



River profiles and the role of fluvial processes in driving landscape evolution in eastern Australia

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The eastern Australian high elevation passive margin was formed by continental rifting and breakup in the late Mesozoic, leading to the opening of the adjacent Tasman and Coral Seas. The margin is over 3,000 km long and it is characterised by an escarpment, a more or less steep fall from a high elevation, low relief upland plateau surface to a low elevation, usually low relief coastal plain. Unlike in all the other high elevation passive margins, in eastern Australia the top of the escarpment coincides with the continental drainage divide only for short distances; more commonly the drainage divide lies inland of the escarpment. In these cases, rivers draining eastward to the Tasman Sea have generally low-gradient upper and low reaches, on the plateau top and coastal plain, respectively. Where rivers fall across the escarpment in this way, the escarpment is commonly embayed by narrow gorges propagating into the plateau as large scale knickpoints that have been related to the drop in base level caused by rifting and continental breakup. A 90 metres resolution DEM of the Macleay, Hastings and Manning River catchments in the New England Tableland region, northern New South Wales, has been used to extract river longitudinal profiles and major knickpoints are identified using Distance-Slope (DS) plots. A positive, linear relationship between log of distance of knickpoint retreat and log of catchment area is found for all the tributaries of the three rivers, confirming that fluvial processes are an important factor in determining escarpment morphology and driving landscape evolution at this high elevation passive margin.