear mathematical methods combined with a deep understanding of geochemical processes.

Professor Cheng's methodology of fractal analysis of geochemical responses has resulted in the discovery of several mineral deposits in China, and his name is synonymous with the application of fractal analysis to geochemical data. More recent innovations are the 'local singularity analysis method' for enhancing weak spatial signals in geochemical data and a new multifractal inverse distance model. These new methods improve on the recognition of geochemical responses, and his research has influenced the way mineral exploration companies conduct their exploration programs. Professor Cheng has worked closely with both the academic and mineral exploration and mining communities to share and implement his research methodologies. His seminal 1994 paper on the separation of geochemical anomalies from background by fractal methods (published in the *Journal of Geochemical Exploration*) has alone attracted over 860 citations. His productivity is reflected in his impressive publication record of some 280 journal papers, books, and book chapters, generally as lead or as corresponding author, of which more than 44 have been published in AAG-associated journals. Professor Cheng received the Andrei Borisovich Vistelius Research Award from the International Association for Mathematical Geosciences (IAMG) as a promising young scientist and, more recently, the William Christian Krumbein Medal, the highest honour bestowed by the IAMG. He is also the first Fellow of the AAG to ascend to the Presidency of the International Union of Geological Sciences (IUGS). Significantly, he has been a mentor and supervisor to 55 graduate students at both York University (Canada) and the China University of Geosciences.

Professor Cheng is a most worthy recipient of the AAG's Gold Medal. His world-class accomplishments, his record of innovation, his education of international young scientists, and his service to the international scientific community have been remarkable. Presentation of the medal took place at the IAGS in Chile in October 2021.

Stephen Cook
Chair, AAG Awards Committee

RECENT ARTICLES PUBLISHED IN *EXPLORE*

The following abstract is for an article that appeared in issue 190 (February 2021) of the *Explore* newsletter.

"Sinclair: Australia's First Caesium Deposit: Discovery and Exploration Implications"

Nigel W. Brand[1,2,3], David J. Crook[4], Stuart T. Kerr[4], Sophie O. Sciarrone[1], Naomi J. Potter[1,3], Christabel J. Brand[1] and Geoffrey E. Batt[5]

The Sinclair Caesium Deposit was discovered in 2016, delineated in 2017, developed in 2018, and is Australia's first mining operation to commercially extract the caesium-rich mineral pollucite and represents a globally important discovery. Known economic caesium deposits are extremely rare, with only three known mining operations having reported commercial quantities of pollucite: the Bernic Lake Mine (Manitoba, Canada), Bikita Mine (Zimbabwe), and the Sinclair Mine (Western Australia). The formation of pollucite only occurs in extremely differentiated, complex lithium–caesium–tantalum (LCT) pegmatites. Given their size and rarity, caesium-rich deposits globally are either a challenge to find or simply 'failed' to form during the emplacement of a given LCT pegmatite. The discovery and development of the Sinclair Caesium Mine has provided a rare opportunity to examine an extremely differentiated, complex LCT pegmatite with applied technologies. This will provide insight for future exploration and discoveries of economic caesium deposits.

The following abstract is for an article that appeared in issue 191 (June 2021) of the *Explore* newsletter.

"Integration of Geochemical and Mineralogical Data: An Example from the Central Victorian Goldfields, Australia"

Dennis Arne[6]

The chemistry of most geological materials is determined by mineralogy. Therefore, the interpretation of total to near-total digest geochemical data is enhanced when integrated with mineralogical data. The latter includes quantitative X-ray diffraction (XRD) or hyperspectral (visible to near-infrared and shortwave infrared) data. Lithogeochemical analyses from the central Victorian goldfields (Australia) combined with mineralogical data provide an understanding of the processes involved in wallrock alteration associated with gold mineralisation. Ferroan carbonate minerals increase as mineralised structures are approached, while chlorite decreases at most deposits, with Bendigo being a notable exception. Detrital albite grains in sandstones are lost during progressive alteration and are replaced by muscovite. These systematic changes are accompanied by sulphidation of wallrock proximal to mineralised structures. Subtle differences in alteration style at different goldfields are likely due to variations in the timing of gold mineralisation during the Silurian and Devonian. An understanding of wallrock alteration patterns at central Victorian goldfields allows vectoring towards mineralised structures during exploration drilling.

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