PROGRESS ON ANOMALY FORMATION IN CALCRETE

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Work on calcrete in CRC LEME continues on many fronts. This talk will try to summarise some of the more interesting or important findings that have been made within the last two years. Work is continuing on mechanisms as to how anomalies form in calcrete and how best that these may be used to refine the exploration methods that use this geochemical sampling medium. Current or recently completed CRC LEME research on calcrete that can be found on the CRC LEME website (LEME symposia) includes:

Finding blind orebodies: geochemical exploration for large nickel-copper PGE sulphides on the western Gawler Craton: **A. Lockheed & K.M. Barovich**.

Geology and geochemistry of regolith carbonate accumulations of the southwestern Curnamona Province, SA: implications for mineral exploration: **P.D. Wittwer, K.M. Barovich & S.M. Hill.**

Gold mobility within dune systems on the Barns prospect, Wudinna, South Australia: a partial extraction approach: **L.B. McEntegart & A. Schmidt Mumm.**

Key findings from the South Australian regolith project: **M.J. Lintern, M.J. Sheard & G. Gouthas.**

Origin and genesis of calcrete in the Murray Basin: **L.N. Tylkowski, D. Chittleborough & K.M. Barovich.**

Strontium isotopes as an indicator of the source of calcium for regolith carbonates: **R.C. Dart, P.D. Wittwer, K.M. Barovich, D. Chittleborough & S.M. Hill.**

The biogeochemistry of calcrete forming processes: **A. Schmidt Mumm & F. Reith**.

By the far the largest of these studies was “The South Australian Regolith Project” that concluded recently with the issuing of a final report. Sixteen or more case studies involving calcrete were undertaken and a series of exploration models for different settings were constructed. Briefly, conclusions were similar to those found for AMIRA-CSIRO Yilgarn studies undertaken last decade:

1. Calcrete is the best near surface sampling medium for Au and should be used as a first pass geochemical sampling technique.
2. It usually occurs within a metre of the surface and is readily identifiable using dilute acid.
3. It works best as a guide to mineralization where transported overburden is absent or thin (<10 m), and when there is saprolite (weathering) rather than fresh bedrock in the residual regolith.
4. Local topography may lead to the development of transported anomalies located away from their source mineralization.

In addition, it was shown that in specific environments (high water table, acidic groundwaters and <10 m of transported material), upward dispersion and co-precipitation of Cu and Au with alunite may occur at the base of the calcrete horizon due to a pH change.

Exploration companies are still faced with the dilemma of which of their many calcrete anomalies should be drilled first – how do we rank geochemical anomalies? It is now considered that to move forward on this problem, the research emphasis must be directed towards understanding the process and a number of projects have been completed, or are under way, that shed light on the way calcrete anomalies form.