TOMINGLEY PROJECT, CENTRAL WESTERN NSW, 2: REGOLITH-LANDFORMS OF THE TOMINGLEY AREA

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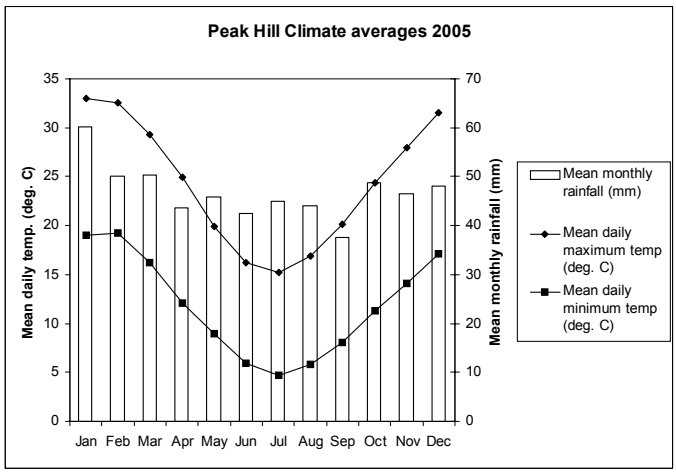
INTRODUCTION

The Tomingley regolith-landforms map (Roach 2006a) covers 214.2 km^2 and contains nearly 1,200 individual polygons depicting regolith materials derived from 7 principal bedrock types. This paper describes the climate, landuse and dominant vegetation types within the mapping area and includes a précis of the map legend of the 52 separate regolith-landform units (RLUs). This is a greater number of RLUs than would normally appear on a map of this area. However, this was deemed necessary to add greater functionality to the map for mineral exploration purposes, i.e., to catalogue the sources and surface distribution of regolith materials. This will better enable mineral explorers to separate anomalous metal values from the background values of the 7 bedrock types and to better define exploration strategies within the local area. A derivative map of the distribution of the 7 different *in situ* bedrock types and their associated transported materials is included in this paper (Figure 3). The methods and strategies used to create the map, which forms part of the Tomingley gold biogeochemistry project described in Roach (2004) and Roach & Walker (2005), are described in this volume (Roach 2006b).

CLIMATE

The Tomingley area has a similar climate to Peak Hill (BOM 2005, Figures 1 and 2), ca. 18 km SSW, which has the closest weather station and commenced recording in 1890. Tomingley lies in Australia's temperate zone and experiences cool winters and warm summers with lowest and highest recorded temperatures ranging from -6°C in September to +45°C in February. Average yearly rainfall is 562 mm, which is distributed more-or-less evenly throughout the year, often as thunderstorms in the warmer months. However, the mean annual potential evaporation rate is between 1600 and 1800 mm. Northerly, southerly and southwesterly winds dominate, with the remainder being light to moderate from the rest of the wind rose.



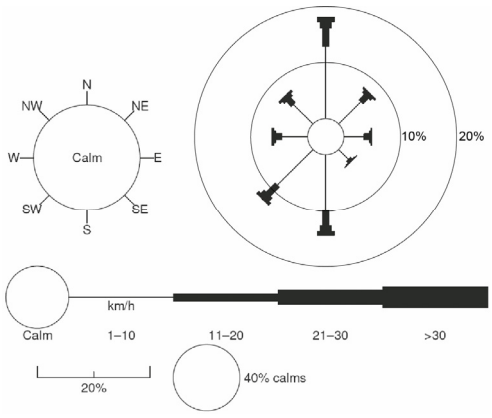


Figure 1 (left) and 2 (right): Average temperature, rainfall and wind speed and direction for Peak Hill (BOM 2005).

LANDUSE AND DOMINANT VEGETATION

The plains and rises of the Tomingley region are extensively cleared and are used principally for cereal and canola cropping, except for the extensive areas characterised by gilgai microrelief. Where gilgais are poorly developed the land is under cultivation, however, the well developed gilgai plains are left largely uncleared for sheep, cattle and horse grazing. Areas of bedrock exposure or colluvial footslopes may be cropped or grazed where relief is low, or left uncleared where relief is too great for the safe use of farm machinery. Remnant native vegetation tends to be confined to windrows along fences, tree lines along roads, scattered shade trees within paddocks or in areas of higher relief that are too steep to be cultivated.

Vegetation is dominated by eucalypts including wide-spread grey box (*Eucalyptus microcarpa*), which occurs over most of the area and cohabitates with bimble box (*E. populnea*) in the sandy plains in the north,

