LANDFORM EVOLUTION IN THE ARMIDALE-URALLA REGION

NEW SOUTH WALES

Mark Damien Connolly
(University of New England)

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ABSTRACT

This thesis aims to explain the geomorphic history of the Armidale-Uralla region in New South Wales. A subsidiary aim is to assess the validity of six theories and concepts of landscape development; and to set the geomorphic history of the Armidale-Uralla region into the east Australian context. Detailed field mapping showed that the Tertiary basalts in the study area are mainly valley-fill basalts, now relief-inverted. Their minimum age range is 33-22 my, and they may have been extruded from regional vents in the Glen Innes area, 60-80 km to the north. Ferricrete occurs as both subsurface horizons and as surface lag deposits, and is usually associated with basaltic soil. It is often vesicular and nodular, with quartz sand. It is post-basaltic, and has formed by the mobilisation and concentration of iron minerals in basaltic soil profiles. There is no single 'ferricrete surface' in the region. The three main silcrete types are: silicified sorted clasts; silicified poorly sorted clasts; and silica-cemented brecciated chert. Silicified clasts appear to be mainly the result of post-basaltic silicification of pre-basalt stream sediments, many of which were probably covered by basalt flows before silicification. There is no evidence of a direct genetic relationship between the basalt flows and silicification of the sediments. Thin section examination of quartz grains in ferricrete and silcrete suggests grains are derived from both granitic and vein sources. Silica-cemented brecciated chert has developed by silicification of fractured chert bedrock.

The geomorphic history of the Armidale-Uralla region as we know it today began in the mid-Permian, with the deformation and welding of the marine New England region onto the Australian craton. This was followed by intrusion of the New England Batholith, including the Mount Duval diapir, and prolonged erosion and sedimentation. Palaeomagnetic dating of highly weathered ferricrete indicates possible Jurassic volcanism. The early development of the eastern highlands and Main Divide may be linked to the opening of the Tasman Sea 80-60 my ago, and subsequent accelerated erosion near the new continental edge. Tertiary basalt extrusions resulted in drainage modification as shown by deep leads. Ferricrete and silcrete developed during and after the extrusions.

Landscape evolution in the Armidale-Uralla region after the intrusion of the New England Batholith 250 my ago, probably involved an extended phase of erosion, and possible Jurassic volcanism, followed by development of the Main Divide by the late Mesozoic - early Tertiary. A series of valley-fill lava flows between 33 and 22 my resulted in drainage modification and minor shifts in the position of the Main Divide. Ferricrete and silcrete are thought to have formed in this post-basaltic landscape during Miocene times. Subsequent erosion has resulted in widespread relief inversion of basalt, and has exposed silcrete, ferricrete, Eocene sediments and basement rocks throughout the Armidale-Uralla region.

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