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INTRODUCTION

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The regolith is not now the uncharted territory that it once was. We are beginning to understand some details of how the regolith 'works' yet, like a vast desert, there are still many parts that are unknown. Using this analogy, there are many paths through regolith research that are well travelled, like the tracks winding through the desert. However, regolith researchers are now trying to move between the different tracks and explore new territory, yielding synergies that were previously unknown and making new discoveries by bringing the many different disciplines involved in regolith research together. Regolith research is now about much more than just mineral exploration. It also includes tools like geomorphology, geophysics, geochemistry, hydrogeochemistry, hydrogeology, microbiology, pedology, mineralogy, electron microscopy, remote sensing and geographic information systems (GIS). These tools are helping to revolutionise new research into numerous fields that are directly or indirectly related to regolith—dryland salinity, geohazards, agriculture, geohealth, economic geology, mineral exploration and understanding complex ecosystems using a holistic approach. Regolith research is valued nationally; The University of Canberra and the Australian National University were recognised as leaders in regolith education by the Minerals Council of Australia's Minerals Tertiary Education Council (MTEC). MTEC invited these two institutions, as part of the Cooperative Research Centre for Landscape Environments and Mineral Exploration (CRC LEME), to join the National Geoscience Teaching Network (NGTN). The NGTN is a consortium of 8 Australian universities that promote the earth sciences and share Honours- and postgraduate-level shortcourses between each other.

The papers contained within this volume catalogue some of the research being done in Eastern Australia on regolith and landscapes throughout Australia. The majority of the work here is written by young scientists who are about to begin, or already have begun, their careers as regolith professionals. Many of these young researchers are Honours or postgraduate students within CRC LEME at the Australian National University and the University of Canberra. Others are professionals belonging to a range of Commonwealth and state research agencies and universities including CSIRO Land and Water, Geoscience Australia, Macquarie University, the NSW Department of Land and Water Conservation and the Victorian Department of Natural Resources and Environment.

This volume contains the proceedings of the first CRC LEME short regolith conference *Regolith and Landscapes in Eastern Australia*, held at the University of Canberra over the 21st and 22nd of November, 2002. The conference was designed to encourage young regolith scientists to present their research to their peers from Eastern Australia, and to celebrate the achievements of two of Australia's foremost regolith professionals, Professor Richard A. (Tony) Eggleton and Associate Professor Graham Taylor. Tony and Graham were individually or together ultimately responsible for the publication of *The Regolith Glossary* (Eggleton 2001) and *Regolith Geology and Geomorphology* (Taylor & Eggleton 2001), the first of (hopefully) many regolith textbooks in the future. Copies of the two books were awarded to the best student presentations.

REFERENCES

- EGGLETON R.A. ed. 2001. *The Regolith Glossary*. CRC LEME, Perth. ISBN 0-7315-3343-7, 144 p.
TAYLOR G. & EGGLETON R.A. 2001. *Regolith Geology and Geomorphology*. John Wiley & Sons Ltd, Chichester. ISBN 0-471-97454-4, 375 p.

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