

# ALLUVIAL AND TURBIDITE FAN DEPOSITION IN A MID CRETACEOUS RIFT LAKE: PUYSEGUR GROUP, SOUTHWEST FIORDLAND

J K Lindqvist

Institute of Geological and Nuclear Sciences

## **Abstract**

Non-marine sediments of the mid Cretaceous Puysegur Group are an important reference horizon for exploration in the Balleny Basin, Solander Basin and other poorly known mid-Cretaceous grabens in the Great South and Canterbury Basins.

Facies and age relations indicate a dynamic tectonic and sedimentary setting involving syndepositional faulting, steep basin margins, deep-water lacustrine environments and extensive delta-slope transport of sandy-muddy sediment in river-generated density currents. A lacustrine environment is inferred from the complete absence of marine fossils or other marine indicators. Mudstones are generally dark grey in colour and contain abundant carbonaceous material.

Although alluvial fan and shallow lake margin deposits occur at the base and top of the exposed sequence, deep water sandstone and shale deposits, consisting of delta slope channel/levee and prodelta turbidite fan associations, dominate the over 1500 m thick succession.

Onshore mid-Cretaceous basins in Otago (e.g. Henley, Kyeburn and Horse Range Formations) and the West Coast (e.g. Hawks Crag Formation, Pororari Group) are best known for their alluvial fan deposits. However, such comparisons may only be locally relevant to the assessment of offshore prospects near basin margins. Inferred deep lacustrine mudstones and turbidites occur in Pororari Group, West Coast, as well as Puysegur Group. Analogous deep-lacustrine organic-rich deposits may present a worthwhile exploration target in areas such as Solander, Great South and Clipper Basins.

## **Author**

JON LINDQVIST is a research scientist with DSIR Geology and Geophysics, presently responsible for the south east South Island portion of the Cretaceous-Cenozoic Basins Project. He holds a M.Sc. in Geology from Otago University.