



New evidence from the Tengawai-1 drillhole, South Canterbury, New Zealand, for Oligocene erosion and deposition associated with early development of the Antarctic Circumpolar Current.

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Oligocene limestone strata along the southeastern seaboard of New Zealand are punctuated by a mid-Oligocene hiatus (Marshall Paraconformity) superposed a relatively condensed greensand horizon. The hiatus is widely recognised throughout New Zealand and has been interpreted to represent a period of non-deposition variously associated with ocean currents and sea level fall coincident with mid-Oligocene intensification of the cryosphere.

The Tengawai-1 drillhole recovered a 273 m core across the Marshall Paraconformity only 40 km from the type section at Squires Farm in South Canterbury. At the Tengawai-1 site, the hiatus is underlain by fine sand which includes a mid-inner shelf, upper Bortonian-Kaiatan (> 36 Ma) fauna and overlain by a 15 m thick greensand containing a shelfal Duntroonian (25 – 27 Ma) fauna which gives way to a Waitakian (< 25 Ma) glauconitic limestone. Magnetostratigraphy from the core indicates that deposition of the greensand was relatively rapid as at least 6 m of this interval is correlated with Chron C7r (25.496-25.183).

The duration of the hiatus in the core, the absence of the underlying Holme Station (Amuri) Limestone, which is present at the nearby Squires Farm section, combined with the character of the surface in a 3 km seismic line across the drill site, suggest significant erosion associated with the Marshall Paraconformity. We infer that this resulted from intense inshore currents persisting for an extended period between 36 and 25 Ma. Post 25.2 Ma, several metres of reworked glaucony were deposited under a waning current. Resumption of deposition at the Tengawai-1 site corresponds to both the lowest $\delta^{18}\text{O}$ recorded for the mid Oligocene (Oi-2b) as well as suggested initiation of the Antarctic Circumpolar Current.