



26th IAGS KEYNOTE SPEAKER

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Gold and calcrete: 25 years of successful exploration geochemistry - what have we learnt?

Gold and calcrete are strongly associated. The CSIRO discovery of this peculiar and extraordinary relationship between two disparate components of the soil goes back to 1987. The discovery has led to the unearthing of billions of dollars worth of gold. It is currently being applied to the delineation of gold mineralisation in the Albany Fraser Belt of Western Australia.

Recent advances in our understanding of the gold-calcrete phenomenon suggest that several mechanisms are operating at different scales: at the micron scale gold may not be directly associated with calcrete but with biotic components of the soil; at the soil sampling scale the strong relationship between gold and calcrete must be considered in order not to overlook a deposit; geochemical mapping of gold-in-calcrete anomalies requires an understanding of landscape evolution and geomorphology. Thus, gold anomalies that have formed in calcrete directly over mineralisation with the help of deeply rooted plants are subject to landscape processes that create subtle but larger footprints to mineralisation. However, these geochemical anomalies in depositional terrains may become spatially isolated and dispersion trains overly complex making interpretation of their origins difficult to resolve.

Synchrotron XRF, isotope geochemistry (C, O and Sr), luminescence dating, laser ablation inductively coupled mass spectroscopy and conventional geochemistry will illustrate the concept of scale associated with evolving Au in calcrete anomalies from a range of gold prospects including Edoldeh Tank, Barns, Bounty and Earea Dam. While this research has been restricted to Australia, it is highly likely that these processes apply in other auriferous calcreted terrains of the world but need to be investigated.

Melvyn Lintern

Dr Mel Lintern is Principal Research Scientist at CSIRO where he has undertaken mineral exploration research for nearly 30 years. During this time he has developed an expertise in the field of mineral exploration and has grown an internationally recognised reputation in applied geochemistry, particularly in the application of biological media and of calcrete to mineral exploration. He discovered the link between gold and calcrete in 1987. He has recently published several papers on the nature of gold in vegetation and in calcrete and has discovered strong links between these two sample media. The impact of his research has enabled mining companies to explore with more confidence in greenfield areas where sedimentary cover dominates, particularly in arid and semi-arid regions of Australia. Moreover, two new large mines (8 M oz of Au) have commenced operations (Tropicana and Challenger) as a result of using calcrete for exploration together with many other brownfield satellite gold deposits that have helped prolong the life of existing mines. He is currently Deputy Leader for a multi-industry project investigating the processes that lead to the development of biological and gas-generated metal anomalies through transported cover and a Project Leader investigating an environmental problem involving the deposition of calcrete.