

LEME information dump

December 2005 report to LEMERs

Welcome to the first of a series of CRC LEME monthly reports. These short reports are designed to keep you all informed about what is happening in the CRC. Thanks to the Program Leaders and AD's for providing the input.

Steve

CHIEF EXECUTIVE OFFICER REPORT:

STEVE ROGERS

Well I'm now two months into the job and I must say how much I am enjoying interacting with you all. I am really impressed with the range and quality of the research you are all doing, LEME is really starting to produce the goods in many of our research areas. However, we must keep up the good work. We are NOT in 'rundown' mode, we still have plenty of time and resources to make some real breakthroughs in Regolith Geoscience research.

I attended my first Board meeting as CEO in Canberra last week. One of the important resolutions that came out of the meeting was to extend funding for CRC cash funded positions. Those of you who are CRC cash funded will receive a letter shortly informing you of this decision, and the length of funding extension.

The Board also discussed the Fifth year review of the CRC due in July next year. Originally this review was a CRC secretariat requirement, our final two years of Commonwealth funding dependant on the outcome. We have now been informed that the CRC Secretariat no longer requires us to conduct a review, and report to them. However, I have decided, with Board support that we will conduct a review of LEME as planned – **watch this space!**

Regarding our annual CRC Regolith Symposia, in a change to the normal format, I plan to have a single symposium next year where we will bring all the CRC together to celebrate and showcase our achievements. Planning is in the early stages, but it is most likely that we will hold a 3-4 day residential retreat in the vicinity of Adelaide, sometime in late October 2006. Thanks to Ian Roach and Steve Hill for originally suggesting this. Again-**watch this space.**

In response to our advert for a CRC Communications Officer, we received 21 applications. A shortlist of three very promising candidates will be interviewed on the 14 Dec, I envisage the successful candidate commencing early in the New Year.

Quick congratulations to Frank Reith and Rob Hough and their co-authors who have both submitted letters to *Nature*, I would like to see more of this, we have got to up our international scientific reputation and profile.

Finally I would like to take this opportunity to wish you all a ***Happy and Safe Festive Season***, come back refreshed in the New Year, ready to carry on the excellent work.

Cheers
Steve

PROGRAM 1 – REGOLITH GEOSCIENCE:

LISA WORRALL

New business

- *Geophysical Signatures of the Regolith*: A new non-LEME PhD student may start on the Tanami program in February 2006.
- *Central Gawler Gold*: Funding of \$44,500 over 3 years has been offered to Baohong Hou by the Australia-China Special Fund for Scientific & Technological Cooperation for travel associated with collaborative research with the Guilin University of Technology on the application of CHIM
- *NT Regolith Project*: A regolith workshop program is being developed for CAMECO. It is planned to hold the workshop in March-April 2006.
- *History of Aridity*: A vacation scholar has joined Ed Rhodes's group and will investigate the dating potential of "slow OSL traps" in the Simpson Desert samples.
- *Lachlan Fold Belt*: Keith Scott has negotiated an industry funded project with Goldfields Australasia to examine geochemical dispersion processes at Lockington near Bendigo.
- *Eucla Margins*: Lindsay Collins has developed a new subproject with the Northern Agricultural Catchment Council regarding the development of a GIS to underpin the assessment of coastal regolith evolution and the distribution of natural resources such as mineral sands. This 2 year project will bring \$190k of external funds to the CRC.

Discussions with outside agencies

- *Geophysical Signatures of the Regolith*: Graham Heinson and Lachlan Gibbons have been talking to *Heathgate Resources* about collaborating on downhole and cross-hole electrical methods for mapping aquifer and aquitards for uranium exploration.

- *Eucla Margins*: Mark Paine, Luisa Ruperto and other project staff are engaged in ongoing discussions with *Iluka Resources* regarding the direction and scope of the Eucla Margins Heavy Mineral Sands sub-project.
- *NT Regolith Project*: Mike Craig has been talking to *CAMECO* about a new collaborative project.
- *Tanami*: Lisa Worrall and other project staff are engaged in ongoing discussions with *Tanami Gold NL* and *Newmont Australia* regarding past and future activity in the project.
- *Tomingley*: Ian Roach met with *Alkane Exploration Limited* to discuss project results.

