

# MINERALS BRIEF

## Regolith Science in Mineral Exploration

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### Termite and spinifex research captures the media's imagination



*The University of Adelaide's Dr Steve Hill (far right) and Catalyst Reporter, Dr Paul Willis (centre), have a break while talking about termite mound geochemistry in the Darling Ranges.*

In the last few months, the science media has shown great interest in LEME's groundbreaking research into using plant and animal structures to search for new mineral deposits. This interest has resulted in an article appearing in the New Scientist Magazine and the ABC TV Science Program, Catalyst, flying out to Perth in August to film two stories on the Centre's work into termite and plant geochemistry, and gold nugget formation.

In late June, New Scientist published an article profiling the research done by PhD student Anna Petts (The University of Adelaide) into using termite mounds located in the Tanami Goldfields of northern Western Australia, as sampling media to better understand the local geochemistry and locate metal anomalies.

Her more recent research, which has included a trip to the Lake Victoria goldfields region in north-western Tanzania, has helped Anna create a framework for estimating the thickness of transported regolith based on termite-mound geochemistry. Research by another LEME PhD student, Nathan Reid (The University of Adelaide), into analysing Spinifex grass geochemistry to detect mineralisation also featured prominently in the article.

A summary of the New Scientist article can be downloaded here:  
<http://environment.newscientist.com/channel/earth/mg19426101.400-termites-the-new-treasure-hunters.html>

A few months later, Catalyst sent over their

reporter, Dr Paul Willis, to find out how termites and plants can be used as mineral exploration tools and learn the secrets of gold nugget formation.

For about a week in mid August, LEME Researchers Dr Ravi Anand (CSIRO Exploration and Mining), Dr Steve Hill (The University of Adelaide) and Dr Rob Hough (CSIRO Exploration and Mining), helped Dr Willis and his crew piece the story together, which included a visit to termite mounds in the Darling Ranges and a trip to the Marvel Loch Gold Mine, near Southern Cross. The TV crew also got some great footage of Rob and Ravi at work in the laboratory while they were in Perth.

Both stories are expected to go to air in early 2008.

### Interactive map boosts SA uranium exploration

A new interactive map by LEME and the Department of Primary Industries and Resources of South Australia (PIRSA) has boosted uranium exploration activities on the Gawler Craton, SA.

The interactive map is part of a recent DVD release containing 1:2 million-scale, datasets of South Australia that show the location of Tertiary palaeodrainage channels and palaeo-coastal barriers. It also features eleven GIS data layers, which can be incorporated into other datasets or existing exploration models.

LEME Assistant Director John Keeling (PIRSA) said the palaeodrainage data on the DVD has proven to be a very popular release.

"Since the preliminary map's release in early May, more than 70 new exploration license applications, specifically located over palaeodrainage networks and associated beach barrier sands, have been received by PIRSA," Mr Keeling said.

"Diatreme Resources Ltd confirmed in a press release on 24 July that their recent tenement applications in South Australia were guided by a review of our palaeodrainage map."

The map was created to promote exploration for regolith hosted minerals, in particular chemically-precipitated uranium deposits, within palaeochannel sands and heavy mineral deposits in Cainozoic coastal barriers in the

Eucla and Murray basins. The map provides explorers with a regional overview of the palaeodrainage network that will assist interpretation of site specific data and the identification of new areas to target.

It was compiled by LEME and PIRSA in response to a recognised demand by explorers wanting a thematic state-wide map that featured palaeodrainage and coastal sediments data.

"The map features topography, drill-hole layers, mineral deposit locations and remote sensing data, such as Shuttle Radar Topography, Landsat 7-247 and NOAA night-time thermal imagery," Mr Keeling said.

"Drill hole data and exploration tenements and cultural feature location information are also on the DVD."

Explorers can interact with the digital palaeodrainage and other spatial data to develop their own exploration strategies, potential target models, optimise tenement applications and plan additional data acquisitions to refine their targets.

LEME research on the stratigraphy and evolution of palaeodrainage systems and associated beach barriers has been critical in understanding temporal distributions and development of preliminary models of mineral concentration.

