REGOLITH AND LANDFORMS OF THE GIRILAMBONE BELT, NEW SOUTH WALES.

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INTRODUCTION

The Cobar-Girilambone project is a joint effort between CRC LEME and NSW DMR. The aims of the project are to help gain information on the geology of the Girilambone belt and to construct a 3D regolith framework for the area. The general study area is located between Cobar in the west, Nyngan to the east, Nymagee to the south and Bourke to the north (Figure 1). The project initially started as a pilot study over the Sussex/Coolabah area (Chan *et al*. 2001), and was extended to cover the Hermidale area (Chan *et al*. 2002) to the south and the Byrock/Glenariff area to the north. The 3D regolith framework includes a multi disciplinary approach encompassing regolith-landform mapping, three aircore drilling programs and integrated soils, geomorphic, geochemical and mineralogical studies.

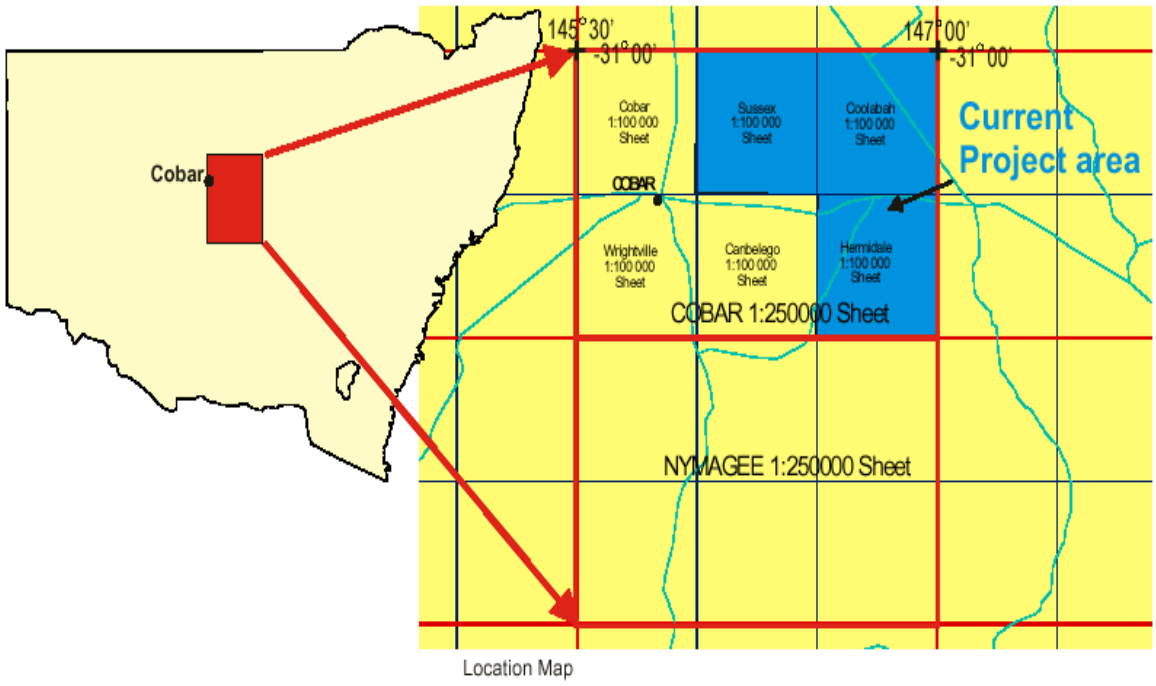

Figure 1: Location map of the current project area (Hermidale 1:100,000) and the previous project area (Sussex/Coolabah 1:100,000).

DISTRIBUTION OF REGOLITH-LANDFORMS

There is significant regolith over 90% of the total study area. It is for this reason that the Girilambone belt, east of Cobar, has not been adequately explored previously. A large number of alluvial systems occur in the study area and are associated with the north draining Mulga Creek (Byrock and Sussex area) and the north-east draining Pangee and Whitbarrow Creeks (Hermidale area). Regolith units mapped are alluvial channels (ACar), alluvial plains (Aap), stagnant alluvial plains (Aas), alluvial depositional plains (Apd) and alluvial drainage depressions (Aed). The alluvial units within the study areas generally contain between 5 and 40 m of transported sediment and consist of sediments which include brown clays, grey clays, fine to coarse sand, rounded to sub-angular magnetic and non-magnetic gravels or a mixture of all of these.

