

**LATE QUATERNARY DEXTRAL SLIP RATE OF THE KEKERENGU FAULT:
NEW ZEALAND'S THIRD FASTEST ON-LAND FAULT**

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This investigation establishes a lateral slip rate for the Kekerengu Fault, and tests the hypothesis that the chief locus of plate boundary deformation in northern South Island steps northeastward from the eastern Hope Fault to follow the Jordan Thrust and Kekerengu Fault before extending offshore into Cook Strait.

Alluvial terraces in the Kekerengu area have been mapped as five distinct units based on soil profile development, number of loess deposits, degree of gravel weathering and clay plugging, and relative elevation. Ages of the younger two terraces – Winterholme (younger) and Kulnine (older) – are constrained by seven OSL and two ¹⁴C dates, and by the presence of disseminated Kawakawa tephra in loess that caps the Kulnine terrace. The Kekerengu Fault truncates a prominent riser between the Winterholme and Kulnine terraces. The distance between the riser and its source, Glencoe Stream, is ~600±50 m. We infer that the riser was cut during the peak of Kulnine degradation, prior to the onset of extensive Winterholme aggradation, during ~25-30 ka. Because subsequent Winterholme aggradation may have caused some further trimming of the riser, this measured distance provides a maximum estimate of lateral offset. These data imply a maximum dextral slip rate of ~18-26 mm/yr. The Kekerengu Fault also truncates, and dextrally displaces, a beheaded channel on a Kulnine surface by ~800±100 m. Our dating suggests abandonment of this Kulnine channel at ~25-34 ka, yielding a slip rate of ~20-36 mm/yr.

The above two dated offsets provide a combined dextral slip rate of ~20-26 mm/yr, making the Kekerengu Fault the third fastest on-land fault in New Zealand (behind the Alpine and Hope faults), and demonstrating that most slip on the Hope Fault is transferred northeastward via the Jordan Thrust onto the Kekerengu Fault.