Exciting new science

- *Geophysical Signatures of the Regolith*: Graham Heinson was part of a successful ARC LIEF grant bid (with Kennett, ANU and O'Reilly, Macquarie University) to buy new equipment for the ANSIR facility. The new equipment can measure magnetotelluric (MT) fields at high frequency, which theoretically means that it can be used to map regolith properties.
- *Eucla Margins*: Initial dating of detrital zircon and rutile suggests different source rocks for these minerals at key deposits in the Eastern Eucla.
- *Thomson Orogen*: Poorly developed but widespread RCA's (Regolith Carbonate Accumulations) have been sampled by Sarah Gibbons (AU) in the Tibooburra area and shown to be a useful sampling medium for gold exploration
- *Thomson Orogen*: NITON (hand-held XRF) analyses of overbank samples provide instant geochemical data, although the accuracy and precision of the instruments are currently in question following testing at Geoscience Australia.
- *Tanami*: Spinifex has been identified as effective biogeochemical sampling media.
- *Central Gawler Gold*: CHIM survey results over Challenger Gold Mine show anomalous Au, As and Ag with some correspondence to projected gold shoots.

PROGRAM 2– MINERAL EXPLORATION IN AREAS OF COVER:

RAVI ANAND

New Business

- Anglo-American has requested 3 more consultancy reports on various international groundwater geochemistry datasets. These will be conducted by Patrice de Caritat and Bear McPhail during Dec 05 to Feb 06.
- Discussions held with Inco and Tech Cominco. They have agreed to join the AMIRA project 778 - Predictive geochemistry in areas of transported overburden. (Ravi Anand).

- For Yilgarn Laterite Atlas work, additional funding has been allocated by GSWA to carry out helicopter sampling in otherwise inaccessible terrain (Matthias Cornelius).
- Frank Reith, LEME PhD student has submitted his PhD thesis and has been offered a position of CSIRO postdoctoral fellow

Discussion with outside agencies

- Discussions held with Peak gold mine (Cobar) through Bear McPhail with the view to organise a groundwater sampling trip (Bear McPhail and Patrice de Caritat).
- Discussion held with UWA, Centre for exploration technologies to develop collaborative projects (Steve Rogers, David Gray, Ravi Anand). Further discussions took place with Mark Tibbett to involve Hons students in biogeochemical research (hydroponic and glass house experiments).
- Discussion with Judy Eastham (CSIRO Division of Forests and Forestry Products) for her involvement in AMIRA Project 778.
- The organisers of AIG-AMEC conference to be held in Kalgoorlie, 1-3 May 2006 have invited Ravi Anand and David Gray to present papers and run one day field workshop.
- Invitation to Ravi Anand from Inco to give lecture on exploration approaches in regolith-dominated terrains on January 10, 2006.
- Over 300 copies of the two Thematic Volumes sold. Orders are coming from Canada, Brazil, Italy and Germany as well as Australia.
- A joint project is being developed with Placer Exploration to examine the relevance and value of spectral logging to exploration through Lake Carey, near Laverton, WA. (Tim Munday).
- Discussions are underway with CEM and others on the deployment of the CRCLEME Core/chip logger into the Eastern Goldfields, WA. This forms part of the Objective Logging projects strategy to develop case studies concerning the application of spectral logging technologies to exploration through the regolith. Presently we anticipate the logging facility to be in place in the Kalgoorlie area in Late January/early February 2006 (Tim Munday).

Exciting new science

- The publication of the Applied Geochemistry and AusGeo News articles on the Curnamona groundwater geochemistry have been met with a good response, judging from reprint requests, emails, and phone calls. .
- The industry workshop (Patrice, Bear, Dave) and the short course (Patrice, Bear, Dave and Michelle Carey from BHPB) on hydrogeochemistry for mineral exploration, both held in Perth just before the IGES, were very successful. Attendance was excellent and feedback positive.

- Ten oral presentations including a key note paper were made by Program 2 staff at the IGES meeting held in September in Perth. The Best Student presentation as well as first prize and two follow up awards for Posters were received by LEME students and staff.
- Rob Hough and Chris Ryan had four days beamtime at the Advanced Photon Source Synchrotron in Chicago to undertake micro X-ray fluorescence and X-ray absorption spectroscopy mapping of samples from the Moolart Well prospect, primarily to study arsenic, copper, zinc and lead distribution and speciation. They collected full spectral data and applied Chris Ryan's PIXE software to determine the trace element distributions in the areas mapped with great success, even managing to detect a few (very small) gold hotspots that are not visible using conventional techniques like SEM. (Funding provided by the Australian synchrotron research program).
- Soil gas and vegetation investigations commenced at Rose Dam (Mel Lintern and Ravi Anand).
- Sampling of vegetation growing on tailings from gold mine near Lancefield (Ravi Anand and Cajetan Phang).
- Work at key sites in the Cobar area, including detailed dating of profiles, is linking different element dispersion processes with different weathering regimes (Ken McQueen).
- Bear McPhail is investigating the exploration potential of groundwaters in unconfined aquifers adjacent to the Moolart Well Au deposit. There the water has low salinity, is Cl dominated and near neutral with low trace element contents (although the Mo, Ni and I contents may indicate contact with mineralisation).
- To date, a total of 2700 laterite samples have been collected in the SW and NW quadrants of the Yilgarn Craton. Analyses and checks for the SW quadrant (2000 samples) have now been completed and release of the data is scheduled for early 2006 in the format of a CRC LEME open file report (Matthias Cornelius).