The alluvial sediments are derived from various sources, which is particularly well highlighted in the radiometrics imagery for the Hermidale area (Figure 2). The image shows two main sources for the sediment, with older sediment derived from a granite intrusion to the south, and modern channel sediments coming from the east.

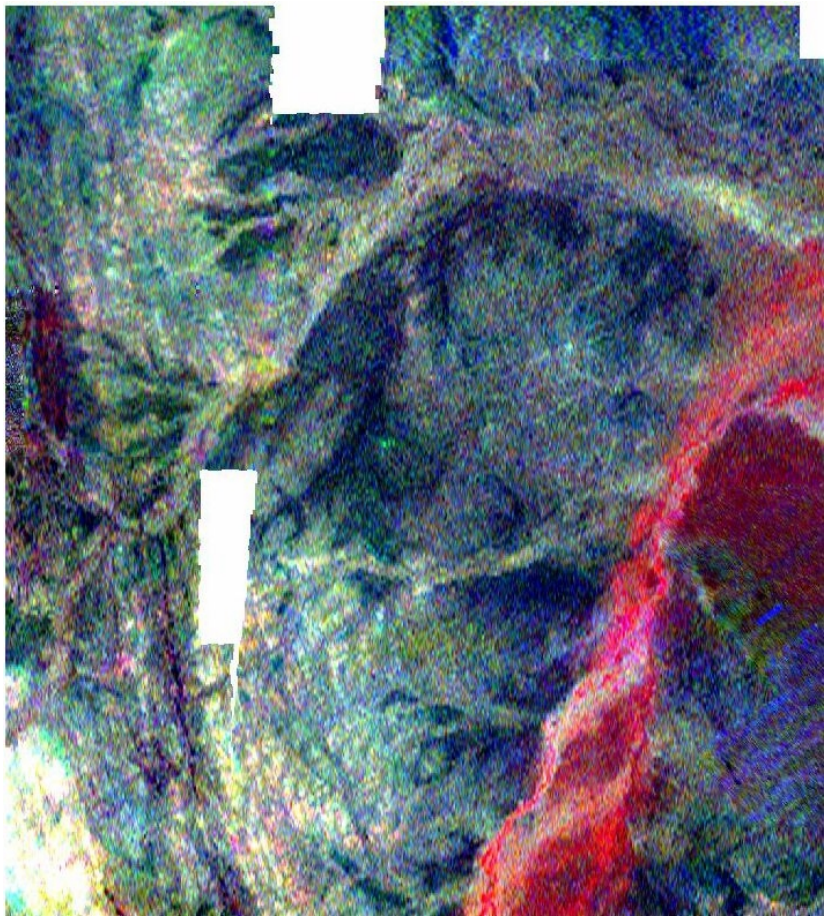

Figure 2: Airborne radiometrics image of the Hermidale 1:100,000 map sheet showing different sediment source areas, with older sediment derived from a granite intrusion to the south and modern channel sediments coming from the east.

Large areas of low relief colluvial sheet-wash slopes occur throughout the study areas. These sheet-wash slopes include depositional plains, erosional plains and erosional rises and consist of angular to sub-rounded quartz and lithic sediment, and sand to granule sized magnetic sediments. The colluvial sheet-wash units vary according to relief, and the size and roundness of sediment materials. The unit with the lowest relief is sheetwash sediments on a depositional plain (CHpd) which has a relief of < 1 m. Sheetwash sediments on erosional plains (CHep) have a relief of 1-9 m, and sheetwash sediments on a erosional rise (CHer) a relief of 9-30 m. Generally as the relief increases, sediment size increases and sediment roundness decreases.

Differences between erosional and depositional landforms within the study areas are based on a change in relief and the depth of transported sediment. Generally depths of transported sediment in erosional areas are between 1 and 3 m, compared to a depth of up to 42 m in depositional areas (Table 1). The variation of relief particularly in the Hermidale area is between < 1 m and 90 m.

Areas of exposed *in situ* regolith are minimal in distribution, occurring in higher relief areas in the Hermidale, Sussex and Byrock areas.