red ironbark (*E. sideroxylon*) in the saprolith ridges to the east, river red gum (*E. camaldulensis*) along major drainage lines, a mallee (most likely the green mallee *E. viridis*; Costermans 1981) occurring on saprolith rises in the southwest and yellow box (*E. melliodora*) occurring sporadically. Other dominant tree species include the widespread white cypress pine (*Callitris glaucophylla*; Moore 2005) and buloke (*Casuarina luehmannii*; Costermans 1981). The drooping she-oak (*Casuarina stricta*; Costermans 1981) is confined to gilgai plains. Other less common trees include the weeping pittosporum (*Pittosporum philliraeoides*; Moore 2005), which occurs principally on alluvial plains. Shrubs and bushes most commonly noted include rosewood (cattle bush, *Alectryon oleifolius*; Moore 2005), wilga (*Geijera parviflora*), budda (*Eremophilla mitchellii*), various wattles (*Acacia sp.*), wedge-leafed hopbush (*Dodonea cuneata*), punty bush (desert cassia, *Senna artemisioides ssp. Zygophylla*; Moore 2005) and rare warrior bush (*Apophyllum anomalum*). There are numerous grasses and forbs plus exotic weed species including the common saffron thistle (*Carthamus lantanus*; Brooke & McGarva 1998) on disturbed ground and the noogoora burr (*Xanthium occidentale*; Brooke & McGarva 1998) occurring in swampy areas near roads in the northwest. Undisturbed soils also host widespread cryptogam communities.

TOMINGLEY REGOLITH-LANDFORM MAP PRÉCIS

Transported Regolith

Alluvial sediments

Alluvial sediments dominate RLUs in the Tomingley regolith-landforms 1:25,000 map (Roach 2006a), comprising ca. 86.3% of the area. Alluvium is present in a range of RLUs that are superimposed over large prograding fans that have their apices in narrow, deeply-incised or wide flat valleys in the Herveys Range in the southeast and the Sappa Bulga Range in the northeast. Alluvial RLUs include alluvial channels, alluvial swamps, alluvial depressions, alluvial plains, alluvial depositional plains, gilgai plains and smaller alluvial fans at the bases of the two ranges. Smaller alluvial fans may also be interpreted within the large fan systems in the extensive alluvial plains in the map area, but these are difficult to recognise because of extensive modification by agricultural practices. Instead, most of these are referred to as alluvial plains and alluvial deposition plains on the map sheet. Alluvium is interpreted to be sourced from all 7 different bedrock lithologies described in Roach (2006b) as subangular to subrounded, occasionally rounded to well rounded, quartzose and weathered lithic silts, sands and gravels up to cobble size (cobbles only occurring in alluvial channels). All of the alluvial units also contain small amounts of maghemite and large amounts of red-brown fine sand and silt, interpreted to represent wind-blown dust. Additional information on regolith materials, landforms and vegetation of individual alluvial RLUs is available on the Tomingley regolith-landforms 1:25,000 map (Roach 2006a).

Colluvial sediments

Colluvial sediments comprise ca. 10.9% of the area of the Tomingley regolith-landforms 1:25,000 map. Colluvium occurs on all saprolith plains, rises and low hills in the area and contains fragments from all bedrock lithologies present in the map sheet. It is present as sheetwash on discrete low-relief landforms and in depositional plains at the bases of higher-relief landforms, in colluvial slopes on the side of high relief landforms and in erosional plains at the tops of high-relief landforms where there is little discernable outcrop. Colluvium consists of most local bedrock lithologies depicted in the map sheet, except for Goonumbla Volcanics and Hervey Group rocks (described in Roach 2006b), as slightly to moderately weathered and slightly ferruginised angular to subangular sands and gravels to pebble size. Colluvium also contains minor maghemite and a proportion of red-brown fine sand and silt, interpreted to represent wind-blown dust. Additional information on regolith materials, landforms and vegetation of individual alluvial RLUs is available on the Tomingley regolith-landforms 1:25,000 map (Roach 2006a).

Fill

Fill comprises only ca. 0.9% of the area covered by the Tomingley regolith-landforms 1:25,000 map. Fill is principally composed of bulldozed or graded regolith in and surrounding farm dams which may be situated on saprolith plains, rises and low hills, or within drainage depressions in the extensive alluvial plains that dominate the map area. Fill also includes mullock dumps composed of unweathered bedrock and saprolith of Goonumbla Volcanics at the Myalls United mine site. These have been spread laterally from the mine site and alluvium from these dumps is also visible on radiometric imagery as a dispersion plume extending up to 500 m to the southwest of the mine site. Farm dams are useful for determining regolith stratigraphy in the otherwise relatively featureless alluvial plains. Dam excavations in the northwest of the map sheet reveal that quartzose and weathered granite lithic alluvial cover derived from the large Yeoval Batholith alluvial fan is relatively thin, perhaps < 1 m in some places. This overlies red-coloured fine-grained sediments possibly

derived from weathered Hervey Group and Dulladerry Volcanics (described in Roach 2006b).

***In situ* regolith**

Saprolite and saprock

Saprolite and saprock comprise ca. 1.9% of the area of the Tomingley regolith-landforms 1:25,000 sheet. Saprolite (moderately weathered bedrock) and saprock (slightly weathered bedrock) consist of most of the bedrock lithologies that outcrop within the mapping area, except for Dulladerry Volcanics and Hervey Group rocks (described in Roach 2006b) that outcrop to the west of the map sheet. Saprolite and saprock are present in plains and rises in the southwest of the map area and in plains, rises and low hills, forming prominent ridges or tor fields, in the east of the map area. Saprolite and saprock may be slightly ferruginised and have mixed outcrop and angular to subangular colluvium with minor maghemite and a proportion of red-brown fine sand and silt, interpreted as wind-blown dust.

