

SO226 – Polygonal faulting and mud mobilization in the Cenozoic sedimentary system of the Chatham Rise, New Zealand

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An integrated analysis of 2D seismic data acquired during the cruise SO226 and results from commercial and scientific boreholes reveals Cenozoic depositional environment in relation to changes in the oceanographic conditions and post-depositional sedimentary processes on the southern flank of the Chatham Rise (500 m – 1100 m water depths). The stratigraphy is represented by the post-rift Cenozoic sedimentary sequence comprising of a lower marine Cretaceous mudstone overlain by limestone bearing strata. The Marshall Paraconformity, a regional Oligocene erosional unconformity separates Oligocene and Miocene strata and is a consequence of erosion caused by the nascent Antarctic Circum Polar current flowing into the area caused by the opening of the Tasmanian gateway. We find evidences for widespread polygonal faulting which is confined to an Eocene-Oligocene limestone unit. The faulted unit is underlain by a unit showing transparent seismic facies with an irregular base and undulating top (Figure 1). We attribute the origin of this unit as a consequence of fluidization caused by overburden from sediment loading. In deeper water, a conical seismic feature with internal chaotic reflection is seen (Figure 2) within Cretaceous strata. The overlying strata show bending and faulting caused by extension as a result of uprising of mobilized sediments. We attribute the origin of the conical feature to mud mobilization, which was probably caused by charging of deep basinal fluid. The uprising is inferred to be multi-phased. On a previously acquired seismic line from the Bounty Trough located south of the study area we identified a strong positive polarity reflector cross-cutting biosiliceous ooze bearing limestone unit of Oligocene-Eocene as an Opal-A to Opal-CT transition boundary. A similar bright amplitude reflector is present on the southern flank of the Chatham Rise although it is mostly concordant to the strata and is offset by polygonal faults and testifies for diagenesis.

Figures

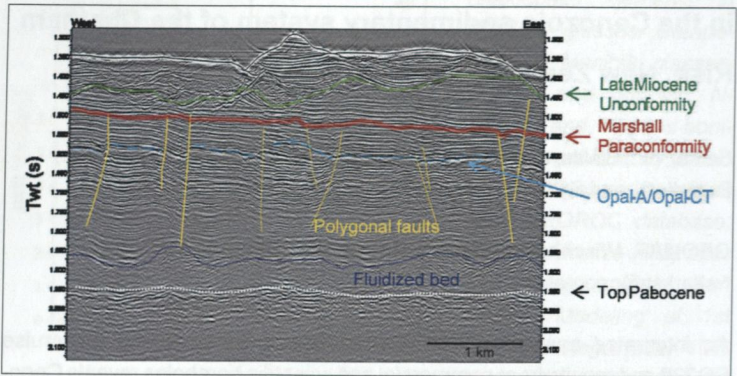


Figure 1: Polygonal faults are seen overlying a contorted and transparent seismic unit identified as fluidized strata. A prominent Late Miocene erosional unconformity is seen at 1.45 s twt.

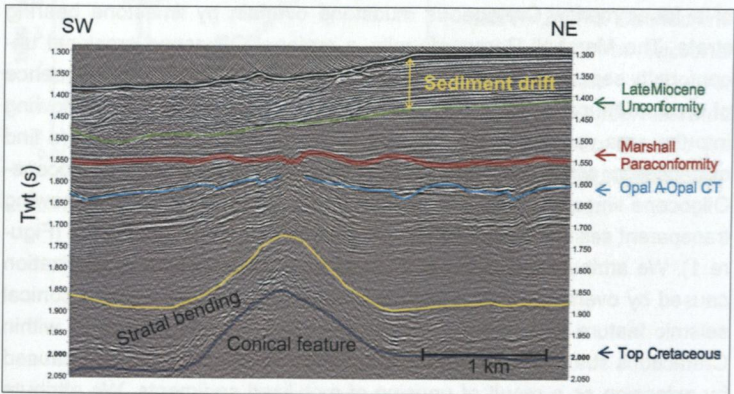


Figure 2: A conical feature in the Cretaceous strata and overlying stratal bending.