

Tertiary and Plio-Pleistocene Geomorphology and Neotectonics of the Nilpena Area, Western Flinders Ranges

Stephen Pledge (B.Sc.)

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Department of Geology and Geophysics
University of Adelaide

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Abstract

The Nilpena Hills are a small group of low hills extending south from the Ediacara Hills. They are detached from the main Flinders Ranges by an expansive floodplain about twenty kilometres wide. They consist of uplifted and tilted Precambrian sediments of the Wilpena Group, in particular Pound Subgroup rocks that largely consist of quartzites and sandstones. Surfaces have been interpreted as remnant land surfaces that have been rotated due to the tilting of the Nilpena Hills. These surfaces consist of silcrete skinned cobbles and ironstone stained cobbles, as well as more recent calcrete and gypsum layers. Also in the area are lacustrine sediments. The lacustrine sediments consist of a basal limestone layer, the Nilpena Limestone, and subsequent gypsiferous clays. The age of these lacustrine sediments has been interpreted as Pleistocene and their extents has been mapped. X-ray diffraction analysis was performed on the clays to determine their composition and it was found that some of them contain glauconite.

The surfaces also give an important indication of climate in the area and how it has varied from a predominantly warm and wet climate during the formation of the silcretes to a much drier climate during the formation of the ironstone stained cobbled surfaces.

Faulting has also played an important part in what is a predominantly extensional area. Reactivation of ancient faults in the late Tertiary or early Quaternary has possibly served as a mechanism for the lake formation. The formation of numerous horsts and grabens in the southern region of the area has also promoted the formation of more armoured surfaces. Faulting in northern area allowed for the generation of a laterite which was subsequent overlain by sand dunes.

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