Additional information on regolith materials, landforms and vegetation of individual alluvial RLUs is available on the Tomingley regolith-landforms 1:25,000 map (Roach 2006a).

CONCLUSION

The Tomingley regolith-landforms 1:25,000 sheet is dominated by alluvial sediments in large systems that follow the dominant westerly to northwesterly drainage in the Bogan River Basin. The dynamics of the landscape around Tomingley are expressed somewhat in the derivative map of the Tomingley regolith-landforms 1:25,000 sheet (Figure 3), however, the subtleties are difficult to express on the map face because of the scale of mapping, especially where large fan systems have been broken down into smaller components, and in areas of agricultural interference. The area is dominated by large overlapping alluvial fan systems composed of sediments from a number of the bedrock lithologies. These alluvial systems carry bedrock geochemical signatures far out onto the plains. The recognition of these signatures in two and three dimensions, as discussed in Roach (2006b), is crucial for the development of mineral exploration models to more successfully explore for Au and Cu-Au deposits in the Macquarie Arc and its overlying transported cover.

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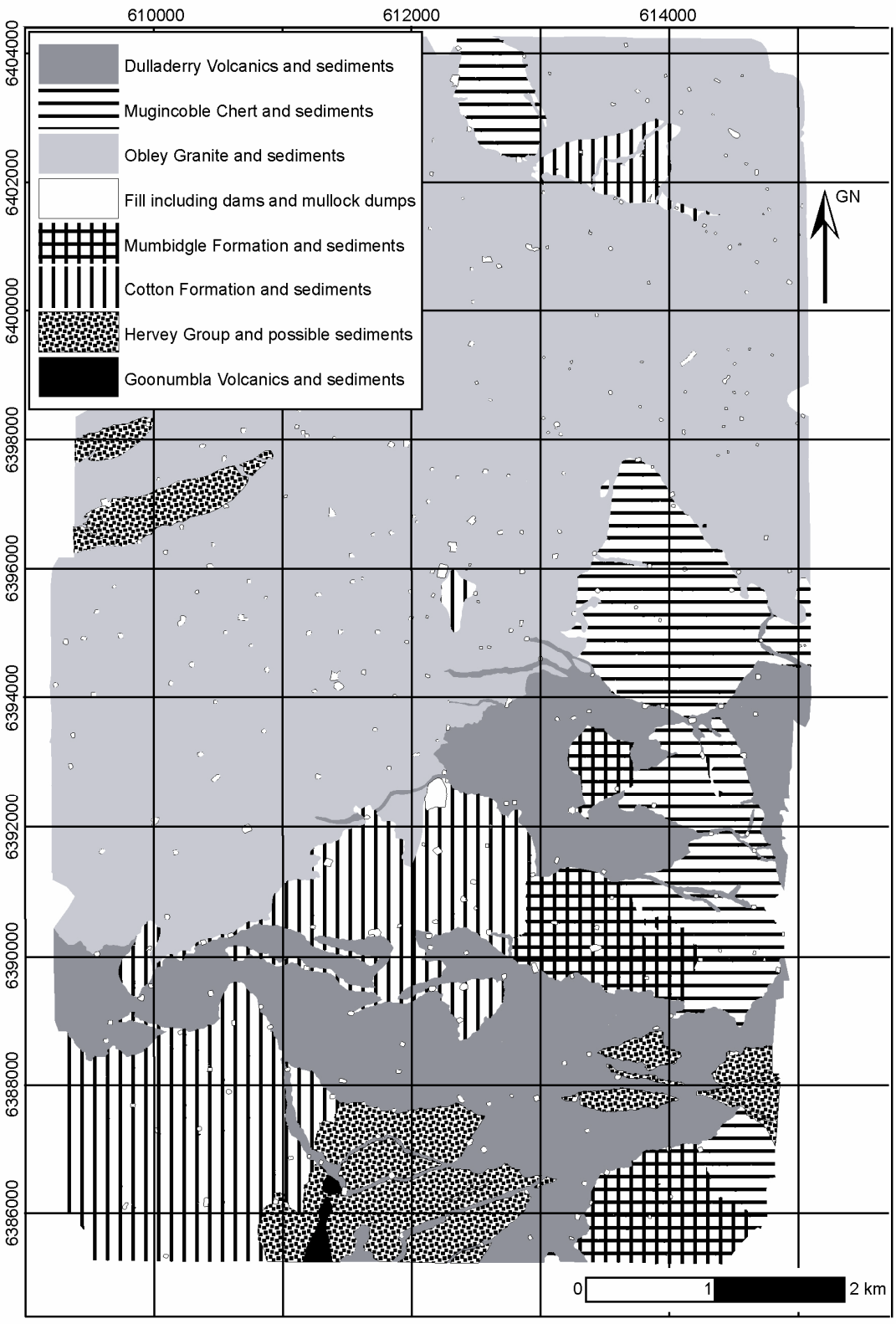

Figure 3: Derivative map of the Tomingley regolith-landforms map depicting all polygons with regolith derived from the 7 major bedrock units within the mapping area, plus fill.