3D REGOLITH

3-Dimensional regolith interpretation of these areas has primarily been based on data from two drilling programs and the interpretation of magnetics imagery. To date 189 holes have been drilled in the Sussex/Coolabah and Hermidale areas (Figure 3). Samples from these holes have aided the identification and characterisation of the various regolith materials and in particular highlighted the distribution of magnetic palaeovalley sediments in the Sussex/Coolabah and Hermidale areas.

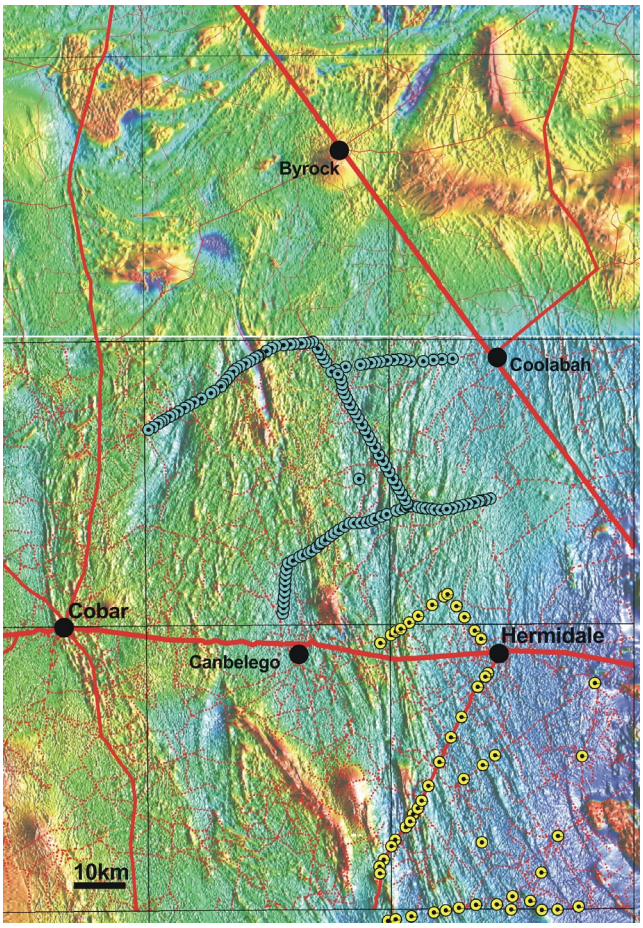

Figure 3: Diagram showing the locations of the 189 holes drilled to date in the Girilambone Belt. The drilling has occurred in two main areas, Sussex/Coolabah and Hermidale. Background image: total magnetic intensity (TMI) image.

Figure 4: 1.5 vertical derivative image of the airborne magnetic data highlighting the extensive network of magnetic palaeovalley sediments.

The 1.5 vertical derivative (VD) image of the airborne magnetic data (Figure 4) displays an extensive network of magnetic palaeovalley sediments that, broadly relates to present day valley sediments but differs in detail (Chan *et al.* 2001). Magnetic palaeovalley sediments occur under present alluvial plains and depositional plains, and may be topographically inverted under sheet-wash plains and rises. Drilling indicates that magnetic sediments (mainly maghemite) may be found to depths of greater than 14 m, particularly in the Sussex/Coolabah area.

The extent of the palaeovalley sediments is greater than that shown by the magnetics imagery, with non-magnetic palaeo-sediments covering large parts of the study areas. Chan *et al.* (2001) found broad areas of preserved palaeosediments, up to 7 km wide and 40 m thick, which in places bury palaeohighs and overtop palaeovalley interfluves. Drilling results show that the palaeotopography has greater relief than at present, with modern processes disguising the underlying palaeosediments. Wind-blown dust has been accreted into the upper 3 m of both transported and *in situ* regolith profiles across all regolith landforms.

REFERENCES

CHAN R.A., GREENE R.S.B, DE SOUZA KOVACS N., MALY B.E.R., MCQUEEN K.G. & SCOTT K.M. 2001. *Regolith, Geomorphology, Geochemistry and Mineralisation of the Sussex-Coolabah area in the Cobar-Girilambone Region, North-Western Lachlan Foldbelt, NSW*. CRC LEME **Report 166**.

CHAN R.A., GREENE R.S.B, HICKS M., MALY B.E.R., MCQUEEN K.G. & SCOTT K.M. 2002. Regolith Architecture and Geochemistry of the Hermidale area of the Girilambone region, North-Western Lachlan Foldbelt, NSW. CRC LEME **Report 179**.