Surface expression of palaeochannels as topographic lows or inverted 'silicified' highs is largely confined to the western and central Gawler Craton, Musgrave Province and Adelaidean Fold Belt.

An appreciation of the broad extent of Tertiary palaeodrainages in the western half of South Australia came about with the release of Landsat imagery in the 1970s. The availability of high-quality digital terrain models has assisted in mapping out palaeodrainages, supported by a relatively small amount of stratigraphic drilling. However in some areas, these interpretations will remain highly speculative until test drilling or detailed geophysics, confirm the underlying features.

The current release of the map reflects data available in the public domain. The present high level of geophysical data acquisition and exploration drilling in South Australia targeting palaeodrainage sediments is generating large volumes of new data. PIRSA plan to release updated versions of the digital map as significant new information becomes publicly available.

Copies of the DVD in ARC-GIS format can be purchased from the PIRSA Website ([www.pirsa.gov.au](http://www.pirsa.gov.au)) for \$20 including packaging and postage.

A hard copy map is also available for purchase for \$27.50. MapInfo format of the palaeochannel layers are available for download at:  
[http://www.pir.sa.gov.au/minerals/publications/south\\_australian\\_palaeochannel\\_map](http://www.pir.sa.gov.au/minerals/publications/south_australian_palaeochannel_map)

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### Record attendance at final NURGS course



*Photo caption: Dr Steve Hill (Uni Adelaide), NURGS co-convenor in full swing at the Junction Mine, Broken Hill, explaining the need for accurate regolith knowledge when exploring for mineral deposits. Nearly 100 students from ANU, Adelaide, Melbourne and Monash universities attended this one-day Broken Hill line of lode regolith tour as part of NURGS.*

Around 100 students attended LEME's final annual undergraduate regolith geology field camp at the Fowlers Gap Research Station near Broken Hill between 9-13 July – a new attendance record for the field camp.

Better known as National Undergraduate Regolith Geology School (NURGS), the course took a selection of undergraduate geology students from Australian universities and put them through an intensive one-week regolith training session.

NURGS is the final of six of the Mineral Council of Australia's (MCA) Minerals Tertiary Education Council (MTEC) Program. Since 2001, LEME has delivered Honours-level training courses through the MTEC Program to students and minerals industry geoscientists through the following courses:

- Regolith Geology and Geochemistry (RGG)
- Regolith Mapping and Field techniques (RMF)
- Introduction to Hydrogeochemistry (HGC)
- Environmental Mineralogy (EMN)
- Advanced Remote Sensing for mineral exploration and natural resource management (RSM).

Coordinated by LEME's Education and Training Program Leader, Dr Ian Roach, NURGS along with the other MTEC courses have been very popular with many attendees going on to pursue further studies or careers in regolith geology.

"The introductory courses provide students with an appreciation of regolith geology and its applications," Dr Roach said.

"As they have been so successful, we are currently investigating new funding arrangements, so the course can continue in another form after LEME finishes in June next year."

Course activities around the Broken Hill area received some local media coverage with an article appearing in the newspaper, the Barrier Daily Truth and a radio interview by Dr Steve Hill, NURGS co-convenor at University of Adelaide, with ABC Regional Radio in Broken Hill.

For more information about LEME's MTEC Courses, click here:  
<http://www.crcleme.org.au/Educ/MTECcourses.html>

#### LEME Project profile: Queensland regolith map

LEME has made significant progress in producing a Statewide-regolith map for Queensland with the successful completion of a 7,500 km long traverse in April this year. The traverse was carried out to determine the major variations in regional terrains and landscapes needed to provide baseline information for the development of the project's overall fieldwork and mapping strategy. Once developed, the strategy is expected to generate new data about regolith materials, their distribution and associated landscapes histories.

During the traverse, about 250 whole-regolith samples were taken for mineralogical and geochemical analysis, with twenty additional palaeomagnetic-age determination samples collected as part of a regolith-chronology pilot study.

The project is a collaboration between the Queensland Geological Survey (GSQ), through the Queensland Department of Natural Resources and Water, and Geoscience Australia. GSQ funding for the project has come from their \$20 million Smart Exploration Initiative.