PROGRAM 3 – ENVIRONMENTAL APPLICATIONS OF REGOLITH GEOSCIENCE:

STEVE ROGERS

New Business

- Rob Fitzpatrick and Richard Merry (consultant) completed an assessment of ASS risk in the Tilley Swamp and Morella for DWLBC the final report was very well received by the client and has been released as a LEME Open File Report - 195.
- The WA Wheatbelt Acid Drainage group will subcontract to GHD to provide geochemical input to the WA EEI funded Yenyenning Lakes Pilot Drainage Assessment.

- U hydrogeochem: Following the discovery of elevated U in solution in drains and groundwater in the WA wheatbelt, the CRC is negotiating a JV with junior exploration company in Perth, for a more detailed reconnaissance of the area. Grant Douglas from CLW has been bought into LEME as a CLW in-kind contribution due to his extensive experience in U exploration and geochemical modelling. If successful this new project will sit in Program 2

Discussion with outside agencies

- Steve Rogers attended a workshop at the University of Delaware, sponsored by the US National Science Foundation, 'Biogeochemistry of Critical Zone'. This meeting was an attempt to launch a new NSF initiative in 'Regolith' biogeochemistry. A key message was that we in CRC LEME are years ahead of our US counterparts in regolith research.
- Sebastien Lamontagne continues to play an important role as a member of the Loveday basin management committee.
- Rob Fitzpartick has been discussing with State Agencies the issues of ASS metal contamination in the Northern Spencer Gulf SA.

Exciting new science

- The Loveday lagoon team led by Sebastien Lamontagne, are identifying the contribution of organic S compounds in both odour generation and S cycling in Murray floodplain sulfidic sediments
- "Baseline geochemical survey of the Riverina region of New South Wales and Victoria, Australia: Geohealth implications", M.E. Lech and P. de Caritat. To be submitted to Geochemistry: Exploration, Environment, Analysis

PROGRAM 4 – SALINITY MAPPING AND HAZARD ASSESSMENT:

KEN LAWRIE

New Business

- New projects initiated in Ord (\$60k contract); invited to submit second stage proposal by end February; workshops in Perth and Kununurra in early Feb to develop proposal;
- Invited to submit proposal for Stage 3 work in Burdekin- workshop to develop this in February.
- Extension to MDBC contract work in Central-West NSW and in Victoria being negotiated with CMAs, MDBC and DNR.
- Discussions on-going with range of clients to develop new AEM project in Sunraysia.

- Revised project schedule for SA Murray Floodplains being developed.
- Tim Munday asked to develop business case for Eyre Peninsula study.
- Paul Wilkes in discussion with Water Corp. on new project opportunities in WA
- Jim Cox asked to submit a \$100K project to the 2006/2007 Corangamite Catchment Management Authority RCIP. This is part funding of a new project on groundwater- surface water dependent ecosystems on the Victorian Volcanic Plains.
- Richard Cresswell asked to submit a \$400K project to BRS for inclusion of the Angas Bremer Plains in the NAP-funded Community Stream Sampling and Salinity Mapping Program. Principal agencies involved will be CSIRO, DWLBC and BRS together with the local community groups. CRC LEME involvement is yet to be negotiated.

Discussions with outside agencies

- Client feedback (Victorian DPI, CRC PBMDs and Central West NSW) on MDBC uplands products has been extremely positive. Follow-up work is being discussed.
- MDBC very happy with progress on uplands work and in-river conductivity mapping validation. MDBC have requested renegotiation of the specific projects and milestones to be undertaken within MDBC.
- Good feedback on preliminary products for Chowilla Floodplain.
- Salinity Communication:
 - Plans for 2nd ISF progressing at rapid pace, with LEME contributing to the scope of the program and design of the technical program. Venue chosen- Adelaide, timing decided- 1st week of March 2008. First international committee meeting in late Feb.
 - LEME-EEHSG Symposium at AESC 2006: proceeding well; 60+ confirmed speakers.
- Bet Bet Sub project DPI Victoria is currently using project outputs to underpin their various research programs within the catchment.(2). Strong interest from local landowners, especially in the Lexton area where there has been valuable participation by farmers.(3). Positive response from Craig Beverly at DPI Victoria (Rutherglen) with early results of 2C-based modelling looking favourable.
- Article written on geophysics in Rural Towns project for December 05 issue of Focus on Salt
- Tim Munday and Andrew Fitzpatrick presented draft findings to staff from SA Water and DWLBC on a forward modelling study of AEM data with a view to determining their potential in delimiting significant aquifer parameters in the southern Eyre Peninsula in South Australia.
- In collaboration with the MDBC and the Goulburn-Murray Water, Tim Munday has convened a workshop to determine whether a business case could be made for the acquisition of airborne geophysics in the Sunraysia region of Victoria/NSW. CRC LEME has been asked to support SA Water in developing a business case for an AEM survey in the Southern Eyre peninsula. This is being progressed.

