

Cooperative Research Centre for
Landscape Environments and Mineral Exploration

Regolith 2005

Ten Years of CRC LEME

Editor: Ian C. Roach

Proceedings of the CRC LEME Regional Regolith Symposia, November 2005
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All papers in this volume are available for purchase in full-colour PDF format as a CD-ROM, or for individual free download in full-colour PDF format, from the CRC LEME website: <http://crcleme.org.au/>.

Front cover:

Granite pillars and boulders known as 'Murphy's Haystacks', southeast of Streaky Bay, Gawler Craton, SA. These have formed from the weathering and subsequent erosion of the Hiltaba Granite and display excellent examples of flared sidewalls.

Photograph © Steven M. Hill, 2005

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INTRODUCTION – TEN YEARS OF CRC LEME

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This volume contains papers that were delivered at symposia in Canberra (2-4 November 2005) and Adelaide (9-10 November 2005) celebrating the 10-year anniversary of CRC LEME. The papers are edited and peer-reviewed and provide a snapshot of the CRC's activities over the 2005 calendar year.

CRC LEME-A BRIEF HISTORY

As a Cooperative Research Centre, CRC LEME has had two different names and two different incarnations since its inception in 1995, however, the acronym has remained the same.

The Cooperative Research Centre for Landscape Evolution and Mineral Exploration (CRC LEME-1) was established in 1995 and had four core parties:

- The Australian National University;
- The University of Canberra;
- The Australian Geological Survey Organisation (later renamed to Geoscience Australia); and,
- CSIRO Division of Exploration and Mining.

CRC LEME-1 established four research Programs and an Education Program:

- Program 1 – Shields;
- Program 2 – Tasman Fold Belt;
- Program 3 – Basins;
- Program 4 – Synthesis; and,
- Education (across all four research Programs).

Research was solely directed towards mineral exploration; CRC LEME-1 sought to advance knowledge on landscape evolution and identify the resulting implications for the minerals industry. It also sought to develop new exploration models and to devise new and improved geochemical exploration methods (CRC LEME 1996). In short, it was to help find new world-class orebodies within and beneath the regolith. Just some of the outcomes of CRC LEME-1 included: an enhanced understanding of how rock and mineral weathering affect the regolith; using calcrete to detect gold and base metal mineralization; regolith dating; understanding Australian landscape evolution; understanding metal dispersion in the regolith; using geophysics and remote sensing to image regolith in 2 and 3 (and even 4) dimensions; and, towards the end, adding regolith knowledge to understanding dryland salinity. CRC LEME-1 also established a vigorous Education Program across all four research Programs whereby undergraduate, honours and postgraduate students were trained in regolith geology to become the new cohort of researchers, mineral explorers and public servants.

In the later years of CRC LEME-1 it was recognized that there was a host of science that it was not covering under its original charter, but that it had later grown towards, which included regolith knowledge for natural resource management and understanding of dryland salinity hazards. The Cooperative Research Centre for Landscape Environments and Mineral Exploration (CRC LEME-2) grew out of CRC LEME-1 after its six years of success, and was enlarged to include ten core parties, being:

- The Australian National University (ANU);
- The Curtin University of Technology (CUT);
- The University of Adelaide (UA);
- The University of Canberra (UC) (now withdrawn);
- CSIRO Divisions of Exploration and Mining (CSIRO DEM) and Land & Water (CSIRO L&W);
- AGSO - Geoscience Australia (now Geoscience Australia);
- Bureau of Rural Sciences (BRS) (now withdrawn);
- Primary Industries and Resources South Australia (PIRSA);
- The New South Wales Department of Mineral Resources (NSW DMR, later Department of Primary Industry); and,
- The Minerals Council of Australia (MCA).

The research focus of CRC LEME-2, as the name suggests, is now twofold: mineral exploration; and, environmental management, managed across five programs, being:

- Program 1 - Regolith Geoscience;
- Program 2 - Mineral Exploration in Areas of Cover;
- Program 3 - Environmental Applications of Regolith Geoscience;
- Program 4 - Salinity Mapping and Assessment;
- Program 5 - Education and Training.

Programs 1 & 2 cover the mineral exploration side, and Programs 3 & 4 the resources and salinity side of the science. Again, Program 5 Education and Training provides regolith education cross all four Programs. It also has a particular focus on training new and better graduates for the Australian and international minerals industry through CRC LEME-2's support of the MCA's MTEC Shortcourse Program (summarised in Roach 2003). At the time of writing, heading towards the fifth year of CRC LEME-2, the CRC has fostered a vigorous research effort into understanding the regolith. Just some of the advances of CRC LEME-2 include increasing understanding of: the geology and geophysics of buried orebodies; the palaeoclimatic history of Australia, including the history of aridity; regolith dating techniques into the Cainozoic and Mesozoic; the hydrogeochemistry of groundwaters interacting with buried ore deposits; the 3-dimensional structure of saline lands; the interaction between the biosphere and the lithosphere at the regolith interface; and, the imaging of regolith using advanced multispectral, hyperspectral, ground and airborne geophysical techniques.

THE CRC LEME REGIONAL REGOLITH SYMPOSIA

The 2005 Regional Regolith Symposia follow the 2004 CRC LEME Regional Regolith Symposia, *Regolith 2004* (Roach 2004), the 2003 CRC LEME Regional Regolith Symposia, *Advances in Regolith* (Roach 2003), the first CRC LEME Regional Regolith Conference, *Regolith and Landscapes in Eastern Australia* (Roach 2002), earlier national conferences including *Regolith '98* (Kalgoorlie; Britt & Bettenay 1998), *Regolith '96* (Brisbane; Eggleton 1998), *Regolith '94* (Broken Hill; Pain *et al.* 1994) and the first ever *Australian Regolith Conference* in 1988 (held in Canberra). Themes for the 2005 symposia included the strategic themes of CRC LEME, which include:

- Improve our understanding of regolith processes and landscape evolution;
- Make exploration geochemistry work through cover;
- Develop techniques to interpret regolith architecture;
- Use regolith knowledge to enhance prospectivity in geological regions; and,
- Develop methods to map and predict salinity with outcomes linked to mitigation and remediation.

The CRC LEME Regional Regolith Symposia provide regolith researchers with a snapshot of how CRC LEME is performing on a yearly basis. The abstract volume is also an important internal and external communication tool and an essential educational tool. Many of the papers published in these volumes form the basis of on-going regolith Education and Training activities at the three CRC LEME core party universities: The Australian National University; The Curtin University of Technology; and, The University of Adelaide.

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