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#### Twenty Five LEME presentations at IAGS

A delegation of LEME researchers made their way to sunny Spain in June to present 25 papers and posters at 23rd International Geochemistry Symposium in Oviedo.

The presentations covered an array of regolith research topics, such as: using termitaria as a biochemical sampling medium, nickel sulfide exploration using hydrogeochemistry, and using groundwater chemical, geochemical expression of bedrock mineralisation through deep cover and isotopic compositions to search for copper-porphyry deposits.

LEME CEO Dr Steve Rogers said the strength of LEME representation at the Symposium is testament to the international relevance of LEME research outputs.

Full list of Abstracts and author contacts via LEME web site at:  
<http://crlceme.org.au/Research/IAGS%20Spain%20Jun07%20Abstracts.html>

#### CRC LEME Explorers' Guide Series

Over the next 12 months CRC LEME will release a series of regional mineral explorers' guides aimed at assisting mineral exploration in regolith dominated terrains.

The first is the

##### **Cobar Region - Lachlan Orogen pre-release**

21-22 September  
2007 Mines and Wines,  
Orange, NSW

followed by

##### **Tanami - April 2008**

Annual Geoscience Exploration Seminar, Alice Springs, NT

##### **Gawler - May 2008**

South Australian Resources and Energy Investment Conference, Adelaide, SA

##### **Curnamona - June 2008**

Mineral Exploration Through Cover Conference, Adelaide, SA

##### **Yilgarn - May 2008**

LEME Minex Seminar, Perth, WA.

##### **Thomson - June 2008**

Exploration in the House, Sydney, NSW

All guides will be available for FREE download from the CRC web site.





### LEME Technology Transfer

#### Upcoming presentations:

- 18-22 November 2007 - ASEG 19th International Geophysical Conference, Perth WA. Keynote and other LEME presentations
- 29 November 2007 - 5th Sprigg Symposium Regolith: mineral deposits and environment. University of Adelaide, SA. PIRSA event, LEME Presentations and support
- 10-15 February 2008, ANZ Geomorphology Group Conference, Queenstown, Tasmania. Keynote and other LEME presentations

Further information about CRC LEME regolith courses can be found here:

<http://crcleme.org.au/Educ/MTECcourses.html>

#### Recently Published Papers

Abstracts and PowerPoints now available from LEME Minex Seminar held 28 August 2007 at: <http://crcleme.org.au/NewsEvents/Events/MinexSeminarAug07.html>

Past issues of the Minerals Brief can be downloaded from: <http://crcleme.org.au/Pubs/index.html>

### Recent Publications

(Available via our website <http://crcleme.org.au>)

- OFR 182 - A bibliographic index for natural resource management in the Upper Burdekin and Fitzroy Catchments
- OFR 193 - 2007. Potassium-Argon ages of late Mesozoic and Cainozoic igneous rocks of eastern Australia
- OFR 216 - Geochemical studies of the regolith at the Mt Gunson Copper Deposits, Stuart Shelf, SA. (Re-release of LEME Restricted Report 76R, 1998)
- OFR 231 - RTMAP regolith database field book and users guide (second edition)

First of the Re-releases of Technical Reports (12 now out of confidentiality) arising from the LEME-AMIRA Project 504 "Supergene mobilization of gold in the Yilgarn Craton" which was carried out over the period 1998 to 2001.

- OFR 217 - Characteristics of gold distribution and hydrogeochemistry at the Carosue Dam Gold Prospect, WA.
- OFR 218 - Gold distribution, regolith and groundwater characteristics at the Mt Joel Prospect, WA.
- OFR 219 - Supergene gold dispersion at the Argo and Apollo Deposits, WA
- OFR 220 - Geochemistry, hydrogeochemistry and mineralogy of regolith, Twin peaks and Monty Dam Gold prospects, WA

More information:

<http://crcleme.org.au/Pubs/P504.html>

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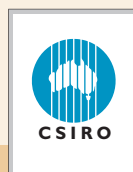
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CRC LEME is the cooperative research centre for regolith geoscience with some 130 contributing researchers from eight Core Parties around Australia. We generate and apply regolith knowledge for mineral exploration and environmental management.



**Your organisation can benefit from CRC LEME expertise.**

<http://crcleme.org.au>