Exciting New Science

- Draft reports delivered to MDBC have demonstrated a new methodology for predicting regolith thickness and distribution in upland landscapes. The new products have the potential to value-add to existing GFS constructs, and are important new data layers in hydrogeological models for salinity prediction. They are essentially new regolith hydrogeomorphic unit maps.
- A new method for extrapolating regolith thickness data and properties has also been developed in NSW. These new products have been well received from peers and clients.
- The following journal paper has been accepted for publication subject to changes: Poulsen, D.L., Simmons, C.T., La Salle, C.L.G. and Cox J.W. 2006. Sources and Spatiotemporal Patterns of Stream Salt Loads in the eastern Mt. Lofty Ranges, South Australia. *Journal of Hydrogeology*.
- Lr Burdekin reinterpretation of cross sections by Arunakumaren (2000) has identified a number of possible Pleistocene marine incursions in the deeper part of the succession. This raises the possibility of major compartmentalisation of the deeper part of the aquifers across the lower Burdekin region

PROGRAM 5 – EDUCATION AND TRAINING:

STEVE HILL

New Business

- Completion of 2005 Honours students at ANU, AU and CUT
- Three successful externally-funded (APA and university scholarships) PhD applicants at The University of Adelaide to conduct research on regolith-related topics. Final scholarship acceptance is due in December. This shows a strong future for regolith-related PhD enrolments building beyond the initial investment of the CRC LEME scholarship program.
- Honours student applications for 2006 received at ANU, AU and CUT. This includes applications for CRC LEME Honours scholarships at ANU.
- Summer-scholarship applications received for ANU.
- Undergraduate regolith courses completed at ANU, AU and CUT.
- Successful completion of the two Regolith Symposia held in Canberra and Adelaide, November 2005. This included very successful presentations and involvement from CRC LEME Honours and PhD students, and some LEME staff. Ian Roach did an excellent job in co-ordinating this with the assistance of local symposium convenors Ken McQueen (Canberra) and John Keeling (Adelaide).

Discussions with outside agencies

- Informal discussions with Kevin Tuckwell (MCA) regarding MTEC course planning and student involvement for 2006.

Exciting New Science

- Student project work is integrated within research programs and is reported there.

Future Planning

- Finalise 2005 Honours grades in December
- Acceptance of externally-funded PhD scholarships at the University of Adelaide in December
- Finalise ANU summer-scholarships and students commence in December
- Undergraduate course reviews at AU on December 5
- Finalisation of 2005 Regolith Symposia abstract volume in December-January
- 2006 Honours students to commence in February
- 2006 MTEC course program commences in February

ASSISTANT DIRECTOR CANBERRA:

KEN MCQUEEN

- The major activity at the Canberra-Sydney node in November was the LEME 2005 Canberra Symposium. There were 95 registrants including 3 from industry and 7 from other organisations. Most LEMERS in Canberra-Sydney were involved in the Symposium, which ran for 3 days and included a visit to the Palaeomagnetic Laboratory and demonstration of the HP IPAQ regolith mapping platform.
- There were two group meetings (LEME Connections) for the node on 17th November and 1st of December. Short presentations were made by PhD students Al Usher and Kat Fitzsimmons.
- The local Writers Co-op had meetings on the 17th November and 1st December, following the LEME Connections. The group now has more than 17 papers in preparation and 4 submitted and in review/accepted. Frank Reith was awarded the first of the student publication incentive payments for acceptance in an international refereed journal at the Canberra LEME Symposium.
- Gerry Govett (LEME Visitor) visited GA and ANU on 17th November for discussions with staff and students. He also attended the LEME Connection.
- Steve Rogers (CEO) visited the node on 22nd November.

- Three LEME Honours Students successfully completed at ANU: Fern Beavis, Jennifer de Livera and Michael Niemanis. All achieved First Class Honours.
- Frank Reith completed and submitted his PhD.